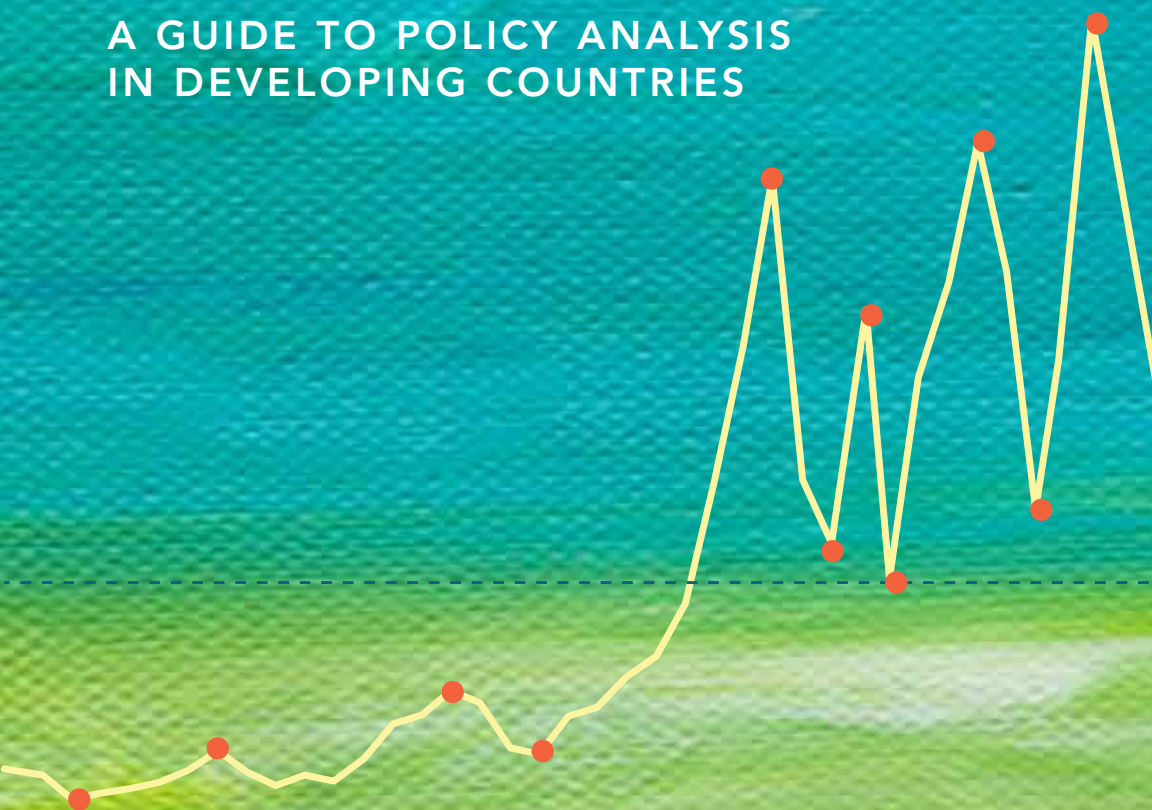


# MACROECONOMICS, AGRICULTURE, AND FOOD SECURITY

A GUIDE TO POLICY ANALYSIS  
IN DEVELOPING COUNTRIES



EUGENIO DÍAZ-BONILLA

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# **Macroeconomics, Agriculture, and Food Security**

A Guide to Policy Analysis in Developing Countries

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Eugenio Díaz-Bonilla

A Peer-Reviewed Publication

International Food Policy Research Institute  
Washington, DC

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DOI: <http://dx.doi.org/10.2499/9780896298590>

### Library of Congress Cataloging-in-Publication Data

Díaz-Bonilla, Eugenio, 1948– author.

Macroeconomics, agriculture & food security : a guide to policy analysis in developing countries / Eugenio Díaz-Bonilla. — 1st edition.

pages cm

Includes bibliographical references and index.

ISBN 978-0-89629-859-0 (alk. paper)

1. Agriculture—Economic aspects—Developing countries. 2.

Macroeconomics. 3. Food security—Developing countries. I. Title. II. Title: Macroeconomics, agriculture, and food security.

HD1417.D498 2015

338.1 '91724—dc23

2015000407

Cover design: Deirdre Launt/IFPRI

Project Manager: Patricia Fowlkes/IFPRI

Book Layout: Sherry Williams/MTM Publishing

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## **ABBREVIATIONS AND ACRONYMS**

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AILP	Agreement on Import Licensing Procedures
AMS	Aggregate Measurement of Support
AoA	Agreement on Agriculture
AREAER	Annual Report on Exchange Arrangements and Exchange Restrictions
ASCM	Agreement on Subsidies and Countervailing Measures
ASTI	Agricultural Science and Technology Indicators
AVE	ad valorem tariff equivalent
BAAC	Bank for Agriculture and Agricultural Cooperatives
BANRURAL	Banco Nacional de Crédito Rural
BAP	Banco Agrario del Peru
BOP	balance-of-payments account
BRI	Bank Rakyat Indonesia
Cb	currency held by depository banks at the Central Bank
CEMAC	Central Economic and Monetary African Community
CGD	Commission on Growth and Development
CGE	computable general equilibrium
CIF	Cost, Insurance, and Freight
CNCA	Caisse Nationale de Credit Agricole
COFOG	Classification of the Functions of Government
CONASUPO	Compañía Nacional de Subsistencias Populares
CPI	Consumer Price Index
CPIS	Coordinated Portfolio Investment Survey
CRDB	Centenary Rural Development Bank
CTAMS	Current Total Aggregate Measurement of Support

DC	Developing Countries
EAC	East African Community
EAP	East Asia and the Pacific
EAP	economically active population
ECA	Eastern Europe and Central Asia
ECLAC	Economic Commission for Latin America and the Caribbean
ECOWAS	Economic Community of West African States
EIP	economically inactive population
ERER	equilibrium real exchange rate
EU15	European Union 15
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	Statistical Database of FAO
FBTAMS	Final Bound Total Aggregate Measure of Support
FC	Foreign Capital
FDI	foreign direct investment
FERP	fixed external reference price
FIS	Financial Institutions Survey
FISIM	financial intermediation services indirectly measured
FOB	free on board
FSI	financial soundness indicators
FSR	financial stability reports
GATS	General Agreement on Trade in Services
GATT	General Agreement on Tariffs and Trade
GDI	gross domestic income
GDP	gross domestic product
GFSM	Government Finance Statistics Manual
GHG	greenhouse gas
GHI	Global Hunger Index
GIZ	German Agency for International Cooperation
GNDI	gross national disposable income
GNI	gross national income
GNP	gross national product
GSSE	General Services Support Estimates
GTZ	German Agency for Technical Cooperation
HLPE	High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security

HOS	Heckscher-Ohlin-Samuelson
IC	industrialized countries
ICTSD	International Center for Trade and Sustainable Development
IEA	International Energy Agency
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IFS	International Financial Statistics
IGCA	International Grain Clearing Arrangement
IIP	International Investment Position
IMF	International Monetary Fund
IPC	International Policy Council
IPCC	Intergovernmental Panel on Climate Change
IPR	intellectual property rights
ISI	import substitution industrialization
IT	inflation targeting
KAOPEN	index of openness of the current account
KCC	Kisan Credit Card
LAC	Latin America and the Caribbean
LDCs	least-developed countries
LIBOR	London Interbank Offered Rate
LIFDCs	low-income food deficit countries
LIRP	low-income or resource-poor producers
MAFAP	Monitoring African Food and Agricultural Policies
MENA	Middle East and North Africa
MENAP	Middle East North Africa and Pakistan
METR	marginal effective tax rate
MFN	most favored nation
MHFR	minimum household food requirements
MIT	Massachusetts Institute of Technology
MPS	market price support
NABARD	National Bank for Agriculture and Rural Development
NAFTA	North American Free Trade Agreement
NAIRU	non-accelerating inflation rate of unemployment
NANFA	net acquisition of nonfinancial assets
NDP	net domestic product
NEPAD	New Partnership for Africa's Development



NFA	net foreign assets
NFIDC	net food-importing developing countries
NGO	nongovernmental organization
NLB	net lending/borrowing
NOB	net operating balance
NPISH	nonprofit institutions serving households
NRA	Nominal Rate of Assistance
NRP	Nominal Rate of Protection
NTMs	nontariff measures
OECD	Organisation for Economic Co-operation and Development
ONRA	official net reserve assets
OPEC	Organization of the Petroleum Exporting Countries
OWINFS	Our World Is Not for Sale
PEPI	pegging to the export price index
PIADAL	Panel Independiente sobre la Agricultura para el Desarrollo de America Latina
PILDAT	Pakistan Institute of Legislative Development and Transparency
PPCs	primary producing countries
PPI	Producer Price Index
PPP	purchasing power parity
pps	percentage points
PSE	Producer Support Estimate
QE	quantitative easing
R&D	research and development
RBI	Reserve Bank of India
RCCs	Rural Credit Cooperatives
REER	real effective exchange rate
RER	real exchange rate
ROW	rest of the world
SA	South Asia
SACCO	Savings and Credit Cooperative Organization
SADC	Southern African Development Community
SAM	Social Accounting Matrix
SDRs	Special Drawing Rights
SDTs	special and differential treatments

SMEs	small and medium enterprises
SNA	System of National Accounts
SPEED	Statistics of Public Expenditure for Economic Development (database)
SPS	sanitary and phytosanitary
SSA	Africa south of the Sahara
SSM	special safeguard mechanism
ST	subsidies and transfers
STEs	state trading enterprises
SVEs	small and vulnerable economies
SWF	sovereign wealth fund
TBT	technical barriers to trade
TGL	trade gains or losses
TOT	terms of trade
TPDS	Targeted Public Distribution System
TRIMs	Trade-Related Investment Measures
TRIPS	Trade-Related Aspects of Intellectual Property Rights
TRQ	tariff-rate quota
UCP	unitary costs of production
UEMOA	West African Economic and Monetary Union (French abbreviation)
UNCDF	United Nations Capital Development Fund
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
UPOV	International Convention for the Protection of New Varieties of Plants
UR	unemployment rate
USDA	United States Department of Agriculture
VAR	vector auto-regression model
VAT	value-added tax
VCF	value chain finance
WAEMU	West African Economic and Monetary Union (usually known in its French abbreviation, UEMOA)
WB	World Bank
WDI	World Development Indicators
WEO	World Economic Outlook

WFP	World Food Program
WTO	World Trade Organization
YL	labor-related factor incomes

## FOREWORD

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The International Food Policy Research Institute's (IFPRI) forty-year history has generated innovative research on a variety of topics, including the intersection of macroeconomic factors and policies, and agriculture and food security. In the 1970s and 1980s several pioneering studies were conducted on the potential anti-agricultural bias of macroeconomic policies in developing countries, mainly focusing on trade and exchange rate policies. Since the 1990s IFPRI significantly extended the use of computable, economywide models for applied analysis of macro policies in several developing countries through the creation of software and a database at the national and global levels. The global economic crisis that started in 2007–2008 and the food price spikes of 2008 and 2011 reinforced the importance of macroeconomic policy factors when deciding on best practices for agriculture and food security.

IFPRI continues to work on the whole spectrum of policies from production to consumption, while also focusing on the macro and global issues that provide the general framework for other sectoral policies. An adequate policy environment for agriculture and food security must take into account these different aspects that work collectively to create a dynamic approach in developing countries.

Most literature on macroeconomics is technical and contains various approaches that are often controversial. For policymakers and practitioners in developing countries it is often difficult to navigate such diversity of theories and philosophical and practical debates. Eugenio Díaz-Bonilla's *Macroeconomics, Agriculture, and Food Security: A Guide to Policy Analysis in Developing Countries* fills that gap, providing an overview to the policy analysis related to monetary, financial, fiscal, exchange rate, and trade policies as they affect, and are affected, by agricultural and food security issues in developing countries. Díaz-Bonilla's approach is based on a simplified

macroeconomic consistency framework and the use of empirical cases to illustrate the policies, what potential problems arise from those policies, and where successes lie. A recurrent theme and observation of the book is that economic programs that ignore or violate that consistency framework tend to end in general crises that negatively affect the well-being and food security of developing countries.

Policymakers, practitioners, and researchers concerned with the intersection of macroeconomic policies, agriculture, and food security and how that intersection can achieve successful outcomes will find *Macroeconomics, Agriculture, and Food Security: A Guide to Policy Analysis in Developing Countries* useful. The framework and policy approaches Díaz-Bonilla discusses can aid decisionmakers when developing policy approaches to alleviate poverty and food.

Shenggen Fan

Director General, IFPRI

## ACKNOWLEDGMENTS

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I want to thank Sherman Robinson, with whom I worked on many of these topics over the years and whose positive influence is clear in this book; Maximo Torero, who encouraged and guided this project; David Orden, David Laborde, Antoine Bouët, Marcelle Thomas, and other colleagues in the Markets, Trade and Institutions Division (MTID); as well as the International Food Policy Research Institute (IFPRI) in general, whose work provided the policy substance to many sections of this book. I also want to thank Shenggen Fan for his support and advice at the beginning of this project. I am deeply indebted to Carl Christ, who impressed in my mind the importance of the proper accounting system for macroeconomic analysis, and to the late Bela Balassa, who contributed so much to development economics and always insisted on the need for high-quality, evidence-based policy analysis. The two anonymous referees and IFPRI's Publications Review Committee, chaired by Gershon Feder, were extremely helpful with their detailed comments, with the usual caveat that all remaining errors are mine. Sara Gustafson was incredibly efficient in helping me with the sequence of manuscripts, and we had the great help of Juvy Villaroman during the critical last weeks of putting together the book. Joy Fabela and Emelyn Go provided invaluable administrative support throughout the whole process. I would like to recognize, as well, the professional work of IFPRI's Publications Unit, especially Patricia Fowlkes and Andrea Pedolsky.

I am particularly indebted to my family—first and foremost my wife, Graciela, but also my children Carolina, Mariano, and Victoria and their families, who patiently waited while I was diverting many hours from family time to complete this project. I do not know what I would be without their love and support.

Eugenio Díaz-Bonilla



## INTRODUCTION

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**W**hy write a book on macroeconomic policies and their links to agriculture and food security in developing countries? The food price spikes of the years just prior to 2010 and the economic, political, and social dislocations they generated refocused the attention of policymakers and development practitioners on the agricultural sector and food security concerns. But even without those traumatic events, the importance of agriculture for developing countries—and for an adequate functioning of the world economy—cannot be denied. First, although declining over time, primary agriculture still represents important percentages of developing countries' overall domestic production, exports, and employment. If agro-industrial, transportation, commercial, and other related activities are also counted, then the economic and social importance of agriculture-based sectors increases significantly. Furthermore, large numbers of the world's poor still live in rural areas and work in agriculture. Through the links via production, trade, employment, and prices, agricultural production is also crucial for national food security. Second, it has been shown that agriculture in developing countries has important growth and employment multipliers for the rest of the economy, and agriculture seems to have larger positive effects in reducing poverty than growth in other sectors. Third, agriculture is not only important for individual developing countries, but it has global significance, considering the large presence of developing countries in world agricultural production and the increasing participation in international trade of those products (these three points will be covered in greater detail in Chapter 1).

Why the focus on macroeconomics? Certainly, an adequate policy environment for agriculture in developing countries includes more than just macroeconomic policies. However, the latter provide the general framework for the sectoral policies, and appropriate macroeconomic conditions are crucial for



the operation of the agricultural sector. At the same time, developments in the agricultural sector have repercussions in the whole economy, particularly in developing countries. Chapters 1 and 2 aim to place macroeconomic policies in the context of the overall policy program for agricultural production and food security.

Why present a separate discussion of macroeconomic issues in developing countries? An obvious observation is that developing countries are different from industrialized countries. This fact has been invoked, since the early debates about development strategies, as an argument for the need of specific policies for those countries, both for long-term growth and for the management of shorter-term macroeconomic policies.<sup>1</sup> The argument has been that, although in abstract, general economic principles apply to both developing and industrialized countries, the specific structural characteristics of the former where those principles operate are sufficiently different as to merit adjustments in policy design and implementation.<sup>2</sup>

Another obvious fact is that the category “developing countries” is very heterogeneous as well. The World Bank (WB), for instance, classifies those countries into low income, lower middle income, middle income, and upper middle income (nondeveloping countries are called “high income”). The International Monetary Fund (IMF) utilizes economic indicators to divide the world into Advanced Economies, Emerging Markets, and Developing Economies (the last two would be roughly similar to the traditional notion of “developing countries” used in this book). With metrics that combined economic and social aspects, the United Nations Development Programme (UNDP) classifies countries into Low, Medium, High, and Very High Human Development (with “developing countries” basically appearing in the first three groups). This book uses in general the notion of “developing countries,” which includes the category of “emerging markets,” while at the same time emphasizing the differences within that heterogeneous group.

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- 1 For instance, Prebisch (1950) noted that while growth cycles in industrialized countries were mainly related to movements in domestic aggregate demand, in developing countries, economic oscillations were linked to exports. From that observation, he derived policy recommendations for macroeconomic management in developing countries that were different from those applied to industrialized ones.
  - 2 Different books have been devoted to the specific characteristics of developing countries in the design and implementation of macroeconomic policies in general (see Taylor 1979, 1984; Agenor and Montiel 2008). At the time this book was being completed, a very thorough and technical new book on macroeconomics and developing countries was published (Végh 2013).

What, then, is the purpose of this book? There is a vast literature on macroeconomics and agriculture, with a variety of views and approaches.<sup>3</sup> Most of that work is quite technical and may not be easily accessible to policymakers and agricultural development practitioners in developing countries. This book aims to fill that gap.

In order to do that, there are at least two general issues that should be addressed. The first one relates to the definition of the audience and its needs: What do policymakers, policy analysts, and practitioners working on agricultural issues in developing countries need to know about macroeconomics to do their job? That is the question addressed in Chapter 5 of the classic book by Timmer, Falcon, and Pearson (1983) as part of a more general review of food policies. In the same vein, this book can be seen as an attempt to answer that question three decades later, considering the new context and offering an extended overview of the issues involved.

However, a separate but related perspective seems also relevant: what macroeconomic policymakers and analysts in developing countries need to know about the effects of agricultural policies and performance on macroeconomic developments. In general, because of the important interactions between the agricultural sector and the macroeconomy in many developing countries, it seems that this angle merits consideration as well. Therefore, this book, although oriented mainly toward the first group, aims to take into consideration the perspective of the other audience as well.

The second issue that needs to be addressed is the approach utilized to present the macroeconomic variables and policies and their links to agriculture. Ideally, one should start with a properly specified economywide model, including not only the productive side of the economy adequately disaggregated (and with the main components of the agricultural sector properly identified), but also the relevant monetary, financial, banking, fiscal, exchange rate, trade, and labor variables. However, such an approach would confront several problems. First, the combination of economywide multisectoral models with macroeconomic models has proven to be difficult (see for instance, Robinson and Lofgren 2005). One difficulty is that multisectoral models are usually

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3 For instance, in Gardner and Rauser (2002), there is a whole section devoted to economywide policies and agriculture, including in particular Chapter 29: "Agriculture and the Macroeconomy, with Emphasis on Developing Countries," by Maurice Schiff and Alberto Valdes; Chapter 30: "Agriculture and the Macroeconomy," by Pier Giorgio Ardeni and John Freebairne; and Chapter 34: "Agriculture in the Macroeconomy: Theory and Measurement," by Alex McCalla and Phil Abbot.

defined in real terms,<sup>4</sup> using mostly relative prices,<sup>5</sup> while macroeconomic models consider nominal variables and would include prices in levels. Moreover, there are multiple and unresolved debates about behavioral, technological, market-clearing, and macro-balancing assumptions and linkages. Developing a single model by imposing a specific set of assumptions would be open to criticism from those holding different views, and trying to solve those debates is beyond the scope of this book and the ability of its author.<sup>6</sup> Even if economists agreed on a specific model, the complexity and technical nature of using such a model for the exposition of policies and impacts would defeat the purpose of the book, which is to be accessible and useful to practitioners in developing countries.

Therefore, a simplified approach is utilized here, based on a consistency framework presented with a reduced number of equations and avoiding complex graphics and mathematics. Basically, the book utilizes simple macroeconomic accounting identities to highlight the structure of the economy, the meaning of the macroeconomic variables, possible interactions across those variables, and the links of macroeconomic policies to the broader economy and the agricultural sector. It has been said that macroeconomics is a collection of accounting equations plus opinions about the functioning of markets, agents, and policies. While opinions vary, the macroeconomic identities utilized here must follow the discipline of double-entry accounting, which cannot be ignored. That accounting discipline is the core of the consistency approach utilized here.<sup>7</sup>

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4 Usually economists use the word “real” to refer to variables that have been adjusted by some measure of inflation, as opposed to “nominal” variables that have not been so adjusted (see further discussion in Chapter 4).

5 “Relative” price means that the price of some item is measured in reference to some other item. For instance, the price of wheat divided by the price of corn or by the price of fertilizers would be the price of wheat relative to corn or fertilizers. The price of wheat alone, not adjusted by inflation, may be called the “absolute” or “nominal” price for that product. Still, it should be noted that such a nominal price is related to some specific dimension, for instance a metric ton. It is always important to identify clearly the units and dimensionality of prices and economic variables in general.

6 Dornbusch (1980, 7), in his classic text on open economy macroeconomics, notes that he decided not to present a single model that, in his words, would “put everything together” because that “alternative is too cumbersome, and is a matter . . . for empirical estimation and simulation in large-scale models.”

7 Similar consistency approaches, but not necessarily focused on agriculture, have been employed, among others by Easterly (1989) in an applied context and by Taylor (2004) in a more theoretical framework. Taylor’s book utilizes not only the income or flow equations used in this book but also the balance sheet (or stock) equations of economic agents. As discussed later in this book, national accounts in developing countries are only starting to build balance sheets for the different agents. Therefore, acknowledging that a complete consistency framework needs flow and stock equations (as the usual income and balance sheet accounting statements for any individual firm), the book focuses mostly on the income equations. A more precise discussion of flows and stocks in macroeconomic analysis is found later in the book.

Such balancing is an accounting matter and does not say anything about whether the economy is in equilibrium, however defined. Similarly, the fact that the macroeconomic identities are satisfied does not mean that the economy is at an optimal point, whatever notion of optimality may be utilized. But economic programs or analyses that are based on projections or numerical assumptions of variables that do not add up to those basic macroeconomic identities will, by definition, not happen as envisaged: the values of the different and inconsistent variables will, because of double-entry accounting, adjust to fulfill those equations.

Notwithstanding that basic fact, there are theoretical and empirical macroeconomic models whose results are dubious because they ignore (or violate) the accounting identities and the relations across variables enforced by double-entry accounting (see Christ 1991, who warns about those accounting pitfalls in model building). Even more unfortunate, because of the effect on real people, is the fact that there are multiple examples of economic programs that did not add up (in the sense discussed in this book) and, therefore, ended in economic crises.

Within the consistency framework utilized here, there is ample room for different opinions regarding how the macroeconomic accounting identities balance within the period of analysis (which may go from one quarter or one year to several years) and what are the changes in production, employment, trade, and the like that bring those macroeconomic accounts into balance. A crucial part of the macroeconomic analysis is to figure out what are the relevant economic processes, actors, and variables that, in the specific historical and institutional context analyzed, lead to the necessary macro balancing, recalling again that the latter cannot be confused with any notion of equilibrium or optimality. As noted, opinions about those processes, actors, and variables differ. The most that can be done in a publication such as this one is to present a variety of those opinions, with references throughout the book to various empirical studies to showcase different approaches and results.

Although this is not a complete macroeconomic book—nor does it cover all of the different policies that affect the agricultural sector—it is hoped that it presents enough relevant material regarding the intersection of macroeconomic policies and agriculture to be useful to developing-country practitioners and enough background to be useful to those interested in pursuing the topic in more depth.

The book is organized in three main parts, with several chapters within each. Part 1 sets the stage for the rest of the book. Chapter 1 discusses why

it is important to consider agricultural and food security issues in developing countries and defines a general framework of objectives and policies related to those topics, placing macroeconomic policies in that context. Chapter 2 presents some basic definitions of macroeconomic policies and topics, delineating what is and is not covered in subsequent chapters. It also sketches the overall links between macroeconomic policies and agriculture and the rural sector on one hand and food security on the other. These links go beyond important but limited topics such as agriculture's terms of trade compared to other sectors (a relative price effect) and include such subjects as income effects and impacts on costs and distribution. That chapter also makes the point that macroeconomic policies need to be analyzed in a broader context that considers domestic structural issues and the evolution of the global macroeconomic environment. These two aspects are covered in Chapter 3: first it discusses the heterogeneity of developing countries' structural conditions; then it analyzes economic trends (such as the increased level of economic integration, sometimes called globalization) and cycles in the global economy and their links to agriculture. Macroeconomic and sectoral policymaking in developing countries requires an acute awareness of what is happening in the global economy. The approach this book takes to highlight this need is to tell the global story and to show the effects of world development on developing countries and agriculture; then, it is hoped, policy analysts can use those past stories to think about the current and potential scenarios where the policies they are analyzing will play out. Because the text includes references to global developments taking place up to the time this book was completed, some of those current analyses will most likely have to be reconsidered as time passes. The alternative approach would have been to write a book only with past events whose historical consequences have already played out. However, this option would have limited the expected benefit of this book to aid policymakers and analysts in developing countries to analyze macroeconomic policies in the context of current and future scenarios for agriculture and food security.

Part 2 focuses in greater detail on macroeconomic data, definitions, overall balances, and adjustment processes. Chapter 4 examines macroeconomic data organized in the four main systems of accounts (national income and product accounts, balance of payments, monetary accounts, and public-sector accounts) and looks at flow/stock and price/quantity variables. Chapter 5 integrates the accounts within a simplified macroeconomic framework, starting with a Social Accounting Matrix (SAM), which constitutes the accounting skeleton of a

macroeconomic model in flows. The chapter notes that there are four blocks of adjustments: in the macro balances discussed (block 1), in the structure of production and consumption (block 2), in factor markets (block 3), and in asset markets (block 4). Chapter 6 uses the main macroeconomic accounts to discuss overall adjustment issues in block 1, related to investment and savings, external accounts, monetary accounts, and fiscal accounts. Then Chapter 7 considers the other three blocks, analyzing further changes in production and utilization of goods and services (block 2), factor markets (block 3), and assets (block 4). This closes Part 2, which serves as the overall background for the analysis of specific macroeconomic policies in the following chapters.

Part 3 includes chapters with a more detailed discussion of macroeconomic policies. Specific aspects of each policy that relate to the agricultural sector and food security are highlighted. This final part is divided into four chapters on fiscal policies (Chapter 8), monetary and financial policies (Chapter 9), exchange rate policies (Chapter 10), and trade policies (Chapter 11). Chapter 12 concludes by summarizing the main policy messages from the book. It also sketches some future scenarios for the global economy in the medium term.

My aim is to provide something of relevance and interest to a diverse readership. Some readers may want to gain a sense of the relevant data, accounting relationships, and macroeconomic consistency issues; others may be interested in the evolution of the global macroeconomy and its links to agriculture in developing countries; still others may focus on some type of macroeconomic policy (say, fiscal or exchange rate policy) and the specific impacts on agricultural production or food security.

Because of the humble realization that in the policy debates covered in the next chapters there are many unknowns (and unknown unknowns), I have subtitled this book “A Guide to Policy Analysis in Developing Countries.” It aims to present different views, and although I do have my opinions, I treat them as provisory, until some better data or analysis confirms or rejects them. For those interested in further analyzing the issues covered in this book, the references cited are all included and may be consulted for additional information. That bibliography, however, cannot possibly include all the works on the vast topics covered in this book, and some readers may consider that important references have been left out and may quarrel with others included as well.

The analyses and discussions in this book should help decisionmakers in developing countries form independent opinions and make practical policies related to the intersection of macroeconomics, agriculture, and food security.



## **PART 1**

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# **The Policy Setting**





## **AGRICULTURE, GROWTH, POVERTY, AND FOOD SECURITY**

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**T**he introduction argues that the agricultural sector is important for growth, poverty alleviation, and food security in developing countries. It also notes that macroeconomics is an important component of the overall policy environment needed to ensure an adequate operation of the sector. This chapter discusses in greater detail why the focus on agriculture, what would be the general policy framework for the sector, and how macroeconomics may fit within that framework.

### **The Importance of Agriculture in Developing Countries**

#### **A General View**

Although declining over time, primary agricultural activities still represent on average about 11 percent of total value-added in developing countries, and primary and processed food products accounted for more than 10 percent of their merchandise trade in the years immediately following 2010. For low-income countries, these percentages are far higher (see Chapter 3). If agro-industrial activities are included, the share in GDP and exports more than double on average (UNIDO 2013). Additionally, counting related activities such as provision of productive inputs and services, transportation, storage, commercialization, and the like, the share of the economic activities related to agriculture expands considerably.

Not only is agriculture important for individual developing countries, but its performance in them has global significance as well. From 2010 to 2014, these countries represented about 75 percent of total world agricultural production, as measured in constant international dollars by the Food and Agriculture Organization's Statistics Division (FAOSTAT) database (FAO 2014). Developing countries have also increased their presence in the group of net agricultural exporters at the world level. During the 1990s, only one developing country was in the top five net agricultural exporters by value; currently, three out of the top five and five of the top ten net agricultural exporters are developing countries (see Chapter 3 and Díaz-Bonilla 2014).

Moreover, about three-quarters of the poor live in rural areas and depend on agriculture-related activities for their employment and incomes (World Bank 2007c).

### **Agriculture and Development Strategies**

Agriculture-led growth strategies appear to have larger dynamic multipliers for the rest of the economy than other alternatives in poor developing countries because of different backward and forward linkages. First, the agricultural sector produces food, feed, and fiber products for processing, exports, and end consumers. Second, the sector demands inputs and services from other sectors of the economy. Third, through employment and income effects, agricultural activities generate an expanded market for manufactures and services in general. Several studies have focused on agricultural growth multipliers for the rest of the economy (that is, how much overall GDP was generated by expanding agricultural GDP) and usually found positive and large multipliers, showing the importance of agricultural development for the economic dynamism of the rest of the economy (Haggblade and Hazell 1989; Delgado et al. 1998; Haggblade, Hazell, and Dorosh 2007).

In addition to these forward and backward linkages, there are cumulative dynamic effects over time, through investments and technology adoption. In fact, in the success stories of the newly industrialized countries of East Asia, a common characteristic is that they invested strongly—and very early—in rural and agricultural development (McCalla 2000).<sup>1</sup>

Econometric estimates (such as those by Christiaensen, Demery, and Kuhl 2010) tend to support the existence of important positive linkages from agriculture to the rest of the economy, although with some qualifications in the case of countries with a significant presence of extractive industries (a characteristic that tends to diminish the positive linkages of agricultural growth).

### **Agriculture and Poverty Reduction**

The emphasis of the 1970s on agricultural and rural development to reduce poverty in developing countries (Chenery et al. 1974) was then replaced by more emphasis on macroeconomic and sectoral policies in the 1980s. However, in the 1990s concerns about slow or no progress in poverty reduction in many

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1 It should be noted, however, that an agricultural-based strategy for developing countries is not without doubters: some consider that the sector cannot generate the dynamic effects postulated (see Haggblade and Hazell 2010, Chapter 1, for a review of the debate related to Africa; and Christiaensen, Demery, and Kuhl 2010 for a consideration of the issue in developing countries in general).

developing countries led to an emphasis on pro-poor growth, as something different from growth alone calculated using the average of per capita income (World Bank 1990). The most common notion was that growth was pro-poor if the poor benefited the same as, or more than, the nonpoor population.

An empirical finding was that, while overall economic growth remained a central factor for poverty reduction, the sectoral composition of growth mattered as well: in fact, several studies showed that agricultural growth not only is pro-poor in reducing poverty or increasing more the income of the lower quintiles of the income distribution, but it also seems to have larger effects on poverty reduction than growth in other sectors (see, for instance, Lipton and Ravallion 1995; Eastwood and Lipton 2000; and Christiaensen, Demery, and Kuhl 2010).<sup>2</sup>

Growth in agricultural activities appears to help reduce poverty through different channels, which are also relevant for food security: (1) increases producers' income; (2) generates more employment opportunities in rural areas; (3) helps to stabilize food supply and prices for net buyers; and (4) produces general multiplier effects on the rest of the economy from agricultural growth and demand.

The exceptions to these results appeared in developing countries with large inequalities in landholdings where agricultural growth appeared uncorrelated with poverty reduction (Eastwood and Lipton 2000). Also, the correlation weakens with increases in a country's income (that is, in richer countries, agricultural growth does not have stronger effects on poverty reduction when compared with other sectors).

### **Agriculture and Food Security**

Regarding food security, since the World Food Conference of 1974 the focus has been moving from the initial concerns about food availability at the global and national levels to those aspects that affect food access and utilization at the household and individual levels, where problems of food security emerge in a more concrete way. The importance of poverty and lack of income opportunities in food insecurity was highlighted early (Sen 1981).<sup>3</sup> Other issues were

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2 Schultz (1979) in his Nobel Prize acceptance speech argued that "Most of the people in the world are poor, so if we knew the economics of being poor, we would know much of the economics that really matters. Most of the world's poor people earn their living from agriculture, so if we knew the economics of agriculture, we would know much of the economics of being poor."

3 Although Amartya Sen did much to clarify the link of food insecurity and poverty, the importance of reducing the latter as a determining factor to improving food security had been clearly stated several decades before in the declaration of the United Nations Conference on Food and Agriculture that took place in Hot Springs, Virginia, May 18–June 3, 1943 and that led to the creation of the FAO in 1945. The declaration noted that "the first cause of malnutrition and hunger is poverty" (see the references in Shaw 2007).

further recognized, such as the negative impact of volatility on food availability and use and the obvious fact that food intakes should provide for more than mere survival, also supporting an active and healthy life. Pulling these ideas together, the World Food Summit in 1996 made the following declaration: “Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO 1996).

Usually, that definition of food security is considered to include four main components: availability (which depends on domestic supply and trade of food); access (which is influenced by income, employment, and poverty patterns related to economic growth and development); utilization (which depends on the nutritious quality of food but also on other factors such as health services, water and sanitation infrastructure, education, empowerment of women, and good governance); and stability (that is to say, that people should have physical and economic access to adequate food at all times).

Agricultural growth and, in particular, increased food production contribute to all four of these components, because they are similar to the channels through which food security helps with poverty alleviation. Food production directly ensures availability (first component). Agricultural and food production growth generate broad employment and income opportunities that are crucial for food access (second component). To the extent that poverty is the main cause of food insecurity, then agricultural growth, which as argued before has particularly positive effects on poverty alleviation, contributes to reduce food insecurity through this channel as well. Agricultural growth, with its multiplier effects in the rest of the economy, also contributes to government revenues, which may be used to improve basic health services, water and sanitation systems, and safety nets for the poor and vulnerable. These expenditures and investments in turn help both access and the proper utilization of food (second and third components). Also, public goods and investments that enable food production, combined with an appropriate role for trade policies, help ensure stability of production and prices for food consumption (fourth component).

### **Production Structures**

The extent to which agricultural production is able to spread income-generation opportunities across large numbers of people changes with the prevalent production structures and the commodities produced. Ensuring that agricultural growth remains pro-poor is related to the debate in developing countries between pursuing growth and production, usually concentrating support

on larger, modern agricultural units or emphasizing poverty reduction and food security with a focus on small farmers, landless rural workers, and other vulnerable groups. The social and environmental sustainability of a strategy based on large commercial farms, versus a strategy focused on small-scale agriculture, has also been amply debated (Box 1.1).<sup>4</sup> Competitive and socially inclusive agricultural sectors need an adequate combination of farm types, with differentiated policies that efficiently and equitably support a variety of productive structures.

### **BOX 1.1 The relevance of the agrarian structure**

The evolution of the agrarian structure is related to the relative advantages of commercial/large versus family/small farms. The former may have advantages of scale, such as in the case of some plantation crops, or benefit from better access to credit and markets. But in general, worldwide agricultural production still shows a significant presence of family and small farms. The latter appear to have the incentives better aligned to adjust to local variations of quality of natural resources, climate, and marketing conditions, due to the use of family labor. Protection of environment and reduction of poverty would also be more associated with family farms (Deininger and Byerlee 2011).

Recent developments, however, may have affected those comparative advantages. Deininger and Byerlee (2011, 3) characterize those new factors as follows: “(i) new technology that makes it easier to standardize and/or monitor farm operations; (ii) increased consumer demand for social and environmental standards and certification even for traditional low value commodities; and (iii) a desire to expand cultivation into previously uncultivated areas where, in the absence of immigration, labor is scarce.” These developments may increase the advantages of large farms and of vertical integration in the value chain. The presence of large farm operators in Latin America and Africa south of the Sahara (SSA) is rekindling anew the debate about comparative advantages of different agrarian structures.

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<sup>4</sup> The debate between commercial and family farms has many facets, including the possibility of complex two-way influences, such as whether more equal societies have higher and more stable rates of growth than their more unequal counterparts (Alessina and Perotti 1996; Deininger and Squire 1997). Others have noted the positive impacts of an agrarian structure based on family farms on the emergence of democratic governance (Moore 1967) and on the formation of larger domestic markets that allow the development of industry and other activities.

**BOX 1.1** (continued)

Some of the trends, however, do not have to bias the structure in favor of large farms. For instance, different technological innovations, such as information technology, are not necessarily scale biased and can be utilized by small farmers to coordinate their efforts. It may also happen that the comparative advantage of large farms comes from policy biases that favor them, such as lack of access by family producers to finance and public goods, including agricultural R&D and infrastructure. Eliminating those policy biases and solving the deficient governance of land markets (for example, small farmers and native communities do not have their rights and land titles registered and protected, and state land is not clearly demarcated and allocated) would be crucial to maintaining a level playing field for small and family farms. The future scenarios will depend, then, not only on the inherent competitive advantages of family/small farms based on family labor and local knowledge, but crucially as well on public policy that monitors concentration of land and protects from instances of “land grabbing,” while defining and implementing adequate public programs in support of small farmers and family farms (Deininger and Byerlee 2011).

Besides the agrarian structure, the composition of production may influence poverty and food security. Some agricultural products, such as cereals, can affect not only incomes and employment but also consumption for the poor, whereas others, such as coffee or sugar, would mainly affect incomes and employment in agriculture but have a clearly smaller incidence in the consumption basket.<sup>5</sup> Therefore, the net effect on poverty and food security can vary.

More generally, it should also be noted that the composition of external and domestic demand may vary by product and generate different growth paths (Díaz-Bonilla, Orden, and Kwiecinski 2014). For instance, Diao, Dorosh, and Rahman (2007) show that in eastern and southern Africa an export-led agricultural growth strategy may not generate substantial overall income growth, while increasing productivity and production of staple foods support higher growth in agriculture provided that there is rapid growth in the nonfarm economy (which creates demand) and that marketing costs are reduced (which allows African producers to supply that demand). This pattern, however, remains an empirical matter that may differ across regions and products.

5 It has also been argued that the positive social impact of growth based on ores and metals or energy products seems to be lower than for other commodities (Sachs and Warner 1995; Tsangarides, Ghura, and Leite 2000).

Those variations in agrarian structure, production, and trade require a consideration of the differences across developing countries regarding the scope and components of an agricultural-based strategy and of the different situations of food (in)security. This heterogeneity is further discussed in Chapter 3.

### **Evolution of Policy Approaches**

While industrialized countries have in general implemented policies to support and protect agriculture, particularly food products, developing countries after World War II followed policies that saw the role of agriculture as subordinated to the needs of the urban population and industrialization. The classic work of Johnston and Mellor (1961) considered four different ways in which agriculture helped industrial developments: transferring labor to industry; providing food (or “wage goods”) and agricultural raw materials; generating savings from rural households that could be used to finance investments in industry; and providing foreign currency through exports to import the machinery and intermediate inputs needed by the industrial sector.

Those who argued that agriculture had a supporting role in development also postulated different political and social externalities of industrialization. Those externalities include economic independence and political sovereignty, social modernization, greater entrepreneurial spirit, and a more pluralistic and participatory political and social life linked to urbanization. A detailed presentation of these arguments can be found in Kerr et al. (1964).

Economic arguments in favor of industrialization included the idea of declining terms of trade of countries exporting agricultural products (or primary products in general) compared to countries exporting industrial goods (Prebisch 1950, 1968; Singer 1950).<sup>6</sup> What has been called high development theory (Krugman 1994) considered that industrialization included important economic externalities: the interaction of economies of scale, pecuniary external economies, technological spillovers, backward and forward linkages, and strategic complementarities. The combination of these elements suggested the existence of multiple equilibriums and the need for coordination, usually requiring some sort of government intervention, to move from lower to higher levels of economic activity (Chenery, Robinson, and Syrquin 1986).

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6 Singer’s arguments were based on the characteristics of agricultural goods (such as supply and demand elasticities); Prebisch contrasted market structures in developed countries (characterized by industrial oligopolies and strong unions) with those of developing countries (characterized by smaller farms and surplus labor) and argued that the former could retain the benefits of technical progress, while the latter surrendered gains from productivity through falling prices of their primary exports (hence the decline in the terms of trade).



Another issue was macroeconomic stability: policymakers considered that industrialization was going to make the economy less vulnerable to external shocks, thus avoiding macroeconomic crises. It was assumed that, as the industrial sector expanded, dependence on revenue from primary products would gradually be reduced, which was supposed to diminish the vulnerability of those countries to external shocks and to protect them against the losses in the terms of trade (ECLAC 1969).

In summary, according to these arguments the positive impact of industrialization appeared substantial, while agriculture played only a subordinated role. Some of these ideas were embedded in what was called import substitution industrialization (ISI), an approach that has been attempted by a variety of developing countries since the 1950s.

By the mid-1960s and early 1970s, several concerns began to be voiced about the adequacy of a development strategy that appeared to discriminate against the agricultural sector, maintaining low agricultural prices to help urban populations and further the process of industrialization. Schultz (1964), in an influential book, argued that farmers in developing countries were “poor but efficient,” reacting with economic rationality to changes in prices and incentives. If agricultural resources were efficiently utilized, no gains could be made by transferring labor and savings to other sectors. A better strategy would be to support the agricultural sector through investments in technology and physical and human capital formation in rural areas. The Green Revolution of the 1970s was based on the idea that there is a technological solution to the rural problem that emphasizes better productivity.

Other studies in the 1970s critically evaluated the development strategies and trade regimes based on ISI in a number of developing countries (Little, Scitovsky, and Scott 1970; Balassa 1971; Krueger 1978). They pointed to the supply-side constraints generated under the ISI policies by the resulting macro structure reflected in two relative prices: the tradables/nontradables price (essentially, the real exchange rate) and the relative price of industrial products to agricultural products (reflecting tariffs and other market interventions). According to these studies, the policies adopted had a triply damaging effect: (1) they made the economy operate below its potential productive capabilities (sometimes called the “production possibility frontier”); (2) they led to a composition of total production that did not allow the country to benefit from international trade; and (3) they slowed the outward growth of the production possibility frontier (or productive potential) of the country.

Other criticisms about the ISI challenged its assumptions about how inelastic international demand and deteriorating terms of trade began (for an

overview of those debates at that time, see Balassa 1989). It was also argued that poverty alleviation in developing countries was impaired by policies that protected capital-intensive industrialization and discriminated against agriculture, negatively affecting employment and income distribution. The obvious realization that the poor in developing countries were concentrated mainly in rural areas led to the conclusion that if poverty alleviation was to be an important objective of economic policy, then greater attention should be given to agricultural and rural development. Chenery et al. (1974) presented the case for an investment program centered on the poor, especially in rural areas. Another influential book (Lipton 1977) criticized the “urban bias” in development policies and investments, arguing that it had led to a less pro-poor growth than a more balanced approach might have generated.

This overall critique was followed by sector-specific studies (mostly covering the period from the 1960s to the mid-1980s) that analyzed the direct and indirect effects of trade, exchange rate, and other macroeconomic policies on price incentives for agriculture. Those studies showed that agricultural importable goods were generally protected by trade policies, while exportable ones were taxed. However, once the indirect effects of overvalued exchange rates and industrial protection were considered, they estimated a negative price bias against agriculture as a whole that affected incentives and the performance of the sector. In particular, the combination of overvalued exchange rates, protection of domestic industry, and taxation of agricultural exports was criticized for severely hindering agricultural growth: those policies represented a “policy bias against agriculture” (Krueger, Schiff, and Valdés 1988), amounting in some cases to “plundering” the sector (Schiff and Valdés 1992a, 1992b).

The policy recommendation was to eliminate inefficient industrial protection, to avoid the overvaluation of the exchange rate, and to phase out export taxes on agriculture. At the same time, it was considered necessary to substantially revamp and scale down government’s involvement in agricultural markets: the maze of inefficient and many times contradictory sectoral interventions that supported and subsidized agriculture should be eliminated, given that overall incentives would shift in favor of agriculture with the change in the general macroeconomic and trade framework (World Bank 1986). The elimination of a general price and macroeconomic bias against agriculture became one of the goals of policy reform strategies, including structural adjustment programs, supported by the World Bank and other international institutions, and many countries undertook such reforms in the 1990s. Also, the experience of mostly Asian developing countries that both supported agriculture and followed an export-led strategy of industrialization

provided a counterexample to the ISI strategy with a subordinated agriculture. An effect of the policy reforms in the 1980s and 1990s appears to have been the reduction or even the elimination of the past bias in incentives against agriculture.

At the same time, it must be noted that the urban bias in the allocation of investments and public services, as suggested in the classic book by Lipton (1977), may still be present in many developing countries. Lipton argued that the poor remain poor in developing countries because public expenditures and economic policy in general (not only relative prices) benefit urban groups who are better positioned to pressure governments to defend their interests. In fact, dealing only with the issue of prices and incentives leaves other crucial policy channels outside of the analysis (as discussed elsewhere in this book).

Another point to be noted is that, contrary to the conventional assessment in the 1970s and 1980s, agriculture (considering both primary and processed products) seems, on average, more protected than industry in many developing countries (Díaz-Bonilla and Robinson 2010). Moreover, different estimates of current support for the agricultural sector that include both trade protection and government payments have been increasing in developing countries (Bureau and Jean 2013; Díaz-Bonilla 2014). These issues will be discussed in greater detail in Chapters 3, 8, and 11.

## **A Policy Framework**

### **Reasons for Government Intervention**

Public policy interventions may result from different considerations. In some cases, the reasons may be related to political economy issues, rent seeking, vested interests, and outright waste and corruption. On the other hand, proper justifications for public policy usually fall under two broad categories of efficiency and equity: the presence of some type of market failure that generates inefficiencies that need to be corrected through public-sector actions (such as public production, subsidization, or regulation) or distributional and equity concerns, linked to undesirable levels of inequality or poverty that must be rectified. Economists tend to judge efficiency issues by the rule that a situation is optimal if no one can be made better off without making someone else worse off (what has been called a Pareto optimum, in recognition of the Italian economist Vilfredo Pareto [1848–1923], who articulated the idea). However, there may be as many Pareto optimums as distribution of resources across the members of a society; therefore, issues of poverty and distribution of incomes and wealth must be judged by other criteria related to some notion of

fairness and equal opportunity. Box 1.2 (based directly on Mogues et al. 2012) discusses in greater detail some of those efficiency and equity justifications as applied to the agricultural sector. It must always be remembered that in addition to market failures, there may be government failures as well, linked to difficulties to aggregate social preferences in appropriate ways, to ensure that public officials really work for the public good, and to a variety of bureaucratic, organizational, and implementation issues (see, for instance, Weimer and Vining 2011).

### **BOX 1.2 Justification of public policies**

#### **Market failures**

Market failure refers to the notion that under certain circumstances, markets can allocate resources in an inefficient manner, and therefore their free operation may prevent the attainment of socially optimal outcomes. Market failures can be divided into the following categories:

**1. Public goods** Public goods are considered “nonexclusive” (that is, once a public good has been created, people cannot be excluded from taking advantage of it) and “nonrival” (that is, the use of a public good by a person does not diminish the ability of others to use it). Therefore, producers of this type of goods or services cannot internalize their full value, and fewer of those goods will be produced than is socially efficient. In practice, few goods are strictly public in the sense defined; the notion refers more loosely to goods and services generated by governments that try to benefit the society in general, rather than individuals. Agricultural R&D is usually considered a public good, although patents can eliminate the nonexcludability. Also, general infrastructure (such as rural roads) may also be considered as public goods, even though congestion affects the nonrival aspect of their use.

**2. Externalities** In goods and services that generate externalities, producers either do not capture the full value (for goods with positive externalities) or do not incur all the costs (for goods with negative externalities). The additional external value or cost falls on agents other than the producer. Market failures emanating from the existence of externalities may lead private actors, such as farmers or businesses in the agricultural supply chain, to produce too much or too little of a good or service relative to the socially efficient level. Examples may include the provision of publicly financed subsidies for agricultural inputs such as fertilizers, based on the positive externalities of modern input and technology use (such as avoiding the need to expand to marginal and forested areas), or the mitigation of the negative externalities arising from agricultural production, such as depletion of soil

**BOX 1.2** (continued)

fertility, soil erosion, and runoff. Because farmers will not consider these externalities in their production decisions, there may be an underuse of fertilizer relative to what is socially optimal.

Other positive externalities from the use of modern inputs and technologies (not just fertilizers) may result from learning effects among producers. Pest control and animal health activities in one area have positive effects in neighboring areas, and vice versa if an area fails to implement the needed controls. Public financial policy tools, such as subsidies and taxes or fees, are often used to affect changes in production behavior to correct for too much (or too little) production in the presence of negative (or positive) externalities by changing the cost of production or the revenue or profit from production faced by the agent. Regulatory measures can also be employed to set production limits or establish modes of production.

A concept related to that of externalities is the “commons,” such as the land that is used for cultivation or for pasture among a community of farmers, or a watershed. If each farmer considers only his or her private gains, the result may be overexploitation of the land and lower aggregate gains, or overuse of water. The government may intervene by establishing rules and regulations related to property rights and water use.

In general, a range of factors helps determine policy choices in addressing externalities, including the effectiveness with which the policy alters production behavior, the policy’s effects on economic agents that were not targeted, the fiscal cost (especially in the case of subsidies or tax incentives) and the transaction cost of implementing the policy, and the political feasibility of initiating the policy or of phasing it out after it has served its purpose.

**3. Imperfect information and information asymmetries** Information asymmetries exist when, in an economic transaction, one party has more information relevant to a particular exchange than does the other party. This asymmetry of information about a good or service, or about the buyer or seller of the good or service, will result in less mutually beneficial market transactions than would have been possible under conditions of symmetric information. Examples of asymmetric information include agricultural insurance (even though there is high demand for this product, markets are thin because it would be very costly to obtain the relevant information that would allow insurers to ascertain farmers’ risk profile) and agricultural credit (which faces the same problems of moral hazard and adverse selection as agricultural insurance markets, leading to underprovision of credit). Subsidies to insurance and credit per se do not solve the underlying problems of information asymmetries; better options may be public investments in information and the design of general insurance schemes based on average yield or

**BOX 1.2** (continued)

linked to weather measures in an area, for which the government can regularly collect data.

**4. Imperfect competition in markets** Economic agents with dominant market power may limit competition among producers, resulting in reduced aggregate output and welfare. That power may come from concentration and from collusion or cartel agreements among economic agents. A different source of imperfect competition may result from the existence of economies of scale in production (in this case, however, the market outcome may not necessarily be inefficient). Those problems may arise along the value chain, particularly when market information systems and transport infrastructure are poor. In those cases, public investments in price and other market information systems, as well as in rural transport infrastructure, can induce greater competition among market intermediaries. Contract farming arrangements with concentrated buyers may also affect farmers. Regulatory policies enabling contract enforcement in cases in which many farmers face one large buyer would ensure that asymmetric bargaining power is not abused.

**5. Coordination failures** An economy may show multiple equilibriums due to the need to simultaneously execute several complementary economic activities whose returns depend on those other activities being executed. For example, in agriculture, simultaneous investments may be needed in telecommunications and other infrastructure, in R&D and the dissemination of agricultural technology through extension, and in credit and insurance markets. Without public intervention, the economy may stay on the bad equilibrium, such as poverty traps. The appropriate policy tool for addressing these market failures will vary depending on a range of factors. Also, as with any market failure argument, public intervention because of coordination issues may lead to other inefficiencies or inequities, and thus should be based on careful analysis of what the exact coordination failure is.

**The equity and poverty reduction rationale for public investment in agriculture**

As noted in the text, two other fundamental considerations, separate from efficiency issues discussed so far, are alleviation of poverty and inequality. The poverty-reduction rationale for government expenditures is particularly salient in the case of agriculture, given the concentration of the poorest populations in this sector in many developing countries. Policies to address poverty in rural and agricultural areas may include the provision of direct transfers in the form of cash, food, or other in-kind goods to low-income households (with or without additional requirements) and the subsidization of poor agricultural producers' costs, such as price subsidies on agricultural

**BOX 1.2** (continued)

inputs. Subsidies may be justified on either efficiency or poverty-alleviation grounds, and, often, both arguments are utilized. In addition, public investments in agricultural research may be geared toward improving the productivity of smallholders and resource poor producers; different investments and public services, such as irrigation and roads, extension, education and health, can also be targeted to marginal or remote areas where the share of lowest-income farmers is higher.

**Market failure and government failure**

All of the above requires that governments be efficient and noncorrupt implementers of interventions for the public good. However, this may not be the case. The notion of “government failure” suggests that governments may not be benevolent agents maximizing a social welfare function with the requisite authority or power to do so and endowed with sufficient information needed for such action. There is the possibility that the government intervention not only does not correct the postulated market failure but also generates additional negative welfare effects. It is important to understand governments as a collection of agents that maximize their utility on the basis of their own objective functions (which may depart from the standard social welfare function). Such political-economy models describe the ways in which government actions and policies, including public-investment decisionmaking, may depart from those investment policies that would contribute optimally to aggregate efficiency and poverty-reduction goals (Mogues et al. 2012).

**Objectives**

Not only has the overall policy framework for agriculture and food production been changing lately (as discussed in the previous section), but also the policy objectives related to the sector have become more complex. With differences depending on the levels of development, the agricultural sector is expected to contribute to the whole economy and society on several fronts. For instance, the Independent Panel on Agriculture for Development in Latin America identifies five aspects:<sup>7</sup> (1) growth in agricultural production and productivity as a means to contribute to growth and economic development in

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<sup>7</sup> These objectives are different from the contributions of agriculture envisaged in Johnston and Mellor (1961), based on transferring labor, food, savings, and foreign currencies surpluses from the agricultural sector to support the development of the rest of the economy.

general; (2) improvement of food security and nutrition conditions;<sup>8</sup> (3) reduction of poverty and vulnerability in rural areas; (4) strengthening of environmental sustainability and protection of biodiversity; and (5) improvements in territorial development, helping to eliminate large income disparities between urban/rural and rural/rural areas (PIADAL 2013).

### Levels of Interventions and Differentiated Policies

An enabling policy environment for agricultural growth and productivity should consider the double way of influences between agriculture and the rest of the economy. It has been mentioned that several studies focusing on agricultural growth multipliers for the rest of the economy usually found positive and large effects, showing the importance of agricultural development for the economic dynamism of the rest of the economy. But the reverse linkages from the rest of the economy to agriculture are crucial for growth and productivity in agricultural and food production.

Figure 1.1 shows four levels of analysis to consider in these linkages. They include the farmers (supply side); the functioning of the whole economy and the opportunities for trade (demand side); the links between supply and demand through the value chains; and the geographical setting where those activities take place. From a geographical point of view, farmers are part of a rural and regional economy (which, among other things, determines the natural resource, weather, and environmental setting, as well as the availability of local infrastructure and public services). From the economic point of view, they are part of agricultural value chains (which include the operation of markets for products, inputs, equipment, and services related to the activities of primary production, processing, transportation, and commercialization of agricultural products). These three levels are embedded in the general economy, which determines the overall governance and policy setting, as well as the final demand for agricultural products (in primary form or manufactured) both in the domestic and external (net-trade) markets (Díaz-Bonilla, Orden, and Kwiecieński 2014).

Figure 1.1 highlights the fact that many of the policies required to improve farmers' opportunities are nonagricultural, from strengthening rural education and healthcare at the local level to sound macroeconomic management

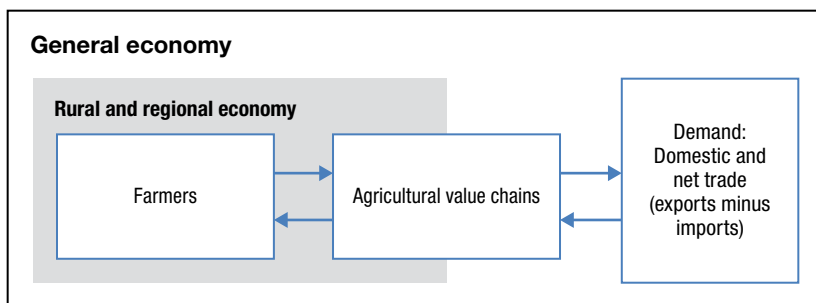
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8 It can be argued that food safety (whether the food complies with health and sanitary standards) should be a separate objective from food security. Others consider that the definition of the World Food Summit in 1996 includes that concept when it asserts that "food security exists when all people, at all times, have physical and economic access to sufficient, *safe and nutritious food* that meets their dietary needs and food preferences for an active and healthy life" (emphasis added).



and overall governance considerations including peace, political stability, and the rule of law. Further, a notion of business climate defined only from the supply side is incomplete without considering demand conditions (Díaz-Bonilla, Orden, and Kwieciński 2014).<sup>9</sup>

**FIGURE 1.1** Different levels of analysis



Source: Díaz-Bonilla, Orden, and Kwieciński (2014).

In terms of an enabling environment for agriculture, even if a country is growing, the two-way linkages between agriculture and the rest of the economy may not automatically occur without adequate governmental policies, investments, and institutions. For example, in several African countries the urban demand for agricultural and food products may not be well linked to the potential supply side that exists in the rural domestic economy. Strengthening the firms, activities, and infrastructure in the rural nonfarm sector that provide the two-way linkages between agriculture and the rest of the economy is crucial for economic development (Barrett, Carter, and Timmer 2010).

Therefore, two important enablers of growth in the agricultural sector are (1) sustained growth on the demand side (that is, growth in the non-agriculture economy and exports) and (2) the strengthening of the rural nonfarm sector and the value chains that link agricultural supply with demand (Díaz-Bonilla, Orden, and Kwieciński 2014; see also Haggblade, Hazell, and

9 For instance, Barrett, Carter, and Timmer (2010), after discussing the impact of agriculture on the growth performance of the rest of the economy, consider the reverse link and note that “unless the non-agricultural economy grows, there is little long-run hope for agriculture.” This points to a more general issue: the weakness of usual growth analyses that focus only on the supply side. Solow (2005), one of the originators of the basic Solow-Swan growth model, has acknowledged the omission of demand considerations as a weakness of the growth theory based on this model (see Díaz-Bonilla, Orden, and Kwieciński [2014] for a more detailed discussion of the supply and demand issues that determine agricultural growth).

Reardon 2007). This requires macroeconomic, agricultural sector, and non-agricultural policies that consider all four levels in Figure 1.1.

In Table 1.1, the four levels of intervention are combined with different examples of potential types of interventions including general public policies, investments and expenditures, laws and regulations, and institutions. The cells show some examples of government interventions without attempting to provide a complete list. The objective is simply to show the variety of possible measures and try to place macroeconomic policies within that broader framework.

Chapter 2 defines in greater detail the macroeconomic policies analyzed later in this book. A further discussion of nonmacroeconomic policies that are relevant for agricultural and food production, as well as detail about the overall policy framework can be found in Diaz-Bonilla, Orden, and Kwiecieński (2014).

### **Prices: Trends, Cycles, Volatility, and Extreme Lows/Highs**

A recurrent topic in agricultural and food policies is price as an important variable for production and consumption decisions (although certainly not the only one, as argued several times in this book). Producers and consumers are affected by both price levels and price variability. Different policies have been utilized to ensure adequate price levels for food and agricultural products and to reduce volatility, an issue that revolves around balancing the interests of producers and consumers in increasingly differentiated societies in developing countries. As noted earlier, there are diverse implications for poverty and food security with the combination of large/commercial and small/family farms in the agrarian structure. But besides production issues, agricultural policies must also consider the fate of consumers, both urban and rural, who may suffer from different forms of poverty and malnutrition.

The effects of changes in price trends on food production and food consumption are different from the effects of changes in volatility around those trends (cycles and extreme events). In what follows, both aspects (price levels on the one hand and cycles and extreme events on the other) are briefly discussed.

Price levels affect producers' profits (and therefore their incentives to produce) and consumers' costs (and consequently their economic access to food, as already discussed). Therefore, much of the debate regarding different policy approaches to agricultural production and food security usually revolves around a traditional policy dilemma (Timmer, Falcon, and Pearson 1983): high/profitable prices to help producers or low/affordable prices to help consumers. High (low) agricultural and food prices should normally lead to more (less) production, improving (worsening) the physical availability, while at the same time making consumption more (less) costly and reducing (increasing) economic access.

**TABLE 1.1** Levels of interventions and differentiated policies

Category	Public policies, investments, and expenditures	Laws and regulations	Institutions
Farmers and rural population	<ul style="list-style-type: none"> <li>*Subsidies to farmers and other payments received by farmers. Price support and price stabilization measures. Agricultural taxes.</li> <li>*Agricultural R&amp;D, extension, inspection services; marketing and promotion; public stockholding; and other general services.</li> <li>*Public investments in irrigation, storing, and commercialization of agricultural products.</li> <li>*General macroeconomic policies that change relative incentives between agricultural and nonagricultural activities.</li> <li>*Access to finance and insurance by farmers.</li> <li>*Local safety nets for nutrition, employment, and cash transfers to rural families.</li> </ul>	<ul style="list-style-type: none"> <li>*Land tenure and land regulations.</li> <li>*Water laws and regulations.</li> <li>*Forestry, environmental, and natural resources laws and regulations.</li> <li>*Goods and services laws and regulations.</li> <li>*Labor markets laws and regulations.</li> </ul>	<ul style="list-style-type: none"> <li>*State-owned enterprises and farms.</li> <li>*Cooperatives and farmers' groups.</li> <li>*Agricultural banks.</li> <li>*Contract and conflict mediation bodies.</li> <li>*Public-private consultation bodies including farmers and rural population.</li> </ul>
Rural and regional economy	<ul style="list-style-type: none"> <li>*Macroeconomic policies that change relative incentives between rural and non-agricultural activities and affect the rural/regional economy.</li> <li>*General productive infrastructure, including energy, roads, transportation, communications, and others.</li> <li>*Public expenditures and investments in health, education, water and sanitation, housing, and others.</li> </ul>	<ul style="list-style-type: none"> <li>*Fiscal and political framework for operations and funding of state and local governments.</li> <li>*Regional and local regulations related to labor, goods, land, water, energy, and environment.</li> </ul>	<ul style="list-style-type: none"> <li>*Quality of provincial and local governments.</li> <li>*Provincial and local judicial system.</li> <li>*Police and institutions to control crime and violence.</li> <li>*Regional development bodies.</li> <li>*Regional public-private consultation bodies.</li> </ul>

High food prices benefit producers (other things being equal), while low food prices help consumers, at least in the short run. But in the medium to longer term, there may be positive effects even for net food buyers if higher food prices generate dynamic economic processes that raise employment and/or wages at the same time (both in rural and urban areas) by amounts that more than compensate for the greater cost of food. For example, higher agricultural and food prices may lead to increased investments by the private and public sectors in agricultural production

**TABLE 1.1** (continued)

Category	Public policies, investments, and expenditures	Laws and regulations	Institutions
Food and agricultural value chains (nonfarm components)	<ul style="list-style-type: none"> <li>*Macroeconomic policies that change relative incentives for the food and agricultural value chains.</li> <li>*R&amp;D and other expenditures and investments related to food and agricultural value chains.</li> <li>*Financing of the value chains. Risk insurance.</li> <li>*Logistics and market links.</li> <li>*Social security (employer contributions).</li> </ul>	<ul style="list-style-type: none"> <li>*Competition policies and regulations.</li> <li>*Laws and regulations related to contracts and business arrangements (such as contract farming).</li> <li>*Intellectual property rights.</li> <li>*Sanitary and phytosanitary laws and regulations.</li> <li>*Food safety and other standards.</li> <li>*Energy and environmental laws and regulations.</li> <li>*Labor market laws and regulations.</li> </ul>	<ul style="list-style-type: none"> <li>*Marketing boards and state-owned enterprises, in agro-industrial activities, products, and inputs.</li> <li>*Agro-industrial associations.</li> <li>*Contract and conflict mediation bodies.</li> <li>*Public-private consultation bodies related to agro-industrial.</li> </ul>
General economy	<ul style="list-style-type: none"> <li>*Fiscal, monetary, financial, exchange rate, trade, and labor policies that ensure global balances and avoid crises.</li> <li>*Social security; national safety net related to nutrition, employment, and cash transfers.</li> <li>*R&amp;D and other expenditures and investments related to nonagricultural and nonrural economy affecting competitiveness of the whole economy (energy, transportation, communications, and similar).</li> <li>*General health, education, human capital, and innovation policies.</li> </ul>	<ul style="list-style-type: none"> <li>*Criminal and civil law.</li> <li>*General competition policies and regulations.</li> <li>*General laws and regulations related to contracts and business arrangements.</li> <li>*Labor markets laws and regulations.</li> <li>*Intellectual property rights.</li> <li>*Energy and environmental laws and regulations.</li> </ul>	<ul style="list-style-type: none"> <li>*Quality of public administration, legislature, and judicial branches.</li> <li>*Defense, diplomacy, control of crime and violence.</li> <li>*National public-private policy consultation bodies.</li> </ul>

**Source:** Author, based on Diaz-Bonilla, Orden, and Kwieciński (2014).

and in rural areas that generate positive employment and wage effects. If, as argued earlier, growth in agricultural (and food) production has large and positive multiplier effects on the rest of the economy and appears to be more effective in reducing poverty, then higher agricultural and food prices may not pose a general policy dilemma for consumers if they lead to expanded employment and higher wages, particularly for lower-income producers and workers. There may also be some positive dynamic effects if a policy, even though it increases food prices in the short term, leads to

investments in productivity that may reduce production costs and prices in the medium term.

Of course, the opposite may also happen: farmers shielded by high protection and pampered by subsidies that increase the prices they receive may not need to incur additional costs and investments to attain their desired profit levels; therefore, protection and subsidization may lead to fewer investments and slowed productivity (see, for instance, Moguees et al. 2012 and Allcott, Lederman, and López 2006). Also, higher agricultural and food prices may increase wages and production costs of industrial and other productive activities in ways that affect their external and internal competitiveness, perhaps leading to overall reductions in domestic production and employment.

Both high prices and low prices result in supply and demand adjustments if markets operate normally and if signals are transmitted properly to producers and consumers. Higher prices should eventually lead to more production and less consumption; both effects would push prices lower (and vice versa, in the case of a low-price policy).

Those who take the perspective of poor producers prefer high prices, arguing that agriculture's multiplier effect has important benefits for employment and poverty alleviation; a smaller subset of those analysts tend to gravitate toward protection and price support through government policies. Those who take the perspective of poor consumers, on the other hand, emphasize the importance of low prices because of their positive effect on urban and rural poverty and malnutrition. They usually suggest lower levels of protection and consider the use of some type of consumption subsidies. But governments need to take into account the welfare of both producers and consumers, considering the short-term impacts as well as the medium- to long-term dynamic effects.

This policy dilemma has led to a variety of policies and approaches in developing countries, with very mixed results. Certainly a government might try to keep producer prices high and consumer prices low through subsidies and market interventions, but the developing countries that have tried such an approach usually find that the policies are unsustainable, mostly because of fiscal costs, the distortions generated in production and trade, and the usually inequitable distribution of costs and benefits.

In particular, if the debate centers on poverty and food security concerns, it needs a more granular analysis of poor and vulnerable households: they may

spend as much as 70 percent of their income on food (World Bank 2009a).<sup>10</sup> Landless rural workers, poor urban households, and many poor small farmers tend to be net buyers of food (Poulton et al. 2006; World Bank 2005<sup>11</sup>). At the same time, it is also important to note the steady shift in the locus of poverty in developing countries, where food insecurity and malnutrition are moving from rural to urban areas (Ruel, Haddad, and Garrett 1999; Haddad, Ruel, and Garrett 1999; Garrett and Ruel 2000). Urbanization in developing countries is posing new questions regarding economic and social policies in general and particularly in the case of food security.

Some empirical studies have suggested that while higher food prices negatively affect the poor in the short term, this may be reversed in the medium term depending on the size of the price shock and how domestic wages evolve after the price shock. For instance, Ivanic and Martin (2014) estimate that a 10 percent general rise in food prices increases poverty (measured at US\$1.25 per day) in the short term for 27 of the 31 developing countries considered in the study, while a 50 percent jump leads to short-term poverty expansion in 29 countries. But after considering enough time to allow for production expansion and consumption adjustments, poverty decreases in 27 countries after a 10 percent price shock and in 22 if the jump is 50 percent. Those estimates do not consider employment effects, which may make the positive impacts on poverty reduction even larger. On the other hand, by relying on the link from food price increases to higher wages, the calculations are abstracting from the fact that central banks in developing countries, particularly if they are operating under IMF programs, may react to price and wage increases by tightening monetary policies, which would slow down the economy and potentially increase poverty.<sup>12</sup>

The debate about price volatility, cycles, and spikes differs from the discussion about price levels. In the context of monetary policies, the idea of price stability refers to inflation in the range of 0–2 percent per year. Recently it has been

10 According to the World Bank (2009a), food consumption in developing countries represents 66 percent of income for rural poor households and 60 percent for urban poor households, with the highest figure at 71 percent for rural households in East Asia and the Pacific and the lowest at 44 percent for urban households in Latin America and the Caribbean.

11 The World Bank (2005) presents the following estimates of the percentages of rural households that are net sellers: Zambia (maize), 24 percent; Mozambique (maize), up to 25 percent; Kenya (maize), 27 percent; Ethiopia (maize and teff), 25 percent; Indonesia (rice), 29 percent; Vietnam (rice), 43 percent; Mexico (maize), 25 percent.

12 Headey (2014) also estimates a positive medium- to long-term impact of higher food prices on poverty reduction using an econometric approach. It would be useful to analyze how much of that result is linked to world and domestic overall growth, which tend to be associated both with higher agricultural and food prices (Díaz-Bonilla and Robinson 2010)

suggested that the definition of price stability could be expanded to an annual inflation of up to 4 percent (Blanchard, Dell’Ariccia, and Mauro 2010). Obviously, a “stable” inflation of 2 percent per year means that the nominal price level is permanently increasing (at 2 percent per year, the price level increases almost 50 percent in nominal terms in 20 years; at 4 percent, it more than doubles during the same period). In other words, stability in levels is one concept, and stability in the rate of change of those levels (that is, stability of inflation) is another.

In the case of food and agricultural prices, the notion of (in)stability for producers refers mainly to levels, while for consumers it is usually the issue of persistent food inflation that counts. Regarding stability in levels, it is important to distinguish between the trend, potential changes in that trend (for example, the emergence of a new trend), and some notion of variability/volatility around the trend. This last concept may take the form of (1) a reasonably smooth business-cycle movement;<sup>13</sup> (2) shorter-term volatility around that cycle; or (3) extreme price events (which tend to be shorter in duration but represent price shocks that may fall outside a defined range<sup>14</sup> above/below the trend or the cycle, depending on the time horizon utilized) (see the discussion in Díaz-Bonilla and Ron 2010).<sup>15</sup>

It has been argued that price instability generates uncertainty about the true price level for producers and consumers, and therefore that production and consumption decisions may lead to suboptimal outcomes vis-à-vis under more stable price conditions. For producers, price volatility may reduce investments and shift production toward lower-risk but also less productive technologies (although World Bank [2005] estimates that these effects may not be significant).

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13 Discussion in Chapter 3 shows that since the early 1980s, nominal prices followed a clear cyclical pattern in line with the global business cycle but around a rather flat linear trend, until about 2005, when there appeared to be a change in the underlying nominal trend (see Canova 1999 for the complex analytical issues involved in distinguishing trends and cycles in macroeconomic analysis).

14 For instance, extreme price events may be defined by their timing (for example, those that only happen 10 percent of the time, according to the historical data) or by their size (those that deviate from the trend by some statistical measure).

15 Other issues to be clarified in those analyses include the following: (a) how the trend is measured (there are several methodologies; see Canova 1999); (b) the use of global or domestic prices; (c) if the focus is on global prices, the proper currency to use for pricing products (US dollars, Euros, or a basket of currencies such as the Special Drawing Rights issued by the IMF, and so on); (d) the relevant markets for price formation and measurement; (e) whether volatility is analyzed for nominal prices or for real prices (and in the latter case, which deflator is utilized); (f) the relevant time horizon for volatility analysis (annual, seasonal, monthly, or daily; the time horizon selected depends on the purpose of the analysis, with consumer issues usually requiring shorter horizons than in the case of producers) (see Díaz-Bonilla and Ron 2010 for a more detailed discussion).

High and variable food inflation and price spikes affect consumers negatively through reduced or at least uncertain access to food. This is particularly true for poor and vulnerable households whose incomes do not adjust with inflation and who do not have assets to stabilize consumption patterns. There may also be negative macroeconomic impacts, such as inflation and balance-of-payment and public deficits, as well as a decline in total investment due to uncertainty, with second-round effects on poverty and food security (Timmer 1989). It is also important to consider the political impacts linked to social unrest and riots caused by increases in food prices. However, it has been noted that, rather than volatility per se, what seems to count in political riots and unrest are high price shocks, which is only one form of (asymmetric) volatility (Barrett and Bellemare 2011). Persistent food inflation also tends to generate political problems, but in many cases sustained inflation (as different from price shocks) is the result of macroeconomic difficulties that may not be related to developments in food markets.<sup>16</sup>

In summary, it is important to consider price trends, their potential changes, business-cycle variability around those stable or changing trends, and shorter-term variability, particularly events of extremely high (or low) prices. Still, it must be emphasized that prices are not the only factor influencing agricultural production and food security and that there are obviously many policies that affect prices (see Chapters 2, 8, 9, 10, and 11).

### **Food Security and Poverty**

As noted before, the definition of the 1996 World Food Summit about food security implies a multidimensional concept encompassing the ideas of availability, access, utilization, and stability. In turn, it is widely recognized that food insecurity is strongly correlated to poverty, also a multidimensional concept affected by many factors.<sup>17</sup> For instance, Sinha, Lipton, and Yaqub (2002) consider that poverty, poverty severity, poverty persistence in individuals, and intergenerational transmission of poverty are all associated with what they call “damaging

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16 Hazell, Shields, and Shields (2005) argue that a nontrivial part of domestic price variability in agricultural and food products is related to macroeconomic factors (see also Dorosh, Robinson, and Ahmed 2009; and Rashid and Lemma 2011 in the case of Ethiopia).

17 There is also a definitional link between food insecurity and poverty to the extent that the general poverty line is usually the cost of minimum household food requirements (MHFR), with an additional markup representing other expenditures; the line for indigence is usually the cost of MHFR without any additional expenditures. Therefore, poverty and food insecurity measures should move closely together by statistical construction. An implication is that if a policy measure increases the cost of MHFR, this, keeping other things constant, would increase both the poverty headcount and the number of food-insecure households among those that are net food buyers. However, other things may not be constant (more on this below).



fluctuations.”<sup>18</sup> This is a general concept that goes beyond risks or shocks and encompasses changes over time that can harm people’s welfare. The authors identify six major damaging fluctuations affecting the poor: (1) violence (wars, civil strife, community violence, and domestic violence); (2) natural disasters; (3) harvest failure; (4) disease or injury; (5) unemployment or underemployment; and (6) shocks that worsen the relative prices of food, especially when compared to income.

For poor and food-insecure households, the main issues are exposure and vulnerability to these damaging fluctuations. However, typically only part of such events may be caused by food price fluctuations; rather, most are related to the other factors mentioned, such as weather shocks, health events, and the spread of conflict and war. In particular, macroeconomic crisis with subsequent drops in production and employment, strong devaluations, and high inflation are some of the major causes of poverty and food insecurity (Díaz-Bonilla 2008).

While the current period of higher and volatile prices in global food markets has focused much attention on the impact on poverty and food security (as mentioned in the previous section), economic access to food is not just a problem of food prices. Access to food also depends on the relationship between household incomes (broadly defined) on the one hand and the cost of the minimum household food requirements (MHFR) on the other. Both income and costs involve the consideration of prices, wages, employment, and other variables, not only a comparison of food prices with wages. Therefore, in order to assess economic access to food, Sinha, Lipton, and Yaqub (2002) suggest the proper equations to consider are the following:

$$\text{Incomes} = \text{Wages} * \text{Employment (or Prices} * \text{Quantity of goods and services sold by the poor)}^{19} + \text{Subsidies or taxes from the government} + \text{Other transfers and public services to the poor}$$

$$\text{Costs} = \text{Food prices} * \text{MHFR} + \text{Costs of complementary goods and services needed to properly utilize food}$$

Furthermore, the world now suffers from what has been called the “triple burden” of malnutrition affecting households and individuals (Pinstrup-Andersen 2007): undernutrition, the traditional focus of food insecurity, as insufficiencies in calories and proteins; overnutrition, leading to problems of obesity, diabetes, and cardiovascular problems; and deficiencies in micronutrients. In developing

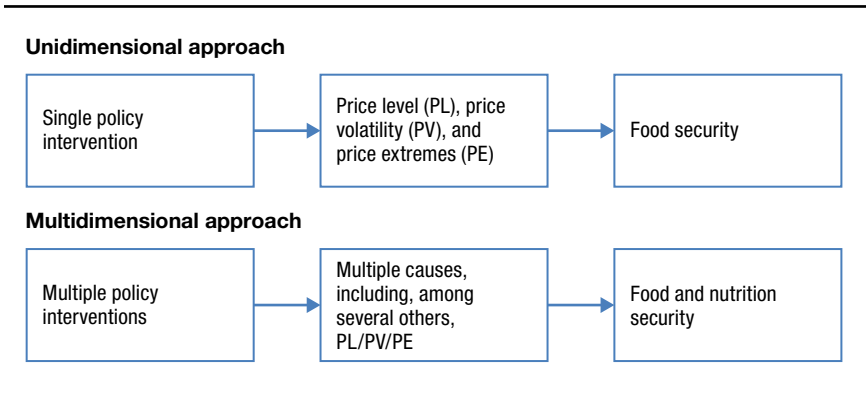
18 Poverty severity is measured by an indicator of how much below the poverty line people are.

19 The sign “\*” means multiplication. Obviously, taxes enter with a negative sign.

countries, it has been documented that both under- and overnutrition may coexist even within the same families (Garrett and Ruel 2003).

Therefore, we need to take a more multidimensional view of the problem (Figure 1.2), because a single policy intervention will not address the multiplicity of factors affecting food security. It is also important to understand the second-round, general-equilibrium effects of the policies pursued (Díaz-Bonilla 2014).<sup>20</sup>

**FIGURE 1.2** Unidimensional and multidimensional policy approaches



Source: Author.

### Outlines of a Policy Approach

In terms of aligning objectives and instruments, two general policy rules or principles must always be considered. One is the “Tinbergen Rule” (Tinbergen 1952), which indicates the need to have as many instruments as objectives; using just one policy (or focusing on just one intermediate variable) will not effectively ensure the welfare of both producers and consumers at the same time. In theory, with adequately operating markets, policymakers should be able to just let those markets deliver an acceptable price for all through supply and demand adjustments, but markets do not always operate adequately in developing countries. The problems may be compounded when policymakers seek to modify those market-based results, sometimes trying to increase prices for farmers

20 For instance, food stocks, while ostensibly focusing on price instability, may generate broader macroeconomic problems (perhaps associated with fiscal deficits) that may damage food security more than the price instability that those policies tried to solve (see, for instance, Timmer 1989; Dorosh 2008). These topics are discussed in several sections of this book, particularly in Chapter 8.

above market-clearing values, sometimes pushing prices for consumers below market-clearing values, and sometimes aiming to do both simultaneously.

Leaving aside the more involved debate about which market failures would need such correction through public policies and what potential fiscal and other costs of such correction would be, the point here is more mechanical. If there are two policy objectives (such as profitable prices for producers and affordable prices for consumers), there need to be at least two policy instruments. Proposals in favor of just one policy (say, protection or free trade) or one intervening variable (high or low prices) would most likely not deliver the multifaceted results needed by increasingly complex societies.

A second policy imperative can be called the Bhagwati principle, following the pioneer article on distortions and welfare (Bhagwati 1971). An implication of that analysis is the need to tailor policy interventions to the source of the problem as closely as possible in order to avoid second-round problems that can arise if the policy only targets a proxy hoping that it will help achieve the objective. For example, if a country wants to help its poor and vulnerable people, targeting specific food products (even if called “food security” crops) is an indirect and at times inefficient and inequitable way to reach the intended objectives of poverty reduction and food security. In addition, if the concern is about the incomes of small and poor producers, trying to increase the prices of some agricultural products will benefit larger producers more than smaller ones. Here, as in other cases in which food security concerns are invoked, the focus of the policy analysis should be on people rather than on crops or food products.

As discussed further in Chapter 3, the economic context for food security concerns has changed significantly, including the seeming persistence of higher agricultural and food prices (at least in nominal terms; in inflation-adjusted terms, they are mostly below the levels of the previous price shocks of the 1970s; see Chapter 3).<sup>21</sup> Notwithstanding those changes, however, some of the policies advocated to address food security concerns seem very similar to those put forth in the 1980s and 1990s to deal with low agricultural and food prices. In many countries, the alarm about high prices and price volatility has led to proposals to increase self-sufficiency using import barriers and distortionary domestic support; this is similar to what was done to try to help producers affected by low prices in past decades. Proponents of this line of thinking view international markets as unreliable and believe that production should be expanded to some level of self-sufficiency so that countries can depend less on external sources.

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21 For a less sanguine view about the continuation of high real prices, see Díaz-Bonilla et al. 2013.

This approach, however, must consider the fact that domestic production in individual countries is far more volatile than global and regional aggregates (see, for example, Díaz-Bonilla, Thomas, and Robinson 2003; World Bank 2005).<sup>22</sup> Thus, using international trade to supplement domestic production should in fact stabilize domestic food availability. Although some developing countries have successfully managed external volatility, there are likely more examples in which efforts to shield domestic markets from global volatility in fact led to increased internal volatility (see Minot 2011, 2012; Chapoto and Jayne 2009 also show the destabilizing results of government interventions aimed at stabilizing maize prices in several SSA countries).

While some policymakers and observers in civil society always seem to suggest protection (and distortionary support) as their preferred policy option with either low or high prices, some economic policy advice, on the other hand, appears to recommend trade liberalization in all circumstances as well. Here, as in other things, a more nuanced approach is required.

Overall, the most effective way to support agricultural production and food security, balancing the interests of producers and consumers, is through interventions that increase production efficiency and reduce costs (agricultural R&D, infrastructure, and related investments), all of which increase profits and incomes for agricultural and food producers while contributing to reducing prices and expanding availability for the agro-industry, consumers, and net exports. At the same time, the challenges faced by poor and vulnerable populations can be addressed through properly designed and funded safety nets and cash transfer programs (Hidrobo et al. 2012; Hoddinott et al. 2013).

An overall adequate policy framework for agricultural growth and productivity, food security, and poverty alleviation would encompass good governance, including strong efforts to reduce corruption and ensure the rule of law; macroeconomic stability; a relatively neutral trade policy; investments in human capital (health, nutrition, and education), infrastructure, climate change adaptation and mitigation, agricultural R&D, and appropriate management of natural resources; strengthened safety nets for the poor and vulnerable (conditional cash transfers, school lunches, women and infant nutrition programs, food-for-work); policies and investments that facilitate the adequate functioning of product and factor markets; land and water policies (and other interventions) that favor a more equitable agrarian structure,

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22 While the comment in the text refers to production, Hazell, Shields, and Shields (2005) also document that the domestic prices of food products tend to be in general more volatile than the respective world prices, although the period of analysis does not cover the recent global price spikes.

facilitating access to the sustainable use of natural resources by poor rural households and small and family farmers; women's empowerment programs; support for community organization and participation, particularly for the poor and vulnerable; and maintenance of law and order in rural areas.<sup>23</sup>

This list of policies goes clearly beyond the macroeconomic policies discussed in this book. However, an adequate macroeconomic framework facilitates the design and implementation of many if not most of the other policies in that list.

The next chapter turns to the conceptual and definitional issues related to macroeconomic policies and agriculture and food security.

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23 As mentioned earlier, Sinha, Lipton, and Yaqub (2002) identified violence and conflict (wars, civil strife, community violence, and domestic violence) as one of the "damaging fluctuations" that deeply affects the poor and vulnerable. This fact is corroborated by the study "Voices of the Poor" of the World Bank, summarized in Narayan et al. (1999), which suggests the importance the poor assign to effective and noncorrupt public law and order, considering that they suffer greatly from the absence of this public good. Therefore, the maintenance of public safety in rural areas is crucial for food security.

## MACROECONOMIC POLICIES: SOME DEFINITIONS AND CONCEPTUAL ISSUES

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The previous chapter placed macroeconomic issues in the context of a general policy framework for agriculture. This chapter defines in greater detail the problems and policies usually considered to be part of macroeconomics and then discusses the links to agriculture and food security.

### Objectives and Policies in General Economic Programs

Economic programs typically address one or more of the following objectives: (1) maintaining or accelerating economic growth with high levels of employment; (2) promoting microeconomic efficiency and correcting distortions; (3) avoiding unsustainable disequilibriums in the balance of payments (external equilibrium); (4) controlling inflationary and deflationary pressures (internal equilibrium); and (5) eliminating poverty, providing for the basic needs of the population, including food security, and expanding broad opportunities for human development.

Short-run macroeconomic programs emphasize the external and internal equilibrium objectives (points 3 and 4). It is normally assumed that in the short run, aggregate supply cannot change much. Therefore, the macroeconomic program tries to ensure that the aggregate demand does not exceed the current level of domestic aggregate supply plus imports beyond what can be financed externally on a sustainable basis. If this balance is not attained, the economy may experience recessions (if aggregate demand is below aggregate supply) or inflationary pressures and unsustainable disequilibrium in the external accounts<sup>1</sup> (if aggregate demand significantly exceeds aggregate supply). Consequently, the economic policies included in these programs are mainly monetary, fiscal, exchange rate, and trade measures aimed at aligning the levels of aggregate demand and aggregate supply in the short term.

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<sup>1</sup> This refers to a country's transaction with the rest of the world, usually presented in the macroeconomic account called balance of payments. Chapter 4 has a detailed discussion of these concepts.

Medium- to long-run growth or development programs, on the other hand, tend to underscore growth objectives (point 1) and economic efficiency (point 2). Policies related to economic efficiency try to position the economy at the frontier of what is feasible to produce with the existing factors of production, natural endowments, and technology. An economy may operate inside such a production possibility frontier because economic inefficiencies and distortions affect the allocation of productive resources or owing to lack of aggregate demand.

A different issue is how to expand such a production possibility frontier over time (which relates to growth, point 1). The expansion of the aggregate supply depends on the quantity, quality, and level of utilization of human, capital, and natural resources, as well as on technological developments. Policies at this level focus mainly on prices and the system of incentives, investment programs (in human and physical capital, infrastructure, and technology), and institutional developments (including an adequate balance between the operation of markets and public-sector intervention and the rule of law). The notion of structural transformation in this context would consist of changes in the productive structure of the countries involved; these changes could be due to modifications in the composition of demand and/or the evolution of international comparative and competitive advantages. However, as will be discussed below, short-term macroeconomic policies may impact the supply side as well.

The final main objective of economic programs (the elimination of poverty, fulfillment of social needs including food security, and provision of meaningful opportunities for all to develop and apply their human abilities) focuses more on the structure and distribution of aggregate demand and supply. Both shorter-term macroeconomic and longer-term growth and development policies can have important distributive effects, affecting how costs and benefits are allocated across social groups. These distributive aspects may be crucial to the political and institutional sustainability of the whole economic program. More to the point, the final objective of any economic program must be to help all human beings attain the fulfillment of their potential. Therefore, distributive effects—and in particular, how the poor and vulnerable fare under different policies—must be crucial concerns in policy design.

Because of the different elements involved in an economic program, there may be a wide variety of complementarities between objectives and policies. For example, price stability allows markets to better perform their static and intertemporal allocation of resources; therefore, price stability may help to foster efficiency and growth. Also, price stability may help with poverty alleviation and enhanced food security, to the extent that the poor and vulnerable

are more affected by sudden and substantial increases in prices of food and basic necessities. In turn, sustainable economic growth may alleviate inflationary pressures and create a more sustainable position in the external accounts on the one hand and ease problems related to poverty and the provision of basic needs on the other.

But there may also be inconsistencies, incompatibilities, and unwanted side effects in the definition of objectives and policies. For instance, policies aimed at structural reform and growth in the long run may produce unintended destabilizing effects on the macroeconomic internal and external balance in the short run (and may be discontinued because of those short-term impacts). Additionally, policies attempting to restore macroeconomic stability (such as restrictive monetary and fiscal policies) may have negative and persistent side effects on growth. Furthermore, both macroeconomic and structural policies to reduce inflation and achieve efficiency objectives may affect social conditions, poverty, and populations' basic needs in ways that impose undue and unfairly distributed burdens across social groups. These social costs can endanger the sustainability of the economic program (because of the political and social resistance they may elicit) or, if the program is sustained, can have negative impacts on both growth and equity, for instance, by impairing the preservation and formation of the human capital of the poor and vulnerable.

### **What Are the Macroeconomic Problems and Policies to Be Considered?**

A common definition holds that macroeconomics focuses on the behavior of economic aggregates such as gross domestic product (GDP), balance of payments, public sector aggregate operations, monetary aggregates, total unemployment, and inflation, while microeconomics looks at the behavior of specific markets and economic agents, such as households and firms.<sup>2</sup> However, macroeconomic aggregates are a reflection of the operation and interactions of individual markets and agents; a sustained line of work in economics in recent decades has been to establish the microfoundations of macroeconomics. Therefore, the distinction between broad economic aggregates (macroeconomics) and individual markets and economic agents (microeconomics) may not capture the differential aspects of macroeconomics as a separate subject.

Another approach to defining macroeconomic analysis and policies starts by noticing that macro variables, such as GDP, show trends in their growth

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2 A more precise definition of the terms used is presented in Chapter 4.



pattern, but there are also up and down movements (cycles) around the basic trends. As noted earlier, growth and development policies act on the aggregate supply (the generation of GDP), mainly in the medium to long term; those policies define trends. Macroeconomic policies, on the other hand, encompass policies directed at aggregate demand, trying to smooth out excessive movements up (expansions) or down (recessions). The emphasis of these policies is thus on economic cycles.

If a strict dichotomy between trends and cycles is accepted, then macroeconomic policy could be defined simply as the stabilization of the aggregate demand around the (independently determined) growth trend of the aggregate supply, with the aim of avoiding either unemployment (if there is a lack of aggregate demand compared to potential aggregate supply) or inflation and balance-of-payment problems (in the case of an excess of aggregate demand over supply). We could call the alignment of aggregate demand with aggregate supply the first macroeconomic problem.

However, it has been argued that this dichotomy between trend growth and cycles could be misleading because there are important interactions between both aspects (see Stock and Watson 1988 for industrialized countries and Aguiar and Gopinath 2004 for developing countries). Thus, it may not be adequate to define the macroeconomic problem as merely a question of how to align aggregate demand with an independently evolving aggregate supply. The interactions between growth trend and cycles must be also considered. Those interactions come from several factors, one of which is the level of aggregate demand (including both domestic demand and exports). As mentioned earlier, a deficit in aggregate demand may push overall growth below the previous trend, while an excess may sustain above-trend growth for a time until the economy suffers a macroeconomic crisis that reduces growth.

Macroeconomic policies can also affect growth through the impact of macro prices—such as terms of trade,<sup>3</sup> exchange rate, interest rate, and average wages—on the stabilization of cycles and on the behavior of growth trends. For example, the exchange rate, which will be discussed in greater detail later, plays a central role in regard to the nominal aspects of the short-run management of aggregate demand, as well as those aspects affecting aggregate supply in the longer run. Interest rates have a dual character as well. They not only influence aggregate demand in the short run, they also affect choices between savings and investment and, possibly, the selection of technological

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3 A country's terms of trade is defined as the ratio of the price index of exports divided by the price index of imports.

alternatives, thereby determining long-term growth prospects. Similarly, wages can affect aggregate demand throughout the growth cycle, but they also have an effect on capital/labor ratios, technological alternatives, and the decision to invest in human capital, all of which define medium- to long-term aggregate supply trends. Finally, trends and volatility in terms of trade have short-term effects on aggregate demand, as well as longer-term effects on investment and growth.

Therefore, in addition to the alignment of aggregate demand and aggregate supply, a second macroeconomic policy issue is how to get the macro prices right (to the extent that these prices can be influenced by policy), avoiding variously defined misalignments between the policy-enforced values and some notion of what the equilibrium, natural, or normal values should be, while at the same time trying to reduce volatility and uncertainty regarding these prices.

Economic crises, with their different fiscal, financial, trade, and social components, are particularly dramatic manifestations of imbalances between aggregate demand and aggregate supply (the first macroeconomic policy problem) and/or of misalignments in macro prices (the second macroeconomic policy problem). Crises tend to affect long-term growth prospects and increase poverty and food insecurity through various channels. For instance, higher unemployment, particularly its persistence over time, deteriorates human capital; crises also destroy installed capital, and their recurrence increases uncertainty, thereby reducing investment and future capital. They also tend to leave a legacy of public and private debt, weakening fiscal accounts and banking and financial systems, all of which affects growth, efficiency, and equity. Crises also have important negative effects on poor populations, which might find their already limited human and productive capital compromised if, for instance, physical or economic access to food is impaired, children have to be withdrawn from school to work for their families, and if assets, such as small farmers' livestock, are sold to try to weather negative economic shocks. Therefore, crisis avoidance (and, when things go wrong, appropriate crisis management) can be considered a third macroeconomic issue in its own right.

There are also other growth, efficiency, poverty, and distributive effects resulting from some microeconomic aspects of macro policies, such as the structure of tax and public expenditures, certain financial and regulatory policies within the general macro framework of a monetary program, and so on. These social and microeconomic implications of macroeconomic policies may be a fourth aspect to be considered, depending on the focus of the specific analysis conducted.

In summary, when analyzing macroeconomic policies, it is important to consider all four issues mentioned: (1) the proper alignment of aggregate demand and aggregate supply; (2) the level, stability, and sustainability of macro prices; (3) the avoidance of economic crises; and (4) the potential social and microeconomic implications.

When macroeconomic policies are discussed in the context of addressing these four macroeconomic problems, the discussion typically includes (1) fiscal policy, (2) monetary/financial/banking policy, (3) exchange rate policy, and (4) trade policy. As we will see, these policies are interrelated in many ways, but it is always helpful to try to separate them, at least in terms of the instruments utilized. Still, some may reasonably argue that exchange rate policy cannot be treated separately from monetary policy (after all, the exchange rate can be considered the price of domestic money in terms of foreign money). The same may be said regarding the difficulties of treating trade and fiscal policy separately from the exchange rate. However, because it is such an important macro price for developing countries, exchange rate policies are given a separate chapter in this book (see Chapter 10).

There are other policies that, although crucial for the performance of both the economy in general and the agricultural sector in particular, may take us far from what are usually considered macroeconomic policies and into economic policies in general. Therefore they are not addressed here. For instance, labor policies and labor market issues, important topics that lie at the intersection of macro- and microeconomic issues, are not considered in detail in this book.<sup>4</sup> Also, it can be argued that there are several policy issues, such as those related to energy, technology, and land policies, that require analysis. More generally, there are many factors that affect growth, including, for instance, the rule of law and governance issues, only some of which are related to macroeconomic policies (see, for instance, the growth-constraint analysis of Hausmann, Rodrik, and Velasco 2005).

Consequently, acknowledging that there are other important policy areas that impact agriculture (as discussed in Chapter 1), this book aims to keep the focus on the traditional macroeconomic policies as seen from the point of view of the ministries of finance, ministries of the economy, or central banks. Therefore, the next chapters concentrate basically on fiscal, monetary and financial, exchange rate, and trade policies.

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<sup>4</sup> In Chapter 7 there is a discussion of adjustments in labor markets when macroeconomic conditions change. Those interested in labor issues can consult Agenor (1996) and Chapter 5 of Timmer, Falcon, and Pearson (1983).

## **Consistency, Credibility, and Sustainability of Macroeconomic Programs**

The multiplicity of objectives and instruments and their possible interactions lead to problems with the continuity of economic programs that have sometimes been referred to as problems of consistency, credibility, and sustainability.

These issues are important because they determine the reaction of the private sector to the announcement and implementation of government measures. The expected outcome of an economic program depends ultimately on the decisions of production and consumption, savings and investment, and innovation by economic agents. If a program is perceived as inconsistent, incredible, or unsustainable, private agents will most likely anticipate changes in objectives and instruments and will adopt defensive behaviors that would derail the program and negatively affect the economy. For example, economic agents may maintain high inflationary expectations that get embodied in the prices of the transactions they made; they could require very high real interest rates to keep their assets in local currency; some economic actors may run speculative attacks on the local currency and feed capital flight; potential investors may also sometimes postpone indefinitely decisions about productive investment because of doubts about the economic program; and so on.

In general, three situations can be distinguished, which, somewhat arbitrarily, are called here problems of consistency, credibility, and political sustainability.

### **Consistency**

There are different concepts of consistency. At the most basic level, there is a consistency problem when basic national accounting identities, discussed in detail in Chapters 4 to 7, are violated (let's call this Consistency 1). If basic macroeconomic identities in a program are not fulfilled *ex ante*, economic agents (or at least a percentage of them) will anticipate that these identities will be met *ex post* in some way (remember that these are accounting identities that cannot be violated). Therefore, they will assume defensive positions depending on the expectations of how those agents believe that the accounting identities will be reconciled. This notion of consistency does not imply any behavioral or market assumption.

At the next level, there may be a problem with programs that—although they do not violate national accounting identities—imply values for key variables that do not seem realistic given the historical experience (Consistency 2). For instance, values of consumption/savings of households or investments by

the private sector may be projected to grow above reasonable historical precedents. While the definition of Consistency 1 is purely an accounting one, Consistency 2 implies some opinions—in this case about what are realistic values for key variables.

At an even more general level, consistency concerns may relate to whether objectives and instruments are compatible and whether those instruments are really going to help achieve the objectives within an appropriate time horizon. For instance, the program may consider public-sector deficits that are not compatible with other objectives (such as inflation or maintenance of a fixed exchange rate). In those cases, if economic agents consider that the deficit will be financed by printing money, sooner or later they would maintain high inflationary expectations, which can feed into the prices of the goods, services, factors of production, and assets that they control and transact. Also, the levels of public and/or private debt can be projected to grow as percentage of the GDP, reaching what some may consider unsustainable levels. Here there is much room for theoretical and empirical disagreements about the technical and behavioral relationships that link objectives and instruments, and what is sustainable or not, thus leading to different views about the consistency of a program (we could call this level Consistency 3).

A separate issue (labeled here Consistency 4) refers to the assumptions about the behavior of economic agents. Theoretical models used in policy analysis consider economic agents as welfare maximizers with perfect foresight (or some form of rational expectations about the future). But human beings may be moved by altruistic behavior and not only by maximization of individual welfare. On the other hand, individuals cannot be assumed to act myopically on a consistent basis, not learn from the past, or engage in decisionmaking rules that do not seem to optimize (in some sense) their welfare (or that of their families), although at times they might behave in irrational or misinformed ways. Therefore, it helps the design and implementation of an economic program if the expected reaction of economic agents is based on the assumptions that (1) they aspire to some level of welfare, at least for themselves, their family, and their social group of reference; (2) to that effect, they try to use their available information, past and present, but they also form some sort of expectations about the future; (3) in that process, economic agents learn and update expectations and the more or less elaborate

decisionmaking rules of thumb they apply; and (4) they should not be expected to make persistent and systematic mistakes.<sup>5</sup>

### **Credibility**

This requirement has less to do with whether the program can be technically and behaviorally implemented as announced (which was the scope of the discussion in the previous point) and more with the perception of whether the government really wants to implement it as announced. The point goes beyond the trivial case of a candidate who reneges on his or her electoral promises once in government. The issue is why a government in power would announce and implement a program and later reverse it. This point has been the center of what has been called the “time inconsistency” of some economic policies (this discussion was initiated with the articles of Kydland and Prescott 1977 and Calvo 1978).

Two examples may help clarify the point. In one case, the government indicates its commitment to inflation control and takes all the expected actions (for example, by reducing or eliminating the deficit, restricting money supply, and so on). Economic agents, seeing this, change their inflation expectations and later enter into contracts based on substantially lower medium-term inflation projections (for example, reflected in the prices of the companies’ supply contracts and in the wages of the labor contracts of workers). If that government is also concerned with growth and employment and controlling inflation has adversely affected those variables (at least in the shorter term), then once inflationary pressures have abated, there is an incentive for the government to try to reactivate the economy. If that is reflected in higher inflation in the medium term, economic agents that took longer-term decisions about production and labor based on lower inflation projections will be negatively affected.

The literature on time inconsistency suggests that economic agents who look ahead would perceive the change in the structure of government incentives before and after the potential policy decision. Accordingly, those economic agents would decide that, although the government did what it promised, they will not reduce their inflation expectations because that would leave them vulnerable, if—given the shift in incentives for the

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5 Perhaps an extreme example of not considering the incentives and expectations of economic agents is a true anecdote in a Latin American country where, after an economic crisis that was the result of failed policies, a minister of the economy protested that when he presented the economic program he had talked to the citizens with his heart, but that the ingrates had answered with their pockets. An economic authority that formulates a program that is consistent in the fourth meaning would be on more solid ground by assuming that economic agents do tend to answer with their pockets.

government—the latter decides to change their anti-inflationary policies. The problem of time inconsistency is that then the economy would suffer the worst of all possible worlds: for instance, a potentially recessionary economic policy implemented by the government, coupled with persistently high inflationary expectations.

Another example would be a government that needs to revive investment and offers a package of tax incentives and several fiscal, credit, and other stimuli to potential investors. If the private sector does in fact invest, then the government incentives now change in the direction of trying to recover part of the fiscal resources lost by implementing new policies that would partially absorb the net proceeds received by investors. The private sector, understanding the change of government incentives before and after the policy decision, may not make investments or may request very large and accelerated incentives to compensate for the potential policy changes.

In general, these and other examples are similarly structured. The government promises to do something that it can and wants to do and then executes it. This action, coupled with the subsequent expected reaction of economic agents, would imply a higher level of welfare for the whole economy. The problem is that if economic agents do as expected, the incentive structure for the government shifts and therefore a change in policy could be expected. If the actions of the economic agents involve some irreversibility (at least for a period of time), then they will have to bear the costs of the policy reversal. A key is the asymmetry between the possible irreversibility of decisions that economic agents would have to make and the relatively greater reversibility of government policy. If there is not an effective way to prevent the government from reassessing their decisions once they get the medium-term commitment of the economic agents, the latter acting rationally will not implement the actions or behavioral changes expected by the economic program, and the economy will be at a lower welfare level than could have been reached with a credible and nonreversible policy.

There have been some suggestions as to how to address the time inconsistency problem using legislative and constitutional reforms that ensure that the government follows certain rules of economic policy (for instance, central banks operating under legally mandated targets for inflation or fiscal rules that limit public-sector deficits), along with penalties for public officials who deviate from them. This is, however, a complex problem with no simple solution, considering that policies also need to be adjusted from time to time, when countries suffer unexpected shocks, or when there are substantial changes in general economic conditions.

### **Political Sustainability**

Although sustainability also has economic dimensions,<sup>6</sup> here the focus is on a political problem: the ability to articulate and maintain a viable political alliance with social groups that can keep the execution of the economic program on track (for example, Haggard and Kaufman 1990). In this sense, a program is not politically sustainable—although it can be technically implemented as envisaged (consistency) and the government wants to do it and will not change it (credibility)—if powerful groups (readers may pick here their preferred culprits) force the government's hand and do not allow the program to be implemented as envisaged. The general point to be recognized is that policymakers need to also take into account the nature of the distributive impacts of an economic program (that is, who wins and who loses). Based on that analysis, policymakers must then consider whether there is a political and social coalition that can support the program and whether such a coalition can be articulated as a viable political force.

### **Concluding Comments on Consistency Issues**

The focus of this book is on consistency issues, mostly emphasizing the first meaning but with references to the other consistency notions as needed. Although the focus on consistency may appear too limited a scope, it has already been noted that policy failures in developing countries are often the result of inconsistent economic programs. In particular, highlighting accounting consistency has several important advantages. First, it serves to organize the data available and as a check on its internal consistency. Before discussing the general adequacy of a macroeconomic program, it is important to be sure that the data are consistent. Second, it provides an aggregate view of the structure of the economy, helping to spot resource constraints and bottlenecks, macroeconomic imbalances that may not be sustainable in an economic sense, and, depending on the disaggregation of the accounts, it may help to understand distributive issues. Third, it is the first step in the design of shorter-term macroeconomic programs and, eventually, for developing macroeconomic and economywide models adding the respective technological, behavioral, and market assumptions (these arguments are developed in Khadr and Schmidt-Hebbe 1989).

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<sup>6</sup> As noted earlier, some of the definitions of consistency may also involve notions of economic sustainability.



## **Contextual and Structural Issues for the Analysis of Macroeconomic Policies, Agriculture, and Food Security**

The impact of domestic macroeconomic policies on a country's economy and agricultural sector is influenced by several factors. The same policy intervention may have different effects on the general economy and on different economic agents, depending on a variety of contextual factors, some related to the domestic economy and others to international conditions. Policymakers and analysts in developing countries need to take that context into account when designing and implementing specific policies.

First, it is necessary to consider prevailing domestic conditions in the country analyzed. For instance, the impact of a policy will be different if the domestic economy is growing and close to full employment, compared to conditions of low growth and considerable underutilization of human, capital, and natural resources. Also, it is important to identify the presence of imbalances in the fiscal, external, and/or banking/financial accounts that can create the possibility of some type of crisis.

Second, individual macroeconomic policies (or any policy for that matter) must be considered within the country's whole economic program. Their impact cannot be analyzed individually without a clear reference to the entire economic program (explicit or implicit) of which they are a component. For instance, an expansion of money supply will have different impacts if it is implemented jointly with expansionary or restrictive fiscal policies, with fixed or floating exchange rates, or with an economy that is open to trade or is mostly closed. Also, a reduction of agricultural tariffs will have different impacts on a country depending on, among other things, whether it is done unilaterally by that country or is the result of a multilateral exercise and whether it happens only for those products or includes other nonagricultural products and services as well.

Third, it is important to consider the structural aspects of the domestic economy, both in general and in relation to the agricultural sector in particular. Some of these aspects can be considered relatively fixed, at least within a certain period (say, five to ten years). For instance, how important is the agricultural sector for domestic GDP, employment, and international trade? What is the country's demographic profile? Who are the country's main trading partners? Are domestic markets for agricultural and nonagricultural goods and services competitive or do they show important rigidities, monopolistic characteristics, or other deviations?

Structural aspects such as land distribution (and in the short to medium term, rural infrastructure) may be crucial as well in determining the effects

of a policy: reducing (or increasing) agricultural tariffs in a country with relatively equal land distribution and good infrastructure is most likely to have very different outcomes than it would in a country with unequal land holdings and/or bad infrastructure.

Given longer periods of time, however, many structural factors may change due to policy adjustments, endogenous developments, or exogenous events. In fact, development is a process of structural transformation, both in the composition of employment and production. The demographic profile in terms of age structure and the rural/urban composition also change over time, as well as the structure of land tenure. Still, at the point in time when policymakers and analysts in developing countries must assess the impact of specific macroeconomic policies, they can avoid many faulty conclusions by being aware of the structural conditions in their countries.

Fourth, it is widely accepted that any policy with economywide impacts (nearly all macroeconomic policies) will have differentiated impacts on households and firms because of the diversity of those economic agents. Such heterogeneity needs to be considered in general, but specifically for food security and poverty alleviation, which take concrete form at the household and individual levels. Therefore, a general policy may be a blunt instrument with which to address food security and poverty problems at the individual level, and more differentiated policy approaches may be needed.

For instance, looking only at the price of food, the impacts on households will be different depending on whether households are net food buyers or net food sellers. Urban households are typically net buyers; however, as noted in Chapter 1, there are a significant number of families within rural households that are net buyers, including landless rural workers and a significant percentage of small farmers, some of whom may experience seasonal variations as net sellers/buyers. Only poor families that are net food sellers (which may not necessarily be the largest percentage of rural families in many developing countries) would benefit from higher food prices. These structural characteristics may explain why some empirical estimates (Warr 2013) have found strong and statistically significant links between higher real food prices and increases in the prevalence and depth of undernourishment, as well as the incidence of poverty. However, these may be just short-term effects, and a longer-term policy perspective may be needed as well, where negative short-term effects may be attenuated or even reversed (Ivanic and Martin 2014 and Headey 2014), as discussed in Chapter 1 and further mentioned in Chapter 12.

Finally, the evolution of the global economy, considering both trends and cycles, affects a country's performance in general and that of its agricultural

sector in particular. Domestic macroeconomic policies may have different effects depending on prevailing international economic conditions. These conditions include indicators of the global business cycle, such as whether or not the global economy is growing; whether world interest rates and world agricultural prices are high or low; the evolution of the exchange rates of major global currencies; and the level, composition, and direction of international capital flows. Other factors refer to more sustained trends, such as the increasing integration of the world economy through the expansion of trade, finance, labor, and information flows.

The impact of external shocks also interacts with domestic contextual factors. For instance, the analysis of the 2010–2011 food price shock by Ivanic, Martin, and Zaman (2011) shows that poverty increased in 27 out of the 28 countries studied, the exception being Vietnam. Vietnam was different because of its urban-rural configuration and the structure of landholdings in rural areas; the authors note that in the last two food price shocks of the late 2000s, total poverty actually decreased in Vietnam due to a larger rural population and a more egalitarian land structure, which led to more poor people being net producers of food.

In summary, to analyze the impact of specific macroeconomic policies on the economy in general and on agriculture and food security in particular, it is important to consider (1) current domestic conditions, (2) the totality of the economic program, (3) structural aspects of the domestic economy and society, (4) the heterogeneity of economic agents, and (5) the world economic environment. Many analytical mistakes result from analyzing isolated macroeconomic policies without considering the five aspects mentioned here. Most of these points will be considered in the discussion of specific macroeconomic policies in Part 3 of this book. However, because of the relevance of structural issues and heterogeneity and of the evolution of the world economy for the analysis of macroeconomic policies, agriculture, and food security, Chapter 3 discusses these two topics in greater detail.

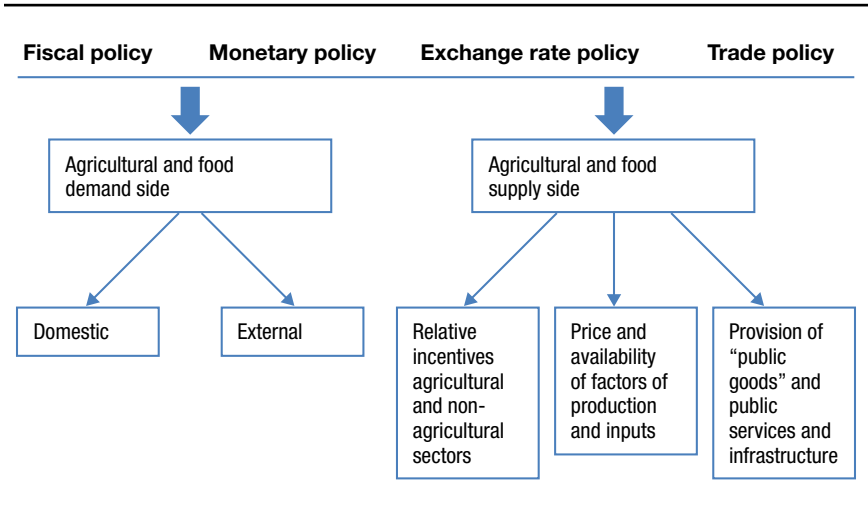
## **Macroeconomics and the Agricultural Sector**

Empirical analyses of the connections between macroeconomic policies and agriculture in developing countries have typically emphasized price effects caused by trade and exchange rate policies and have focused on two main indicators: the real exchange rate (an index of relative prices of tradable to nontradable products) and the internal terms of trade between the agricultural and nonagricultural sectors (Krueger, Schiff, and Valdés 1988). However, the impacts on agriculture stemming from different macroeconomic conditions involve a larger

number of variables and channels.<sup>7</sup> This fact has long been recognized in empirical studies of industrialized countries. In addition to the importance of the exchange rate for agriculture (Schuh 1976), macroeconomic analyses of industrialized countries have factored in other considerations such as income and demand effects, interest rates, and the impact of other monetary and macroeconomic variables operating directly or indirectly on the agricultural sector (Schultz 1945; Gardner 1981; the articles in Paarlberg and Chambers 1988, particularly Thompson 1988; and Orden 1986).

This book takes this second, broader view of the agricultural impacts of macroeconomic issues and policy options, considering the four levels identified in Figure 1.1 in Chapter 1: the farmers, which defines the primary supply side; the functioning of the whole economy and the opportunities for trade (which define the demand side); the links between supply and demand through the value chains; and the geographical setting where those activities take place (see Díaz-Bonilla, Orden, and Kwieciński 2014). Figure 2.1 presents a schematic and by necessity limited view of the several potential channels through which macroeconomic conditions and policies affect agriculture.

**FIGURE 2.1** A simplified overview of macroeconomic linkages and agriculture



Source: Author.

7 Chapter 5 in Timmer, Falcon, and Pearson (1983) presents a theoretical framework for macroeconomic and food policies in line with the broader approach followed in this book.

First, while growth models tend to focus only on the supply side, it is crucial to consider the demand side, both domestic and external. Domestic demand in general—and for agricultural products in particular—depends on the growth of the whole economy, as well as employment generation and poverty and income distribution patterns, all factors affected by macroeconomic policies. Food consumption subsidies may play an important role in some countries (with important fiscal and other general economic implications). External demand depends as well on the relative prices in the domestic and external markets. Monetary, fiscal, exchange rate, and trade policies affect the level, rate of growth, and distribution of income and the relative prices between domestic and external products, thus influencing the demand side (domestic and exports). In general, it is necessary that macroeconomic (and other) policies maintain sustainable growth of aggregate demand in line with potential aggregate supply, ensure socially inclusive and broad-based growth, and facilitate trade opportunities as part of the demand for agricultural products.

Second, the level and expected variations in macroeconomic prices (such as exchange rate, interest rates, and wages) define the relative incentives between agricultural and nonagricultural activities, with important implications for the growth path of the economy. The level and change in taxes or in transfers/subsidies from governments (all factors often influenced by fiscal and trade policies) contribute to determine incomes for agricultural producers and for the agents in the agro-industrial value chains.

Third, macroeconomic policies affect the prices and availability of factors or production and inputs (in a broad sense), impacting on the supply side of primary agriculture and the operation of the value chains. For example, credit availability depends in part on monetary and financial policy; availability and prices of inputs and machinery can be influenced by exchange rates and international trade policies; and so on. Macro prices affect the level and composition of investments, employment, and the technological bias as well.

Fourth, the operations of farmers and agricultural value chains require public productive services (such as research and extension), benefit from social services in the rural areas (such as health and education), and depend on the quality of the relevant rural and regional infrastructure (irrigation, roads, communications, and so on), all of which is affected by fiscal policies. Furthermore, fiscal policies that allow enough decentralized resources to maintain peace and citizen security in the rural areas as well as controlling endemic diseases in the countryside (such as malaria) would be removing constraints to agricultural growth that can be as limiting as a very bad resource base (Díaz-Bonilla, Orden, and Kwieciński 2014). In general, the crucial links

between agricultural supply and the domestic and external demand, ensuring that overall demand is translated in specific market opportunities for agricultural producers, are all influenced by macro policies that affect the provision of public goods and infrastructure for the rural economy and the operation of value chains.

Finally, as noted, an important objective of macroeconomic policies is to avoid economic crises—which affect growth, poverty, and food security when they happen—but also because they impact negatively on physical and human capital and can leave a legacy of public and private debt that constrains aggregate demand going forward.

All these previous channels affect the return to agricultural activities and the agricultural component of rural incomes ( $Y_a$ ). However, for individuals and families in rural areas, these activities are part of a broader array of activities. Some incomes may also come from nonagricultural sources ( $Y_{na}$ ). In turn, all activities (agricultural or other) may feature exportable ( $Y_{ax}$ ,  $Y_{nax}$ ), importable ( $Y_{am}$ ,  $Y_{nam}$ ), and nontradable ( $Y_{ant}$ ,  $Y_{nant}$ ) goods and services, as in the following simplified matrix:

	Exportable (x)	Importable (m)	Nontradable (nt)
Agriculture ( $Y_a$ )	$Y_{ax}$	$Y_{am}$	$Y_{ant}$
Nonagriculture ( $Y_{na}$ )	$Y_{nax}$	$Y_{nam}$	$Y_{nant}$

The livelihoods of rural families in developing countries tend to combine, in different proportions, more than one of these income cells. Therefore, the effects of macroeconomic conditions and policies on those families occur through a variety of channels, with ambiguous results. Events or policies that improve agricultural incomes ( $Y_a$ ) may reduce nonagricultural ones ( $Y_{na}$ ), and vice versa, with a variety of net impacts on rural families.<sup>8</sup> Even within each type of income, macroeconomic policies may have different impacts on exportable, importable, or nontradable products.

These families and firms, in turn, through their production and demand decisions, influence the levels of activity and consumption in other sectors and contribute to determine general macroeconomic conditions. If productive resources can be transferred to nonagricultural activities (which can be done for many if not most of the factors of production in the medium term) and if nonagricultural rates of return and incomes are more rewarding (after adjusting for risk and other factors) than those in agricultural activities, then

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<sup>8</sup> For instance, a strong devaluation may help the agricultural sector (as a mostly tradable sector) while negatively impacting nontradable sectors, such as construction, where poor rural migrants may look for temporary work.

families and firms in the agricultural sector will eventually transfer their productive resources to other sectors of the economy (Mundlak 2000).

In addition to the influence of various macroeconomic conditions and policies on agriculture, in developing countries the reverse causality must also be considered, particularly in those countries, such as many in Africa south of the Sahara (SSA), where agriculture represents a significant percentage of the GDP, employment, trade, and even fiscal receipts linked to exports. In those cases, the performance of the agricultural sector will determine growth, inflation, balance-of-payment conditions, and fiscal balances (see, among others, Johnson 1987, for analysis of the agricultural sector in IMF-supported programs; Ran, In, and Dillon 1995, for a specific analysis of the effects of agricultural production fluctuations on China's macroeconomic conditions; and Collier 2005, for the economywide repercussions of price and output shocks on agriculture and potential policy responses).

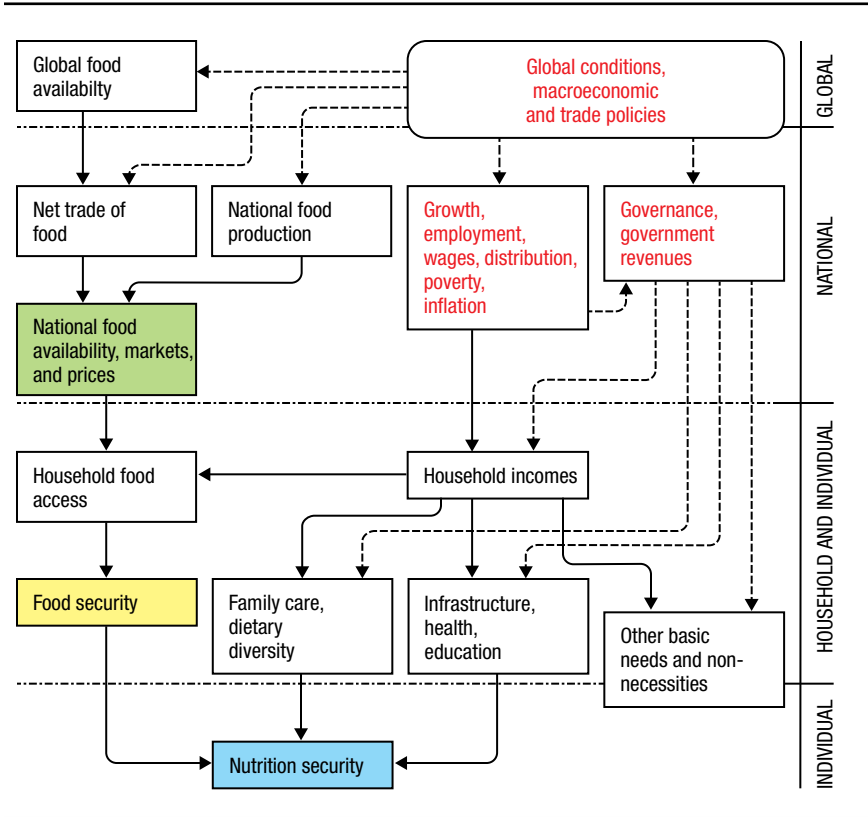
A broader analysis must consider both the static, short-term effects of policies and changes in macroeconomic scenarios and the dynamic, longer-term results, considering the agricultural and nonagricultural components of the economy. As noted earlier, ideally the impact of different macroeconomic conditions and policies on agricultural activities and rural incomes will have to be embedded in an appropriately specified macroeconomic general equilibrium model—a task that exceeds the more modest scope of this book. Part 3 on specific macroeconomic policies expands on the brief qualitative considerations discussed so far.

### **Macroeconomic Policies and Food Security**

As noted, there are four main components of the concept of food security: physical availability; access (individuals must be able to buy or otherwise get ahold of that food); utilization (which depends on the quality of food, as well as on other factors); and stability (the fact that physical and economic access should be available at all times). Considering that food (in)security has its more relevant manifestation at the individual level, it is also necessary to distinguish undernutrition from malnutrition. In this regard, it has been mentioned that the many developing countries now suffer from a triple burden of malnutrition, including undernutrition (lack of calories and proteins); overnutrition (excess consumption of fat, sugar, and salt); and deficiencies in micronutrients. Each one of the components of the triple burden has different negative impacts on human health and may be affected differently by the macroeconomic policies discussed here.

Figure 2.2 shows the different channels through which macroeconomic factors may influence the four components of food security.

**FIGURE 2.2** Macroeconomic policies and food security



Source: Author, adapted from Smith (1998).

Macroeconomic policies influence domestic agricultural and food production and food net trade (the latter two aspects defining national food availability, the first component in the definition of food security). But those policies may also have an impact on the rate and variability of growth, as well as its quality (that is, the employment, income distribution, and poverty effects). Broad employment and income opportunities define economic access (the second component of the definition of food security), which along with food availability define food security conditions at the household level.

The avoidance of economic crises and an adequate management when they arise are also central for the stability component of the definition of food



security (the fact that physical and economic access should be available at all times). Higher unemployment—and its persistence over time generated by economic crises—deteriorates human capital. Improvements in health, nutrition, and education indicators are usually slowed down or reversed by a crisis, with its negative impact on the human capital of the poor and its contribution to the persistence of poverty (Dercon and Hoddinott 2005). Decline in the human capital of the poor also affects the performance of the economy, which is an economic justification for the provision of publicly funded safety nets (Lustig 2000). Crises may also compromise the limited productive and human capital of the poor if, for instance, assets such as livestock must be sold to help small farmers face economic shocks and children are taken from school to help support the family (Lipton and Ravallion 1995).

Crises can also worsen income distribution, making it more difficult for the growth recovery to reduce poverty (Lustig 2000). A high degree of macroeconomic volatility can also cause poverty traps, not only because of the negative impact that crises can have on the human capital of the poor but also because the risky environment leads the poor to engage in low-return activities. For instance, the Inter-American Development Bank (1995) estimated that if Latin America and the Caribbean (LAC) had a level of macroeconomic stability similar to industrialized countries, the poverty headcount would have been reduced by one-quarter. Also, episodes of hyperinflation or very high inflation have been accompanied by large increases in poverty and food insecurity (Chapter 3 and Díaz-Bonilla 2008). On the other hand, it has been argued that lower inflation tends to benefit the poor because they usually have nominal incomes that adjust slowly and do not have access to financial instruments that protect them from price increases.

Another important channel of influence for macroeconomic policies is through government revenues, directly in the operation of the tax system and indirectly through the impact of the rate and quality of growth on general tax collection. The level of government revenues affects the possibility of implementing transfer policies (such as food subsidies or other poverty-oriented programs) and financing public services and investments in health, education, and related areas, all of which support different components of national food security.

Figure 2.2 emphasizes the fact that what matters, in the end, is the impact of policies at the individual level (which in the figure is labeled “nutrition security”). Availability and access at all times are only preconditions for adequate utilization of food. They do not determine unequivocally malnutrition (or nutrition insecurity) at the individual level (Smith 1998; Smith and

Haddad 2000). For instance, Smith (1998) noted that widely used indicators of food insecurity based on national food availability measured by national consumption of calories per capita (even if corrected by the gender-age structure and income distribution of the specific countries) were only weakly correlated with “deeper” measures of malnutrition, such as the percentage of child malnutrition based on anthropometrical measures. Analyzing food and nutrition insecurity at the individual level seemed to require the consideration of other determinants. In fact, Smith and Haddad (2000), in a cross-country analysis with data from 63 developing countries over the period 1970–1996, using anthropometric measures of food insecurity (linked to child malnutrition), found that in the regions with the highest rates of food insecurity (SSA and South Asia), women’s education contributed to strong declines in food insecurity, along with improvements in per capita food availability. In East Asia, the need to improve women’s education (and the status of women relative to men) ranked above food availability as a contributor to food security. In other regions, such as Latin America, North Africa, and the Middle East, increases in food availability were not as relevant, while issues such as women’s education and status and the provision of health services appear more important to reduce food insecurity.

Therefore, while macroeconomic policies affect food availability and economic access at the household and individual levels, as well as other determinants such as health services and infrastructure, there are other factors on which macroeconomic policies per se would have only an indirect effect, such as the quality and quantity of family care, mostly related to women’s relative status in the society (Smith and Haddad 2000).



## **CONTEXTUAL FACTORS: COUNTRY HETEROGENEITY AND GLOBAL ECONOMIC CONDITIONS**

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**T**his chapter first discusses a variety of characteristics that differentiate industrialized and developing countries and then looks at the significant heterogeneity within the latter category. Then it moves on to discuss changes in global economic conditions, considering that the economic performance of developing countries is clearly influenced by international macroeconomic conditions. Because differences in the structure of exports comprise an important variable to understand the economic performance of developing countries, this chapter includes a final section devoted to the impact of commodities on that performance. A main message of this chapter is that policymakers and analysts need to consider country heterogeneity, global economic conditions, and the interactions between the two when discussing adequate policy approaches.

### **Heterogeneity of Country Characteristics**

Heterogeneity will be discussed regarding three dimensions: general economic aspects, agriculture-related issues, and food security conditions.

#### **General Economic Aspects**

The Introduction notes the obvious point that developing countries are different from industrialized countries. Some differential characteristics of developing countries, with implications for macroeconomic policies, include the following: lower income per capita and a greater headcount and incidence of poverty; larger primary sectors and informal economy as a percentage of the GDP; in many cases, larger trade/GDP ratios and a greater incidence of primary products in exports; more segmented labor markets; smaller governments or, at least, a smaller tax base as a percentage of GDP; more difficulties funding domestic public and private operations in local currency; greater percentages of public debt denominated in foreign currencies; a smaller banking and financial system and a narrower set of financial instruments; higher inflation; relatively extended use of foreign currency for transactions in the internal market along with the

domestic currency; and weaker institutions of economic policymaking and of governance in general (see Agenor and Montiel 2008).

Another obvious fact, also highlighted in the Introduction, is that the category of developing countries is quite heterogeneous as well.

Table 3.1 utilizes the categories of the World Bank (countries with low income, lower middle income, middle income, and upper middle income) to show different indicators of income, poverty, general economic structure, and fiscal, monetary, financial, and trade variables.

**TABLE 3.1 Economic and social indicators**

Indicators	Low income	Lower middle income	Middle income	Upper middle income	All developing countries
GNI per capita, Atlas method (current US\$)	382.9	1,084.5	2,385.2	3,706.7	2,101.7
Poverty headcount ratio at \$2 a day (PPP) (% population)	78.4	61.6	44.3	26.7	46.1
Agriculture, value added (% GDP)	29.9	18.6	11.0	8.7	11.5
Manufacturing, value added (% GDP)	12.0	17.0	22.2	23.8	21.9
Gross capital formation (% GDP)	22.3	26.5	28.8	29.5	28.7
Broad money (% GDP)	39.1	57.2	84.2	92.2	83.2
Inflation, consumer prices (annual %)	25.7	19.3	16.7	15.9	17.0
Tax revenue (% GDP)	10.9	11.2	13.2	13.7	13.2
Taxes on international trade (% revenue)	15.9	7.2	5.8	5.0	7.4
General government final consumption expenditure (% GDP)	10.6	11.3	13.9	14.7	13.8
Total debt service (% GNI)	1.7	3.9	4.5	4.6	4.4
Multilateral debt (% total external debt)	51.3	21.0	12.5	9.1	14.1
Trade (% GDP)	56.9	57.4	60.0	60.8	59.9
Foreign direct investment, net inflows (% GDP)	2.7	2.2	3.0	3.3	3.0

**Source:** Author's calculations based on the World Development Indicators (WDI) database, World Bank (2014).

**Note:** Indicators are averages for the period 2000–2013 depending on data availability.

Compared to developing countries with higher income levels, low-income countries show a larger incidence of poverty, a larger share of the agricultural sector, and a smaller share of manufacturing activities as percentage of GDP; lower investment levels and monetization of the economy; higher inflation; lower tax revenue (but with a larger importance of trade taxes) and government consumption; and a somewhat lower trade share and foreign direct investments as percentage of GDP. On the other hand, low-income countries have a lower incidence of total debt service, and an important part of that

debt is with multilateral institutions, which tend to be a more stable source of external funding.

The upper-middle-income countries (a category that to a large extent overlaps with the IMF category of Emerging Markets; see Introduction) exhibit the reverse image of the poorer developing countries. Also, as discussed in Chapters 9 and 10, they tend to be more integrated into global financial markets with a lesser degree of government intervention regarding the current and capital balance-of-payments account. On the other hand, lower-income and lower-middle-income countries generally show less integration and more government intervention in external transactions.

These variations in economic structure and the different degrees of global financial integration have implications for the conduct of macroeconomic policies and for the transmission of global macroeconomic shocks. For instance, there are differences across developing regions in how they appear to be affected by growth in industrialized countries. An IMF (2007a) study on growth spillovers for the period 1970–2005 estimates that growth in the United States has a larger impact on Latin America and the Caribbean (LAC), with 1 percent growth in the United States leading to somewhat less than 0.25 percent growth for that region. The European Union affects the economic performance of Africa in particular, with a similar relationship of 1 to 0.25 percent. Japan does not seem to affect either of these developing regions and has only a small influence on Asia. In general, Asia seems to be more influenced by its own internal dynamics, although the United States, Europe, and Japan, in that order, appear to have some influence; however, the coefficients are far smaller than in the case of the United States and LAC or the European Union and Africa (IMF 2007a).

China's strong growth of the last decades has also had differential impacts on developing countries, depending on whether they were commodity exporters (and with variations across commodities) and on the types of manufacturing exports (with some developing countries favored by China's growth because they were integrated in value chains that were complementary with that country's production, while others were negatively affected because they were competing against those value chains) (see, for instance, Wood and Mayer 2009).

Therefore, in policy analysis it is important to understand not only the internal structure of a specific country but also its insertion in the global economy.

### **Heterogeneity of Agricultural Conditions**

In addition to variations in general economic conditions, developing countries also differ from one another in terms of their agricultural sectors.

For instance, the 2008 *World Development Report* from the World Bank (2007c), which focused on agricultural development issues, divided developing countries into three groups depending on the contribution of agriculture to growth and the importance of rural poverty. The groups were called agriculture-based countries, where agriculture contributes significantly to growth and where the poor are concentrated in rural areas; transforming countries, where agriculture contributes less to growth but where poverty is still predominantly rural; and urbanized countries, where agriculture is not the main contributor to growth and where poverty is mostly urban. Based on these characteristics, the World Bank defines separate sets of agricultural policies for the three groups of countries.

The countries in these three categories can be approximately mapped into income and geographical groupings. For instance, in general, low- and lower-middle-income countries, many from Africa south of the Sahara (SSA), represent the largest percentage in the first group. Lower-middle- and middle-income countries from South Asia (SA), East Asia and the Pacific (EAP), and to a lesser extent the Middle East and North Africa (MENA) belong in the second category. Finally, middle- and upper-middle-income countries, mostly from Latin America and the Caribbean, as well as Eastern Europe and Central Asia (ECA), are the main income groups and geographical regions in the third category.

Table 3.2 uses the developing regions to highlight the great variety in structural characteristics in their agricultural sectors. Agriculture in LAC is less important as a percentage of GDP, and the rural population in this region is smaller compared to total population than in other regions. SSA and SA (followed closely by EAP) fall on the other extreme, with agricultural production and rural population having larger incidence. But although agriculture is relatively smaller in terms of GDP in LAC, this region depends more on agricultural exports, followed by SSA. Agriculture appears to be more productive (per unit of labor) and uses more capital (using tractors as a proxy) in ECA, LAC, and MENA. The large average applications of fertilizers in Asia, particularly in EAP, may point to environmental and agricultural problems because of excess use of those inputs in several countries.

An important indicator of infrastructure is roads, and SA and then EAP show the higher density of coverage. LAC and ECA have more available arable land per capita (counting rural population) than Asian countries, with MENA and SSA in between. Average holdings are far larger in LAC, and land appears to be distributed more unequally there than in Asia and Africa (Table 3.3). Although SSA has more than double the land availability per capita than Asia, the region also shows the lowest values for the capital/technology and roads

indicators, and the average size of the plots actually farmed is similar to that in Asia. This highlights some of the opportunities, such as potentially more land to be incorporated into production, and constraints on agricultural production, such as lack of infrastructure and low productive capital, in SSA.

**TABLE 3.2** Regional agricultural indicators

Category	Europe & Central Asia	Latin America & Caribbean	Middle East & North Africa	Africa south of the Sahara	East Asia & Pacific	South Asia	All developing countries
Rural population (% total population)	41.0	22.2	41.6	64.9	54.6	70.1	55.9
Agriculture, value added (% GDP)	8.9	5.6	10.6	16.8	11.4	18.8	10.8
Agriculture value added per worker (constant 2005 US\$)	4,270.2	3,728.3	2,653.8	655.5	673.2	608.8	843.9
Arable land (hectares per rural population)	1.1	1.3	0.4	0.4	0.2	0.2	0.3
Agricultural machinery, tractors per 100 sq. km of arable land	171.1	116.0	137.1	12.8	59.1	103.0	92.9
Fertilizer consumption (kilograms per hectare of arable land)	57.9	101.4	87.6	12.4	371.3	153.5	142.1
Agricultural exports (% merchandise trade)	10.2	19.9	5.9	16.2	7.9	12.4	11.4
Road density (km of road per 100 sq. km of land area)	22.5	16.1	10.6	6.7	34.4	103.7	26.6

**Source:** The WDI database, World Bank (2014).

**Note:** Indicators are average 2005–2011, except tractors, which are calculated for 1995–2000.

More generally, those structural factors will influence the impact of different macroeconomic policies. For instance, trying to improve internal terms of trade for agricultural products (say, by a devaluation of the local currency) will have a different production response in SSA, where producers face relatively more constraints in infrastructure, capital, and technology, than in Asia or LAC. In SSA countries, the growing urban markets appear in several cases better linked to international food aid and imports than to the producers in the domestic economy. In turn, the distributive effect (and therefore the political economy implications for policies benefiting the agricultural sector) will be different in the small-farmer agricultural economies of Asia than in many LAC countries with dualistic agrarian structures and large populations of



urban poor. In the latter countries, macroeconomic policies improving relative prices for agriculture, at least on impact, may help relatively more large farmers with potentially negative impacts on poor urban consumers. The political economy of different policies will thus differ across those regions.

**TABLE 3.3** Land structure: Average size of holdings and concentration

Region/country	Average size (unweighted)	Average size (weighted)	Gini index
Africa <sup>a</sup>	2.92	1.20	0.53
Asia Developing <sup>b</sup>	2.20	1.62	0.57
LAC w/Argentina <sup>c</sup>	87.09	63.25	0.82
LAC w/o Argentina	32.53	27.66	0.82
USA	186.95	n/a	0.64
EU <sup>d</sup>	27.27	17.91	0.59
Japan/Korea	1.12	1.15	0.47
Canada	349.07	n/a	0.74

**Source:** Author's calculations based on data from the 2000 World Census of Agriculture; FAO (2010).

**Note:** a. Burkina Faso, Congo (Dem. Rep.), Djibouti, Egypt, Ethiopia, Guinea, Guinea-Bissau, Lesotho, Libya, Malawi, Namibia, Reunion, Uganda; b. India, Indonesia, Iran, Myanmar, Nepal, Pakistan, Philippines, Thailand, Vietnam; c. Argentina, Brazil, Colombia, Honduras, Panama, Paraguay, Peru, Puerto Rico; d. Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, United Kingdom.

Developing countries also differ in the structure of their agricultural trade, which has been changing over time as well, in terms of net agricultural position, products, and origin and destination.

On average, from the mid-1990s to the early 2010s, industrialized countries and LAC have had agricultural trade surpluses, supplying other developing regions that are mostly net importers of food and agricultural products, and increasingly so (Table 3.4).

**TABLE 3.4** Net trade in developing countries

Type of trade	1995–1999	2005–2009
	% Developing countries	
Net food importing	81.2	81.6
Net food exporting	18.8	18.4
Net agricultural importing	56.9	68.6
Net agricultural exporting	43.1	31.4

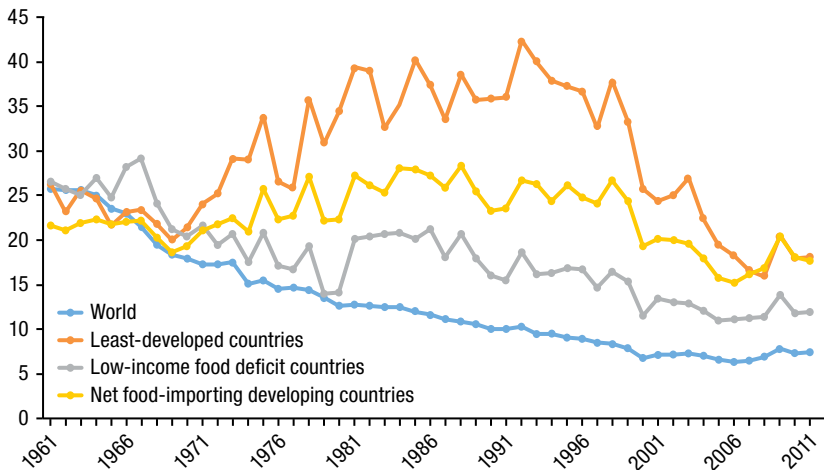
**Source:** Valdés and Foster (2012).

**Note:** The sample is between 136 and 138 countries.

The percentage of developing countries that are net importers of food and agriculture has increased from the second half of the 1990s to the present, while the percentage of net exporters has been declining. However, at the same time agricultural and food imports as a percentage of total merchandise

exports (a more adequate indicator of affordability from the point of view of the country as a whole; see Díaz-Bonilla et al. 2000) has been declining in general in developing countries. Figure 3.1 shows that in the case of three groups of countries (least-developed countries [LDCs], net food-importing developing countries [NFIDCs], and low-income food deficit countries [LIFDCs]),<sup>1</sup> that ratio has been declining significantly (the ratio shows agricultural imports; using food imports, a subset of agricultural commodities, the lines would be below the ones shown in the figure and would have the same behavior; therefore they are not included here).

**FIGURE 3.1** Agricultural imports as percentage of total merchandise exports



Source: Author's calculations based on FAOSTAT, FAO (2014).

It is also interesting to note that the agricultural and food price spike of 2008, even though visible in the figure, is below the price shock of the 1970s.<sup>2</sup>

- 1 Least-developed countries (LDCs) is a category defined by the United Nations Assembly. Net food-importing developing countries (NFIDCs) was a category defined during the Uruguay Round negotiations and incorporated into the current legal system of the World Trade Organization (WTO). Both have some legal implications for economic aid and trade negotiations. Low-income food deficit countries (LIFDCs) is a statistical category that the FAO uses to present some data.
- 2 There are two main reasons for this: the 2008 price shock has been smaller than in the 1970s (as shown later), and second, the value of total exports from developing countries has been growing faster than agricultural or food imports. At the time of this writing, there was no full data available after 2011 at the global level to evaluate the impact of that year's price spike.

Another point to be noticed is that, although developing countries in general may be net agricultural and food exporters, there have been significant advances in some developing countries that have become large net exporters. Table 3.5 shows the evolution of the countries that were net agricultural exporters in the 1990s, the 2000–2009 decade, and two more recent years.

**TABLE 3.5** Net agricultural exports (millions of current dollars)

Rank of countries	Average 1990–1991	Rank of countries	Average 2000–2009	Rank of countries	2010–2011
USA	19,951	Brazil	32,120	Brazil	60,796
Netherlands	14,054	Netherlands	21,989	Argentina	36,157
France	11,309	Argentina	20,727	USA	31,164
Australia	10,804	Australia	14,630	Netherlands	30,686
Argentina	8,008	USA	14,528	Thailand	22,729
Brazil	7,662	France	12,294	Indonesia	20,888
Denmark	5,313	Thailand	11,434	Australia	18,740
Thailand	4,864	New Zealand	8,851	France	15,672
New Zealand	4,681	Indonesia	8,658	Malaysia	14,481
Ireland	3,819	Malaysia	7,185	New Zealand	12,919
China, mainland	3,563	Canada	6,264	India	11,288
Canada	3,455	Denmark	5,966	Canada	8,782
Malaysia	3,065	Spain	4,881	Spain	7,695
India	2,104	India	4,869	Denmark	6,879
Colombia	1,951	Ireland	3,428	Ukraine	5,307

**Source:** Author's calculations based on data from FAOSTAT, FAO (2014).

During the 1990s, only one developing country (Argentina) was in the top 5 net agricultural exporters by value; only 2 more (Brazil and Thailand) were in the top 10. By 2010–2011, Brazil and Argentina had displaced the United States and Netherlands; along with Thailand, there were now 3 developing countries in the top 5 exporters. Altogether, in 2010–2011, 5 out of the top 10 agricultural exporters were developing countries. Note also the presence of Indonesia, Malaysia, India, and Ukraine among the top 15 net agricultural exporters.

The composition of agrifood exports from developing countries also exhibited important changes during the last decades, notably with the emergence of fruits and vegetables and oilseeds as the more dynamic export products, displacing traditional export crops such as sugar and coffee, tea, and cocoa. Within this general structure, there are important regional differences across Africa, Asia, and Latin America and the Caribbean. African agricultural exports still exhibit the importance of coffee, tea, and cocoa and have a larger incidence of textile fibers in total agricultural exports. Compared to other regions, Asia has a larger incidence of cereal exports. While all three regions are net exporters of fruits and vegetables and coffee, tea, and cocoa, LAC has a stronger net export position than the other regions in these products. Of

the three developing regions, LAC also has a larger incidence of meat exports (Díaz-Bonilla and Robinson 2010).

In terms of the direction of trade, developing countries as a whole export a larger share of agricultural products to developed countries, but the proportion of trade among developing countries has been growing strongly during the early 2000s, and the origin and destination of trade flows differ by developing region. Africa exports mostly to Europe and other African countries. LAC's export partners have been, until recently, mostly the European Union, the United States, and Canada, as well as other LAC countries; however, recently China and other Asian countries have become main destinations of agricultural exports for the region (the exception to this is Mexico and some Central American countries, whose agricultural exports are oriented to the United States and Canada). Developing countries in Asia, on the other hand, sell agricultural products mostly within Asia and to the European Union (WTO 2012). Therefore, changes in macroeconomic and agricultural policies in Europe, for instance, could have a relatively greater impact in Africa than in Asia, due to greater trade and financial links between the first two regions. The same can be said in the case of the United States and a number of LAC countries.

### **Heterogeneity of Food Security Conditions**

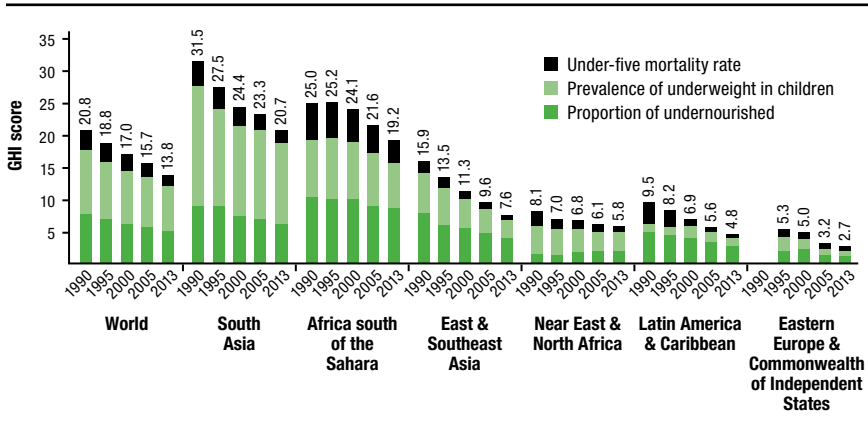
There is also a large heterogeneity of food security conditions among developing countries. Figure 3.2 classifies different developing regions based on the Global Hunger Index (GHI) (see IFPRI, Concern Worldwide, and Welthungerhilfe 2013).<sup>3</sup> South Asia and SSA show less favorable indicators (a higher number means worse hunger conditions), with the countries in the Near East and North Africa, LAC, and in Eastern Europe and Central Asia on the other extreme. A positive fact is the decline of the GHI over time,

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3 The traditional indicator for hunger and food insecurity has been the "Prevalence of Undernourishment" calculated by the FAO, which was adopted as the official Millennium Development Goal indicator for Goal 1, Target 1.9. It expresses the probability that a random individual from a country consumes an amount of calories (the habitual daily Dietary Energy Consumption) that is insufficient to cover his or her energy requirement for an active and healthy life (which is called the Minimum Dietary Energy Requirement) (FAO 2013). More recently, the International Food Policy Research Institute (IFPRI), Concern Worldwide, and Welthungerhilfe developed a Global Hunger Index that attempts to reflect the multidimensional nature of hunger, combining three equally weighted indicators into one index: (1) the proportion of undernourished people as a percentage of the population (which is FAO's indicator); (2) the proportion of children younger than age five who have low weight for their age; and (3) the mortality rate of children younger than age five (IFPRI, Concern Worldwide, and Welthungerhilfe 2013).

which indicates overall improvements in hunger conditions in developing countries.

**FIGURE 3.2** Contribution of components to 1990, 1995, 2000, 2005, and 2013 Global Hunger Index scores, by region



Source: Global Hunger Index (2013).

The indicators mentioned above are summarized in single-value variables. A different approach is based on cluster analysis, which, with its multidimensional geometry, allows for the differentiation of profiles even for the same single numerical value of food insecurity. For instance, Díaz-Bonilla et al. (2000) used cluster analysis across a world sample of developed and developing countries to classify 167 countries encompassing all income levels into 12 clusters using 5 indicators of food security: food production per capita, the ratio of total exports to food imports, calories per capita, proteins per capita, and the share of the nonagricultural population. Developing countries appear scattered across all different groups of food security and insecurity, except in the very high food-secure group, whereas developed countries are all in food-secure clusters.

As mentioned, the use of cluster analysis allows the differentiation of the shape or geometry of the components of food (in)security. For instance, SSA and South Asia have a larger percentage of food-insecure countries according to this classification, and they are predominantly rural, while LAC and Eastern Europe have more countries in the neutral food-security category and are basically urban countries (Díaz-Bonilla et al. 2000). The same policy—such as maintaining domestic prices high to help producers or the opposite of keeping those prices low to help consumers—will have different impacts in these two types of countries.

Similarly, some countries are food insecure mostly because of low levels of calories and proteins per capita; but these countries do not use large percentages of their exports to buy food. In the terminology of the study, these countries are consumption vulnerable but not trade stressed. Other food-insecure countries are a mirror image: they appear trade stressed (that is, they use a large percentage of their exports to buy food) but less consumption vulnerable (their current levels of calories and proteins per capita are close to the average for all countries considered). Again, the policy options for these two types of countries are different: for instance, the first group may increase imports to improve availability of calories and proteins, whereas the second group may need to increase domestic production.

Further distinctions across countries could be made considering the triple burden of malnutrition (Pinstrup-Andersen 2007). There have been important changes in consumption patterns in developing countries linked to increasing incomes, urbanization, and important structural modifications in the processing and marketing of food products, all of which have led to a diversification of consumption and a decline in the percentage of calories and proteins associated with the usual staple crops considered in food-security stocks. All these changes suggest the need to have a more precise typology of nutrition problems, consumer demand, and retail channels in developing countries. An approach to food security limited to a reduced number of staple crops distributed by the public system may become progressively less and less relevant in many developing countries due to these changes (see Díaz-Bonilla 2014).

### **International Macroeconomic Developments, Agriculture, and Food Security**

The analysis of scenarios for agricultural production and food security must consider several global trends and strategic drivers. Table 3.6 (adapted from Zahniser 2012) shows some of those factors, classifying them on two axes: first, whether they are economywide or agriculture-specific drivers; and second, whether they operate over longer-term (trends) or shorter-term (cycles) horizons.

The discussion of all the global factors mentioned in Table 3.6 is beyond the scope of this book.<sup>4</sup> In this section, basically macroeconomic topics are addressed, considering both trends, such as the increase in global economic integration (sometimes called globalization), and cycles, highlighting the links to global

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<sup>4</sup> For a more detailed discussion of these global factors, see Díaz-Bonilla et al. (2013).

agricultural and food security developments.<sup>5</sup> The narrative is designed to aid agricultural policymakers and analysts in developing countries to identify current and future global macroeconomic scenarios that frame the macroeconomic and agricultural policies they might be considering. Table 3.7 shows different indicators of world macroeconomic conditions during the last decades.<sup>6</sup>

**TABLE 3.6 Strategic dimensions**

Term	Economywide	Agriculture specific
Longer term (trends)	Globalization and world governance (general)	Globalization and world governance (agrifood sector)
	Economic growth (trend). Poverty and income distribution	Evolution of the agrarian structure, of the agrifood value chains, and of the rural-urban balance
	Demography and population	Consumption patterns (urbanization, sustainability, health issues, other values, impact on meat consumption)
	Trade agreements (general)	Trade agreements for the agricultural sector. Public regulations and private standards related to ag and food
	Energy trends	Constraints in natural resources (water, land)
	General technology	Agricultural R&D; productivity growth
	Climate change (general economy)	Climate change (agricultural sector)
Shorter term (cycles)	Economic growth (cycle). Employment, poverty and income distribution	Cyclical factors affecting the agrifood sector
	Exchange rates, interest rates, capital flows, and other macroeconomic factors	Agricultural trade policy
	Agricultural and food prices, price of energy (oil and others)	Global biofuel policies (short term). Stock-to-use ratio
	Weather (general economy)	Weather (agricultural sector)

Source: Author, adapted from Zahniser (2012).

## The 1960s and 1970s

### GENERAL ECONOMIC CONDITIONS

The 1960s were years of high growth, moderate inflation, and low real interest rates (Table 3.7). The world was rebounding from World War II, and the

5 See Baldwin and Martin (1999) for an early comparison of trends between two waves of globalization (roughly 1820–1914 and 1960–present). Díaz-Bonilla and Robinson (2001) and von Braun and Díaz-Bonilla (2008) discuss different meanings and indicators of globalization and analyze the implications for agriculture, food security, and poverty.

6 The data is the average for the respective decade. In this and other tables and figures, when numbers appear with an “s” as in 1960s, they refer to the whole decade.

**TABLE 3.7 World macroeconomic indicators, 1960–2009**

Indicator	1960s	1970s	1980s	1990s	2000–2009
<b>World</b>					
GDP growth (% per year)	5.5	4.0	3.1	2.7	2.6
GDP per capita growth (% per year)	3.5	2.0	1.3	1.1	1.4
Trade growth (% per year)	n/a	6.1	4.7	6.3	5.1
Trade as a share of GDP (%)	18.1	27.0	31.7	34.0	44.8
<b>Developing countries</b>					
GDP growth (% per year)	5.1	5.7	3.4	3.8	5.8
GDP per capita growth (% per year)	2.8	3.3	1.4	2.0	4.3
GDP growth (% per year) (w/o China)	5.3	5.6	2.9	2.7	4.3
GDP per capita growth (% per year) (w/o China)	2.9	3.1	0.6	0.8	2.6
<b>Inflation (% per year)<sup>a</sup></b>					
Industrialized countries	n/a	8.6	6.5	2.9	2.0
Developing countries	n/a	15.1	41.7	47.3	6.9
<b>Interest rates (%)</b>					
Nominal <sup>b</sup>	4.2	7.1	10.0	5.1	3.0
Real <sup>c</sup>	1.8	0.0	4.2	2.1	0.4

**Source:** Author's calculations based on the WDI database; World Bank (2014); and the International Financial Statistics (IFS) database, IMF (2013c).

**Note:** a. Based on the consumption index; b. US money market rate; c. Deflated using US CPI inflation. Growth is calculated at market exchange rates.

reconstruction of industrialized countries, along with the advance of economic integration in Europe, led to strong global economic growth. The economic buoyancy of those years was also helped by expansionary macroeconomic policies in many countries and by stable exchange rates (based on the Bretton Woods Agreement),<sup>7</sup> coupled with the expansion of international trade and finances (globalization). This world macroeconomic configuration helped the relatively resource-abundant, primary exporters of Africa and Latin America. Latin America and the Caribbean (LAC) and Africa south of the Sahara (SSA) were the two fastest-growing regions during the 1960s, and they continued to grow strongly during the 1970s, although by then East Asia's growth began to exceed all other developing regions. North Africa and the Middle East also benefited from higher oil prices in the 1970s. Rents from natural resources financed both the development of the industrial sector and the expansion of the welfare state to different degrees in many developing countries.

7 During July 1944, different country members of the United Nations met at Bretton Woods, New Hampshire, to discuss the global financial structure to be established when World War II ended. They agreed to the creation of the International Monetary Fund and the International Bank for Reconstruction and Development. Concerned that chaotic devaluations of domestic currencies had contributed to the Great Depression and eventually to World War II, the participant countries agreed to establish a system of fixed exchange rates (tied to the US dollar, which in turn was linked to gold by a fixed parity). The Bretton Woods system of exchange rates broke down in the early 1970s (see below).



Although global economic growth declined somewhat in the 1970s compared to the previous decade, growth was even stronger in developing countries at this time, particularly in East Asia. In the first part of the 1970s, synchronized and high growth across a variety of industrialized and developing economies sustained global demand for commodities. Table 3.8 shows average price indexes of oil, agriculture, and metals, and Figure 3.3 illustrates the evolution of nominal and real prices of agriculture based on IMF data.

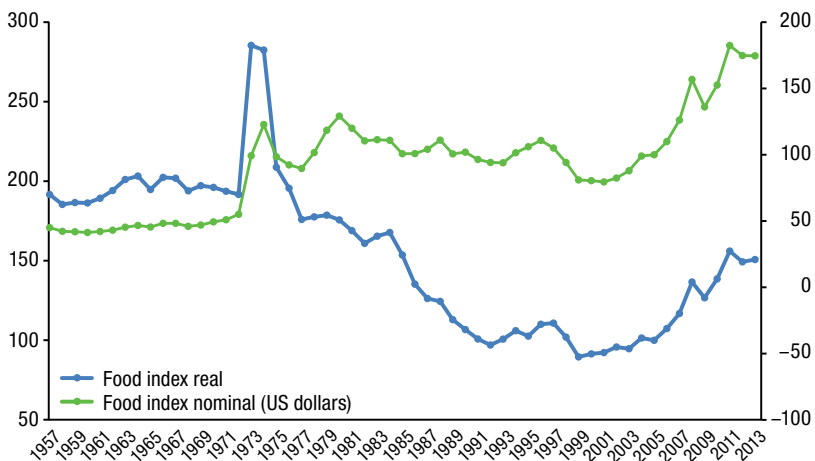
**TABLE 3.8** Nominal and real price indexes (2005 = 100)

Indicator	1960s	1970s	1980s	1990s	2000–2009	2010–2012
<b>Commodities nominal</b>						
Oil	3	19	47	34	92	180
Agriculture	38	75	100	101	105	160
Metals	31	54	63	63	106	208
<b>Commodities real</b>						
Oil	14	38	64	36	90	149
Agriculture	161	173	132	106	107	133
Metals	129	125	82	67	104	172

**Source:** Author's calculations based on the International Financial Statistics database (IMF 2013c).

**Note:** Agriculture is aggregate of food, beverages, and agricultural raw materials using IMF weights, deflated by export unit value in advanced economies.

**FIGURE 3.3** Agricultural prices, nominal (right axis) and real (left axis), in US\$



**Source:** Author's calculations based on the International Financial Statistics database (IMF 2013c).

**AGRICULTURE**

Within this supportive economic environment, agriculture showed strong growth rates in the three developing regions of Asia, Africa, and LAC during the 1960s (Tables 3.9 and 3.10).

**TABLE 3.9** Agricultural growth (total % year)

Region/country	1960s	1970s	1980s	1990s	2000s	1961–2010
World	2.6	2.5	2.3	2.3	2.3	2.4
European Union	2.0	2.3	0.7	0.6	-0.3	1.0
USA+Canada	2.1	2.7	1.0	2.4	1.3	1.9
Asia	3.2	3.0	4.0	4.3	3.0	3.5
China	4.7	3.7	5.1	5.9	3.3	4.5
India	1.7	2.4	4.2	2.9	2.6	2.8
Asia w/o China, India, Japan	3.0	3.1	3.5	3.9	3.1	3.3
Africa	3.2	1.5	2.9	3.4	3.0	2.8
LAC	3.1	3.1	2.5	3.2	3.1	3.0

**Source:** Author's calculations based on FAOSTAT, FAO (2014).

**TABLE 3.10** Agricultural growth (per capita % year)

Region/country	1960s	1970s	1980s	1990s	2000s	1961–2010
World	0.6	0.6	0.6	0.8	1.0	0.7
European Union	1.1	1.8	0.4	-0.2	-0.7	0.4
USA+Canada	0.8	1.7	0.0	1.3	0.4	0.8
Asia	0.9	0.8	2.0	2.5	1.8	1.6
China	2.5	1.6	3.5	4.8	2.7	3.0
India	-0.4	0.0	1.9	0.9	1.0	0.7
Asia w/o China, India, Japan	0.4	0.7	1.0	1.2	1.6	1.0
Africa	0.7	-1.2	0.1	0.8	0.6	0.2
LAC	0.4	0.7	0.4	1.5	1.8	1.0

**Source:** Author's calculations based on FAOSTAT, FAO (2014).

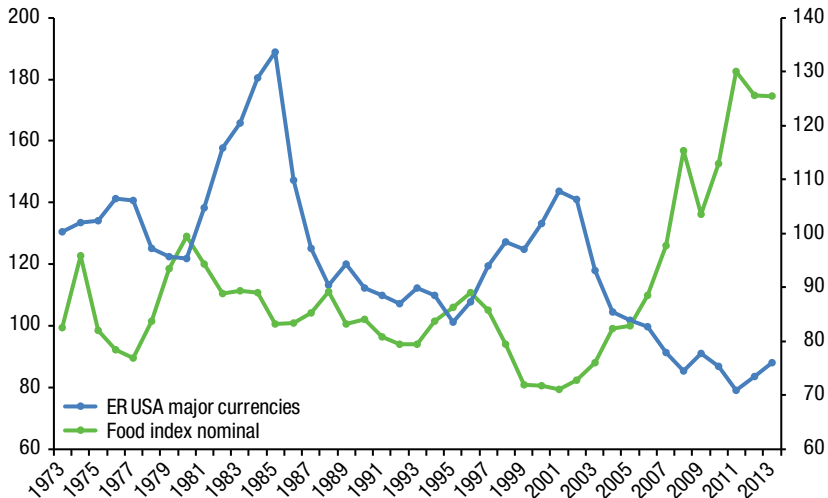
In the early 1970s, these expansionary policies led to accelerating inflation (Table 3.7). Amid global imbalances, the US dollar was devalued in 1971,<sup>8</sup> and by 1973 the Bretton Woods system of fixed exchange rates was abandoned and most major currencies began to float. The US dollar depreciated during this period, and therefore nominal prices of commodities, which are denominated in US dollars, increased.<sup>9</sup> Figure 3.4 shows the inverse relationship between the US dollar (measured as the effective nominal exchange rate

8 Devaluation, depreciation, and similar notions indicate that the currency mentioned is losing value against other currencies. These ideas will be discussed in greater detail in chapter 10 on exchange rate policies.

9 Mundell (2002), among others, pointed out the inverse relationship between the value of the US dollar and the price of commodities in that currency.

against major currencies) and the IMF nominal index of food products (closely correlated with the agricultural index of Figure 3.3).<sup>10</sup>

**FIGURE 3.4** US effective exchange rate (right axis) and nominal index (left axis) for food products



**Source:** Author's calculations based on the International Financial Statistics database (IMF 2013c) and Federal Reserve (2014).

Agricultural prices jumped over 70 percent in 1973 (food prices increased about 80 percent),<sup>11</sup> but other commodity prices also increased significantly. In the case of oil, the jump took place in 1974 (the year after the sudden increase in agricultural prices) and was also related to geopolitical developments in the Middle East. The oil shock led to a significant slowdown in the

10 These terms are more precisely defined in Chapter 10. The nominal food index is from the IMF/IFS database. The US exchange rate is the index for major currencies in nominal terms calculated by the Federal Reserve (2014) ([http://www.federalreserve.gov/releases/h10/summary/indexn\\_m.htm](http://www.federalreserve.gov/releases/h10/summary/indexn_m.htm)). Major currencies include the euro, Canadian dollar, Japanese yen, British pound, Swiss franc, Australian dollar, and Swedish krona. There is also a broader index that considers more than twenty currencies (including those mentioned in the major currencies). The indexes can be calculated in nominal or in price-adjusted terms. The chart shows the same pattern if presented using the price-adjusted index for the broader set of currencies.

11 In addition to high growth, a depreciating dollar, and expanding inflationary pressures, the jump in agricultural prices was also related to poor weather conditions in many parts of the world (a cyclone in Bangladesh in 1970, a long drought in SSA, a partial failure of the Soviet cereal crop in 1972, and floods in India) and a hike in fertilizer prices, partly due to problems with Morocco's fertilizer industry.

global economy in 1974 and 1975, with many industrialized economies and close to 40 percent of the developing countries experiencing recessions.

The interaction of global macroeconomic conditions and agricultural production during this period differed by developing region (Tables 3.9 and 3.10). LAC had the best agricultural performance during the 1960s; it continued to do well in the 1970s, although with a decline from the previous decade. High world prices fueled the expansion of exportable and import-substitution agricultural products, while strong domestic demand and the expansion of the manufacturing sector provided demand for food and agricultural raw materials. Although the overall policy strategy during this period was considered to be biased against the agricultural sector, supportive world markets and domestic income growth helped generate comparatively higher growth rates in LAC's agricultural sector in the 1960s and 1970s. Advances in agricultural technology, linked to the expansion of the Green Revolution and supported by the creation of national institutes of agricultural technology and the expansion of public and private infrastructure, provided the material basis for that rapid growth.

In SSA, agricultural growth declined during the 1970s, due in part to war and civil conflict associated with the difficult transition from colonial rule to independence, macroeconomic imbalances, a lack of investment in agriculture, a high incidence of disease in rural areas, and antitrade biases. For some African countries, the emergence of mineral exports appreciated exchange rates during this period, which appears to have had a negative effect on agriculture and agro-industry. The general jump in commodity prices (Table 3.8) facilitated increases in public and private indebtedness that resulted in the debt crisis of the 1980s in several countries (similar to what occurred in LAC).

Asia's agriculture showed sustained growth during the 1960s and 1970s, mostly determined by domestic conditions and overall economic growth. In general, the density of the region's population, the mostly small-farm basis of production, and the fact that the ratios of exports and imports to domestic production were not high all made agricultural growth largely dependent on the domestic market. Advances in agricultural technology, irrigation, and infrastructure in general provided the material underpinnings for Asia's fast growth in agricultural supply, while domestic growth sustained the demand side for agricultural and food products.

#### **POVERTY AND FOOD SECURITY**

The strong growth at the level of the whole economy and of the agricultural sector in many developing countries helped to reduce poverty and to improve food security. The World Bank (1990, 40) estimated that in the period from the

1960s to the early 1980s, there was “considerable progress in reducing the incidence of poverty, a more modest reduction in the number of poor, and achievement of somewhat better living standards for those who remained in poverty.”

## The 1980s

### GENERAL ECONOMIC CONDITIONS

The breakdown of the Bretton Woods system of fixed but adjustable exchange rates and the oil shocks of the 1970s changed global macroeconomic conditions. After the first oil crisis, industrialized countries tried to fight the economic decline with expansionary fiscal and monetary policies (as agreed in the 1978 Bonn Summit of industrialized countries). Also, developing countries were encouraged to borrow against ample export revenues supported by high commodity prices.<sup>12</sup> All of these policies contributed to global economic growth and inflation in the latter part of the 1970s. After the second oil crisis at the end of the 1970s, inflation jumped to double digits, and industrialized countries shifted to contractionary macroeconomic policies to fight inflation. Real interest rates skyrocketed.<sup>13</sup> This policy change led to recession early in the decade; global economic growth in 1982 was the lowest of the five decades shown in Table 3.7.<sup>14</sup> By the mid-1980s, real commodity prices had collapsed, and they continued declining in the 1990s (Table 3.8 and Figure 3.3).

In the case of agriculture, declines in world prices during the 1980s were associated with slumping global growth, but they also resulted from other factors, such as expanded public support of agricultural production, particularly in the European Union through the Common Agricultural Policy; changes in the US Farm Bill of 1985; the 1980s debt crises in developing countries; the agricultural transformation in China; the expansion of the Green Revolution in many developing countries; and the breakup of the Soviet Union. All of these developments added to the supply side and/or weakened the demand side, leading to the collapse of agricultural prices in the mid-1980s (see Borensztein et al. 1994; Díaz-Bonilla and Reza 2000). In the case of oil, from

12 The funding came from the increase in US dollar holdings by oil producers deposited in Western banks (this was the notion of “recycling of petrodollars” promoted by industrialized countries).

13 Monetary authorities in key industrialized countries raised nominal interest rates substantially above inflation rates, leading to high real interest rates: 10.0 percent in nominal terms and 4.2 percent in real terms on average during this decade, with a peak of about 6–8 percent in real terms in the early 1980s (see Díaz-Bonilla and Robinson 2010).

14 As discussed later, it remains to be seen what will be the performance of the decade of the 2010s as the world struggles with the aftermath of the global financial crisis of 2008–2009.

early 1982 until late 1985, OPEC had implemented supply restrictions, with Saudi Arabia acting as a supply buffer. That arrangement broke down by early 1986 because of increased production in non-OPEC countries (Kilian 2006). When, in the mid-1980s, the United States stopped acting as a demand buffer for agricultural products,<sup>15</sup> and Saudi Arabia decided not to be a supply buffer for oil, the result was a generalized decline in commodity prices.

Countries that had borrowed against expectations of high commodity prices during the 1970s, mainly in LAC and Africa, were hit first by changes in macroeconomic conditions early in the decade and then by the collapse of commodity prices in the mid-1980s, driving them into a phase of debt distress and economic crises.

Asian countries in general adjusted earlier and more efficiently to the economic shocks of the 1980s than countries in Africa and Latin America. They were helped by generally lower levels of indebtedness, because they were, with some exceptions, not resource-abundant, commodity-exporting countries and therefore could not borrow much in international markets during the time of high commodity prices. Also, the relatively more resource-constrained countries of Asia were increasingly importing primary goods and gradually specializing in exporting manufactured goods. As a consequence, they were less affected by the decline in commodity prices during the 1980s and eventually benefited from it.

### **AGRICULTURE**

Depressed global food and agricultural prices during the 1980s and 1990s discouraged investment in the rural sector of developing countries, mainly in LAC and SSA. The World Bank and other development banks began to cut loans for agricultural and rural development projects, a decision that was influenced in part by low world agricultural prices that reduced those projects' returns (Lipton and Paarlberg 1990).<sup>16</sup> The lack of rural dynamism also contributed to an increase in rural migration to cities and to premature or

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15 The US Farm Bill of 1980, anticipating levels of inflation that later did not materialize, established high nominal values of domestic support prices for agricultural commodities. Because of the way the US Department of Agriculture managed and accumulated stocks, it actually acted as a global demand buffer, providing support to world real prices. This was modified significantly in the 1985 Farm Bill, which began the process of unloading onto world markets the stocks previously accumulated and started an export subsidy trade war, supposedly aimed at the European Union but in fact depressing global prices of the commodities affected.

16 World Bank agricultural lending declined (in constant 2001 US dollars) from about \$5 billion and some 30 percent of total World Bank lending in the late 1970s and first half of the 1980s to \$3 billion and 10–15 percent of total lending in the second part of the 1980s. By the early 2000s, agricultural lending had declined further to about \$1.5 billion and 7 percent of total World Bank loans. Similar trends occurred in other multilateral institutions and individual donors (Lipton and Paarlberg 1990).

excessive urbanization in many developing countries. Low food prices also transformed several developing countries, particularly in SSA, into net food importers by discouraging the domestic production of staples and close substitutes. Those countries increased their need for subsidized food from abroad, while amplifying their external vulnerability by becoming extremely specialized producers of tropical products. At the same time, however, low prices, other things being equal, should have helped net consumers of food, particularly the urban poor. The net impact on poverty of those developments differ by country, depending on the particular constellation of price, investment, employment, and external vulnerability conditions.

The agricultural sector in Asia, however, continued growing (Tables 3.9 and 3.10). The different performances of Asia on the one hand and of Africa and LAC on the other were in part related to their dissimilar policy reactions, both at the level of the economy and for the agricultural sector (which continued to be supported in Asia). But the decline in world export shares by Africa and LAC also reflected the fact that these regions were more dependent than Asia on industrial countries' demand for agricultural products (and other commodities), and that sectoral agricultural and trade agricultural policies in industrialized countries were changing in ways that undermined agricultural and agro-industrial production and exports from Africa and Latin America.

#### **POVERTY AND FOOD SECURITY**

Regional poverty trends during the 1980s followed overall economic and political performance in the regions: the share of people living in poverty dropped significantly in East Asia and South Asia (where growth rates exceeded those in other developing regions)<sup>17</sup> but increased in Latin America and the Caribbean and Africa south of the Sahara (Chen and Ravallion 2008). At the lowest poverty line (usually called, as an approximation, the 1 US dollar/day),<sup>18</sup> the poverty headcount went from about 67 percent in East Asia and 42 percent in South Asia in 1981 to 39 percent and 34 percent, respectively, by 1990. In Latin America, poverty increased from about 7.7 percent in 1981 to 9.2 percent in 1984, and it was still at 8.9 percent in 1987. In Africa south of the Sahara, poverty moved from 42.6 percent in the early 1980s to more than 45 percent in the mid-1980s and 47.5 percent in 1990. Declining trends in the

17 Another important development was the relocation of Cold War confrontation from Asia in the 1950s and 1960s to Africa (and Central America) in the 1980s. Therefore, Africa suffered a triple shock in the 1980s: a macroeconomic and debt crisis, a commodity crisis, and a geopolitical crisis, all with devastating effects that are still being felt in the region.

18 The actual value is 1.25 US dollars in 2005 prices corrected by purchasing power parity, which makes prices in domestic currency more comparable in international values.

incidence of poverty were also observable at higher poverty lines (such as 2 US dollars/day and higher) (Chen and Ravallion 2008).

Related to the increases in poverty, other social indicators were also negatively affected in LAC and SSA: for instance, Paxson and Schady (2004) found that the 1988–1992 crisis in Peru led to increases in infant mortality and a visible deterioration in nutritional conditions among children.

## **The 1990s**

### **GENERAL ECONOMIC CONDITIONS**

During the second part of the 1980s, the United States continued to ease its monetary policy, particularly after the country's 1987 stock market crash. This expansionary monetary policy eventually led to the boom-and-bust associated with the housing market and the crisis of the US system of savings and loan mortgage banks in the late 1980s and early 1990s. The oil price spike generated by the first Gulf War also contributed to the global economic downturn at the beginning of the 1990s.

This US recession in the early 1990s, coupled with low real interest rates in industrialized countries, sent capital flowing back to developing countries, particularly to Asia. Figure 3.5 illustrates net private capital flows to developing countries as a percentage of GDP.

Global macroeconomic conditions changed drastically when US monetary authorities initiated a period of tightening in the second half of the 1990s amid concerns about increasing inflationary pressures. Capital flows to developing countries stopped and even reversed once interest rates and the value of the US dollar began to increase in the mid-1990s (Figure 3.5). That turnaround in capital flows led to a wave of developing-country debt crises, first in Mexico in 1995 and followed by several countries of East Asia in 1997, Russia in 1998, Brazil in 1999, and Argentina in 2001. During this period, if we exclude China, overall developing country growth performance was very weak (2.4 percent total GDP growth and 0.5 percent in per capita terms; Table 3.7).

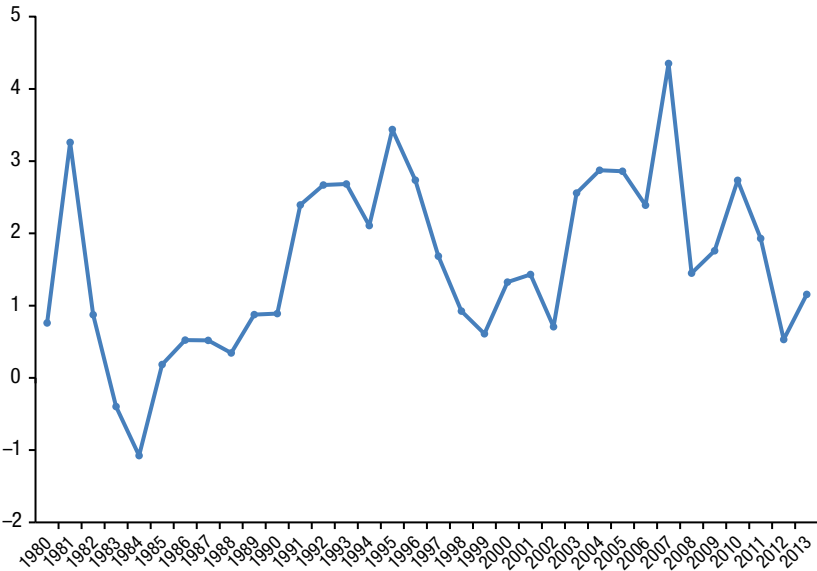
### **AGRICULTURE**

In LAC, trade and economic liberalization (including the accelerated pace of regional economic integration), the return of capital flows, and the resumption of total domestic growth all supported agricultural production during the first half of the 1990s. Agriculture in the region was further helped by better international conditions: first, the world recovered from the mild recession at the beginning of the decade; and second, agricultural trade wars (using subsidized exports) between the European Union (EU)



and the United States declined in intensity, thanks in part to the agreements of the World Trade Organization (WTO) negotiated during the Uruguay Round and concluded in 1994.<sup>19</sup>

**FIGURE 3.5** Net private capital flows as percentage of GDP in emerging and developing countries



Source: Author, based on IMF (2013c).

Several African countries began to correct their macroeconomic imbalances and antitrade policies during the 1990s, and agricultural growth recovered as a result. In Asia, aggregate growth continued strong, supported by the cycle of high capital inflow during the first part of the decade.

But then when the wave of financial crises hit in the second part of the 1990s, conditions for agriculture changed. The currency devaluations in Asia

<sup>19</sup> There have been several rounds of global trade negotiations before and after the creation of the WTO. During the period of the General Agreement on Trade and Tariffs (GATT), the precursor of the WTO, the rounds of negotiations were as follows: 1947 (Geneva), 1949 (Annecy), 1951 (Torquay), 1956 (Geneva), 1960–1961 (Dillon Round), 1964–1967 (Kennedy Round), 1973–1979 (Tokyo Round), and 1986–1994 (Uruguay Round). Since the creation of the WTO, the Doha Development Round was launched in 2001 but has not been completed yet. There was a partial agreement during the WTO Ministerial Conference that took place at Bali, Indonesia, in December 2013.

led to a contraction of demand for agricultural products in world markets, whereas those in Brazil and Argentina expanded world supplies. This combination of increased supply and decreased demand resulted in the decline of global agricultural prices at the end of the 1990s and the beginning of the 2000s (IMF 1999). This new economic configuration, combined with economic slowdown in the industrialized world and the appreciation of the US dollar in the early 2000s, had negative repercussions on global agricultural markets, as well as other commodities: their prices reached their lowest values in nominal and real terms during this period (Figures 3.3 and 3.4).

### **POVERTY AND FOOD SECURITY**

The sudden emergence of financial crises and the subsequent disruption of the economies of many Asian and South American countries affected the poor and, therefore, food security. World Bank data show that, in general, the percentage of poor people increased in Latin America and the Caribbean (from about 6 percent in 1993 to almost 7.4 percent in 1999, using the 1.25 US dollars/day as the poverty line) and stayed the same or declined very slowly in Asia and Africa south of the Sahara during the second half of the 1990s (Chen and Ravallion 2008). These figures are regional aggregates, however, and only some of the countries (mostly middle income) were affected by financial crises. For the countries affected, the financial crises had clear negative impacts on poverty: the median value of the percentage of poor people living on less than 1.25 US dollars/day increased from 5.2 percent before the crisis to 7.3 percent afterward; the median value of the percentage of people living on less than 2 US dollars/day jumped from 23 percent to almost 28 percent (see Díaz-Bonilla 2008).

Also, the countries affected by the Asian crisis, such as Indonesia and Philippines, saw the prevalence of undernourishment increase (from 16.0 percent and 21.7 percent respectively before the 1997 crisis, to 19.0 percent and 22.4 percent afterward), and in LAC the percentage of prevalence stagnated at 12 percent during the second part of the 1990s, after having experienced consistent declines in the previous years (see the food security section in FAO 2014).

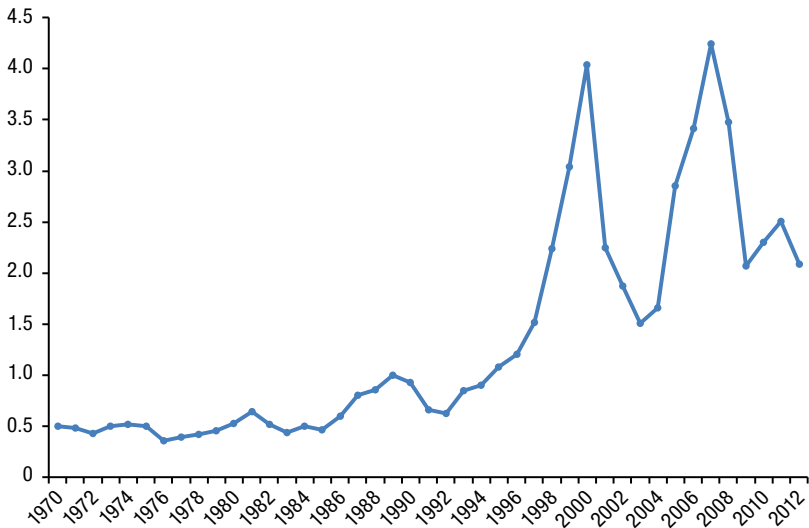
## **2000–2009**

### **GENERAL ECONOMIC CONDITIONS**

In this decade, the process of global economic integration (or globalization), which started slowly after World War I with the new architecture for international economic governance based on the Bretton Woods agreement,

increased during the 1990s and accelerated further in the early 2000s. Two usual indicators of financial and trade integration are foreign direct investment (FDI) and trade as percentages of world GDP (Baldwin and Martin 1999). Figure 3.6 shows the important jump in FDI as a percentage of world GDP from about 0.5 percent in the 1970s to more than 4.0 percent in the last two cycles of international capital flows.<sup>20</sup>

**FIGURE 3.6** Foreign direct investment (FDI) as percentage of GDP, net inflows



**Source:** Author's calculations based on World Bank (2014).

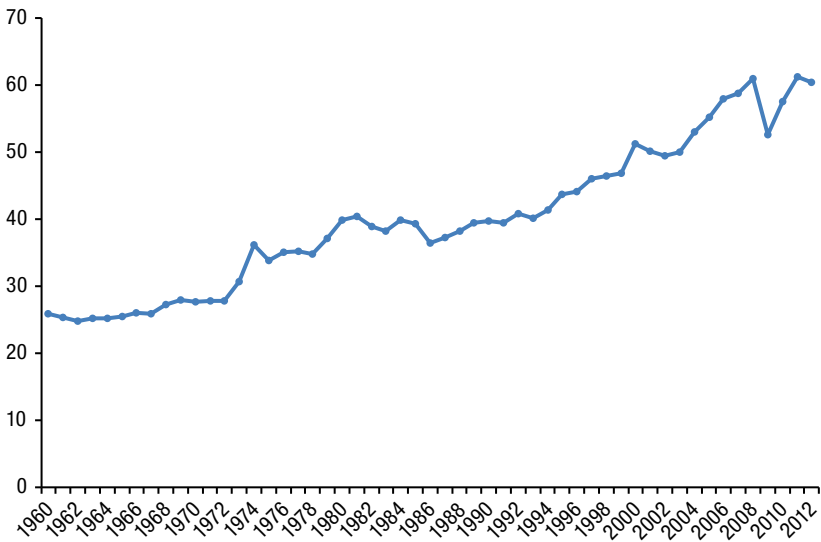
Trade (exports plus imports) as a percentage of the world GDP also increased from about 25 percent in the 1960s to almost 40 percent in the 1980s and early 1990s (Figure 3.7), but then it jumped to 60 percent until it sharply dropped during the crisis that started around 2007. Since recovering from the lows of 2008–2009, trade as a percentage of world GDP has been mostly stagnant.

Other global developments that began to emerge in the mid-1990s hit with full force once the global economic slowdown of the early 2000s ended. First,

<sup>20</sup> It should be noted that Figure 3.6 is different from Figure 3.5: the former looks only at FDI for the world, while the latter shows all private capital flows (which include more than FDI) but only for emerging and developing countries.

millions of workers were incorporated into the global economy because of both policy changes in China, the end of the Cold War, and economic liberalization in a variety of developing countries, putting downward pressure on salaries and the price of manufactured goods and helping reduce global inflationary trends.<sup>21</sup>

**FIGURE 3.7** Trade as percentage of GDP



**Source:** Author's calculations based on World Bank (2014).

Second, low inflationary pressures allowed central banks in industrialized countries to maintain more expansionary monetary policies than what would have otherwise been possible. Monetary policies were also expansionary in developing countries, as a result of current account surpluses and an accumulation of reserves of foreign currency that expanded their own domestic

<sup>21</sup> The substantial supply-side shock can be better appreciated considering the implied shift in labor supply: the IMF (2007b), using the simple approach of weighing each country's labor force by its export-to-GDP ratio, estimated that the effective global labor supply quadrupled between 1980 and 2005, with most of the increase taking place after 1990. In these calculations, East Asia contributed about half of the increase because of the rise in the working-age population and increasing trade openness.

money supply and accelerated growth.<sup>22</sup> Those reserves were invested in dollar-denominated instruments, contributing to a reduction of long-term interest rates in those countries and putting downward pressure on global interest rates (Table 3.7).

Developing and emerging countries became net exporters of capital, which, along with traditional surpluses from Japan, went mostly toward the United States. As a consequence, the United States began to show steady increases in the deficit of its external accounts after the mid-1990s,<sup>23</sup> until it reached a record of more than 6 percent of its GDP in 2006 (or somewhat more than 1.6 percent of the world GDP, a level unprecedented in modern economic history; Díaz-Bonilla and Robinson 2010). The US external deficit, low interest rates, and expansion of credit all supported global growth.

This growth, in turn, began to push up nominal and real prices of several commodities. The devaluation of the US dollar beginning in the early 2000s also added pressure to commodity prices, including food (Table 3.8 and Figure 3.3). Some commodities, such as metals and oil, experienced not only nominal gains but also real increases, surpassing the peaks achieved in the 1970s (Table 3.8). For agricultural goods, however, the story has been somewhat different, as discussed below.

This configuration of world economic conditions generated two bubbles during the early 2000s in the housing and the stock markets that sustained growth and consumption in the United States and the developed world and that provided an outlet for the expansion of production, especially in East Asia. In other words, the real side shock of the expansion of available world labor was accommodated by monetary expansion in the United States and other industrialized countries, imparting a strong pro-growth tilt to the world economy as a whole.<sup>24</sup>

This growth model ended when concerns about inflation led to a reversal of the accommodative US monetary policy by mid-2004, putting in motion the events that generated the housing and related credit crises that started in 2007–2008 in several industrialized countries. A global credit crunch ensued,

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22 As discussed later in Chapters 4 to 7, the monetary expansion results from the fact that a central bank buys dollars from exporters, who receive domestic currency. In the absence of other compensatory action by the central bank (such as buying domestic currency with bonds), money supply expands.

23 I am referring here to the current balance-of-payments account. The section on national accounts contains a more detailed discussion of these concepts.

24 The European Union had a separate internal problem linked to the excess borrowing from certain countries within the block, as a result of the decline in perceptions of risk related to the common adoption of the euro.

and in 2009 the world suffered the first negative GDP growth since the 1930s (−2.1 percent for total GDP and −3.2 percent for GDP per capita). While from 2000 to 2008, global GDP (measured at market exchange rates) had grown at 3.1 percent per year, the average annual growth during 2008–2013 dropped to about 1.9 percent.

A global coordinated response of monetary, fiscal policies, and financial policies was engineered through the Group of 20 (G20),<sup>25</sup> which helped stabilize the world economy, but there are still significant weaknesses in fiscal and financial conditions in many developed and developing countries, and these conditions have slowed down growth.

### AGRICULTURE

These macroeconomic events had several implications for agricultural growth. A first point to be noticed is that the evolution of agricultural prices was somewhat different from that of metals and oil. Although in the second half of 2007 and early 2008, nominal agricultural prices increased significantly, agricultural prices in *real* terms stayed below highs seen in the 1970s, although there was a clear reversal in the trend toward declining real agricultural prices (Table 3.8 and Figure 3.3).

These price developments were related to different factors, such as (1) the resumption of world growth and greater demand from developing countries in 2000–2005; (2) climatic shocks during 2005–2009 that affected agricultural production in many regions; (3) expanded biofuel mandates and subsidies in major industrialized countries, which increased the demand for crops used for fuel; (4) low stock-to-use ratios for several key crops; (5) changes in US monetary policy in late 2007 and early 2008 that led to further declines in the value of its currency (which, as noted earlier, led to increases in the prices of commodities in US dollars); (6) changes in the trade policies of several key producers, including, among other measures, restricted exports to maintain their own domestic supplies; and, perhaps, (7) financial speculation, with investments by commodity funds seeking short-term gains and hedges against inflation (von Braun 2007; Headey and Fan 2010; Torero 2012).

The 2008 spike in the international prices of several food commodities generated global concerns, particularly in developing countries, some

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25 The G20 is an international forum that started with the economic authorities of several large countries but since the 2007–2008 financial crisis has included presidents and prime ministers. The members are 19 individual countries (Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Russia, Saudi Arabia, South Africa, South Korea, Turkey, United Kingdom, and the United States) and the European Union.

of which suffered from social and political upheaval as a result of the shock. These countries tried to reduce price increases and volatility through a series of measures focusing on trade (export restrictions and adjustments in import taxes), consumption (price controls and the expansion of consumer subsidies and safety nets), and production (subsidies for inputs and expanded credit). Some of those measures, as noted, served only to further exacerbate the spike in world prices. Since 2008, food prices and price volatility have declined somewhat; in addition, the transmission from global prices to domestic ones appears to have been muted by the appreciation of exchange rates in several developing countries (see Chapter 10 on exchange rate policies for more details), as well as by the different domestic policies mentioned.

### **POVERTY AND FOOD SECURITY**

Global macroeconomic events also affected poverty and food security, with diverse effects depending on the phase of the cycle. After the world recovered from the deceleration of the early 2000s, strong growth, falling inflation, and lower volatility translated into declines in poverty (as a percentage of the population) in all developing regions. In fact, World Bank data for 2005 recorded the lowest levels of poverty for all developing regions up to that time (measured at different poverty lines, from 1.25 US dollars/day to 2.5 US dollars/day), since comparable numbers have been compiled starting in the early 1980s. Even the absolute number of poor (measured at 1.25 US dollars/day) declined for all regions from the levels of the late 1990s (Chen and Ravallion 2008).

These positive trends were interrupted, however, by the increase in fuel and food prices of late 2007 and early 2008. World Bank (2009a) estimated that these price spikes may have sent between 130 and 155 million people into poverty (increasing the poverty incidence by 1.3–1.5 percentage points). The economic decline in 2009 was also estimated to have increased poverty in many developing countries by an additional 50 million poor people (measured at the 1.25 US dollars/day poverty line), compared with the period previous to the crisis (and the number is even greater if higher poverty lines are used) (World Bank 2009a; 2009b). Estimates of the impact of the 2010–2011 food price increases on poverty were more modest (see Ivanic, Martin, and Zaman 2011).

However, subsequent estimates showed that poverty and undernourishment continued to decline in developing countries, although at a lower rate than before: while in the period of the 2000s previous to the crisis, poverty (at 1.25 US dollars/day) declined by about 1.4 percentage points (pps) per year, since 2008 it has been dropping by 1.03 pps/year (data from World Bank 2014).

## The 2010s

During the 2010s, amid economic weakness in the industrial countries, developing and emerging countries have been expanding their share of global GDP, particularly when measured in purchasing power parity. According to the IMF/WEO database, developing countries' world shares of global GDP (at purchasing power parity [PPP] values) grew from 31 percent in 1980 to 51 percent in 2013 (and, correspondingly, advanced countries' share of global GDP fell from 69 percent to 49 percent).<sup>26</sup> In other words, in 2013, for the first time in modern history, developing countries represented a larger share of global GDP than advanced economies (using the categories of the IMF, which are somewhat different from those of the WTO and World Bank, as discussed earlier).

General economic advances in developing countries have been accompanied by changes in agricultural production, trade, and policies. In terms of global production, developing countries now represent about 75 percent of total agricultural production (as measured in constant international dollars by FAO/FAOSTAT). The increase in developing countries' share in production since the 1960s, which is almost 29 percentage points (pps), can be explained mostly by Asia's expanded production (23 pps, of which China represents about 14.6 pps and India almost 2 pps); however, production in Latin America and the Caribbean (LAC) has also increased (3.5 pps), as has production in Africa (1.2 pps) (Díaz-Bonilla 2013 and 2014).

Different developing countries (mostly in the middle- and upper-income categories) have also been increasing support for their agricultural sector. Indicators of support for agriculture, such as the Nominal Rate of Assistance (NRA) (as calculated by a World Bank project), the Producer Support Estimate (PSE) (computed by the OECD), and the categories of domestic support as defined in the Agreement on Agriculture that must be reported to the WTO, all show increases in agricultural support (Díaz-Bonilla 2014).<sup>27</sup>

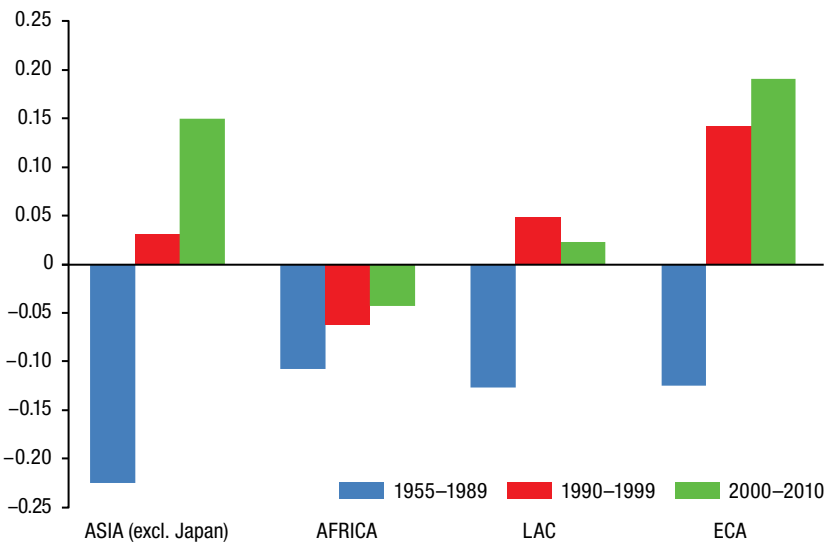
26 Remember from the Introduction that the IMF divides countries into developing economies, emerging countries, and advanced economies. In the text, the notion of developing countries includes the first two categories of the IMF.

27 The PSEs and NRAs are economic measures of support to agricultural producers. Increases (decreases) in their values in a country broadly indicate expanded (reduced) support to agricultural producers. A third indicator of domestic support for agriculture is defined in the Agreement on Agriculture of the WTO. The NRA and the PSE have more in common in their calculation, but the WTO measure is significantly different from the other two. Both the NRA and the PSE include support through trade measures (which usually imply a transfer from consumers to producers), plus different measures of support that imply fiscal expenditures (that is, they represent transfers from taxpayers to producers). For the calculation of the NRA, see Anderson and Valenzuela (2008) and the database at [www.worldbank.org/agdistortions](http://www.worldbank.org/agdistortions). Comparisons of PSE and different WTO measures of domestic support can be found in Effland (2011); Brink (2009).



Figure 3.8 shows the NRA estimates.<sup>28</sup> The shift from taxing the agricultural sector (a negative number in the figure) to supporting it through different measures (a positive number) becomes particularly clear in Europe and Central Asia, where the NRA moved from a tax equivalent of about 10–20 percent of the value of total agricultural production from 1955 to 1989 to a positive transfer to agriculture since the 1990s, reaching some 15–20 percent of total agricultural production in the early 2000s. LAC countries also shifted from taxing agriculture in the 1950s–1980s to supporting the sector since the 1990s, but the NRA in this region stayed below 10 percent and declined even further in the early 2000s. Africa, on the other hand, continues to tax agriculture but at smaller rates, moving from about –10 percent to somewhat less than –5 percent in the early 2000s.

**FIGURE 3.8** Nominal Rate of Assistance (NRA) total (%)



**Source:** Author's calculations based on data from Anderson and Nelgen (2013).

The Producer Support Estimates (PSEs) calculated by the OECD provide a comparative view of the advances in support in developed and developing countries (see also Bureau and Jean 2013). Table 3.11 shows the value of the

<sup>28</sup> The data in the Chart is from Anderson and Nelgen (2013), as part of a recent World Bank exercise covering a large number of developing countries.

PSEs in billion dollars for selected countries covered in the OECD database.<sup>29</sup> Although the developed countries considered (particularly the combination of the EU, Japan, and the United States) still show the largest values of support compared to developing countries (about 215 billion US\$ in 2010–2012 compared to 211 billion US\$), the aggregate PSEs have remained broadly stable since the 1990s. On the other hand, the developing countries included have significantly increased their PSEs, from about 15 billion US\$ in the 1990s to some 211 billion US\$ in recent years, although this has been mainly driven by the large increase in China’s support, which includes significant investments in infrastructure. Not counting China, the value of the PSEs in developing countries drops to about 75 billion US\$, about a third of the level of the group of developed countries but still a more than sixfold increase since the 1990s.

**TABLE 3.11** Producer Support Estimates

Region/country	1995–2000	2000–2005	2005–2010	2010–2012
<b>Developed countries<sup>a</sup></b>				
Total USD billion	215.7	210.1	215.5	214.6
w/o EU USD billion	106.6	104.6	93.3	109.2
EU % total	50.6	50.2	56.7	49.1
Japan % total	25.4	22.3	20.5	28.3
US % total	18.1	20.9	15.2	13.9
<b>Developing countries<sup>b</sup></b>				
Total USD billion	14.8	47.9	114.7	210.8
w/o China	12.1	27.6	52.6	75.4
China % total	18.1	42.4	54.2	64.2

**Source:** Author’s calculations based on OECD (2014).

**Note:** a. The developed countries included are Australia, Canada, European Union, Japan, New Zealand, Norway, Switzerland, and the United States; b. The developing countries included are Brazil, Chile, China, Indonesia, Kazakhstan, Mexico, Russian Federation, South Africa, Turkey, and Ukraine.

The domestic support as measured in the WTO has also increased for several important developing countries, as calculated by Orden, Blandford, and Josling (2011). They show that for the period from 1995 to 2008–2009, the developing countries considered in the study (Brazil, China, India, and Philippines) have increased their domestic agricultural support in the more recent years; India in particular has moved from a level of domestic support of about 6 percent of the total value of agricultural production in the 1990s to a level above 18 percent in 2008–2009 (or above 11 percent if the domestic food aid program and related public stockholding is not counted). China

<sup>29</sup> See data in OECD (2014).

moved from 6.5 percent to 9.6 percent in the same period. Domestic support in Brazil and Philippines, on the other hand, stayed relatively flat at somewhat less than 6 percent and 4 percent of the value of agricultural production, respectively.

Still, the levels of domestic support in these developing countries clearly remain below the levels seen in developed countries. In 2008–2009, the comparable percentages of domestic agricultural support over total value of agricultural production were 33 percent in the United States, 29.1 percent in Japan, and 28.7 percent in the EU.<sup>30</sup>

These increases in GDP and incomes have led to reduced levels of poverty and improvements in various health, nutrition, and food security indicators, although with important variations across developing countries and regions.

### Future Scenarios?

As of this writing, there are still significant uncertainties about the future evolution of the global economy. In particular, potential trends for agricultural development and food security also depend on developments in the strategic dimensions presented in Table 3.6, such as the evolution of global economic integration, income and population growth, urbanization, changing consumption patterns, and new technological developments in agriculture and energy. In the shorter term, the main macroeconomic issue will be how the world recovers from the fiscal, monetary, financial, and exchange rate consequences of the economic crisis that began in 2007.

One key question for agriculture and food security is whether the world has permanently moved from the scenario of low global food and agricultural prices of the 1990s and early 2000s to another of sustained high prices. More generally, the question is whether the prices of all commodities (not only agricultural and food products) are in what has been called a “super-cycle,” and if the answer is yes, how much longer that cycle has to run (Erten and Ocampo 2012).

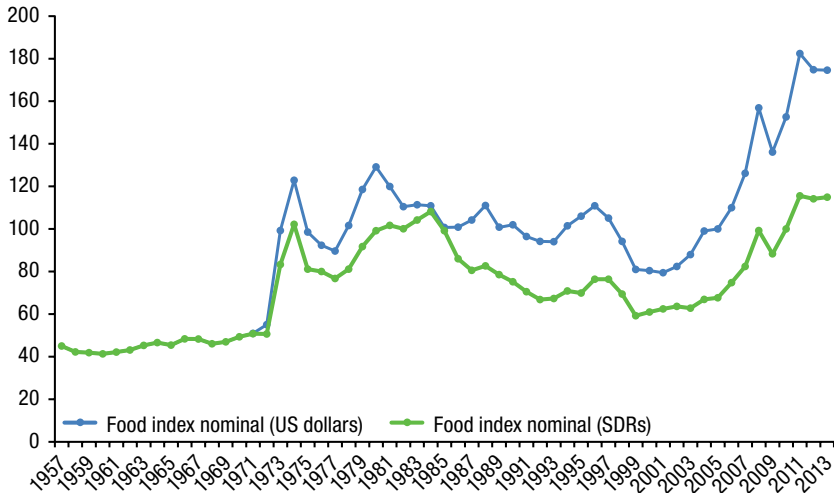
A first point that should be noted in this regard is that if the value of commodities in nominal terms is measured in a basket of currencies, such as the Special Drawing Rights (SDRs)<sup>31</sup> issued by the IMF, the recent price increase

30 The PSEs in Japan and the EU are far larger than those of the United States because their calculation includes a market protection component through border measures that is not part of the WTO measure of domestic support.

31 The Special Drawing Rights (SDRs) is a special financial instrument created by the International Monetary Fund in 1969. Its value is based on a basket of currencies that include the US dollar, euro, Japanese yen, and pound sterling. The value of that basket in US dollars is calculated daily by the IMF and posted on its website.

looks clearly lower than when measured in US dollars (Figure 3.9 presents an example for the IMF food index).

**FIGURE 3.9** Nominal food price indexes in US dollars and SDRs (2005 = 100 for US index)



**Source:** Author's calculations based on IMF (2013c).

**Note:** SDR = Special Drawing Rights

The current price spike in nominal terms is higher than that seen in the 1970s and early 1980s only if measured in US dollars; in SDRs, the 2008 peak is below the nominal value of the early 1980s. In other words, the current high prices in nominal dollars are in part a result of the devaluation of that currency. Furthermore, prices in real terms (adjusted by the loss of purchasing power due to inflation during previous decades) appear lower than during the 1970s (see Figure 3.4 for the IMF agricultural index, which behaves similarly to the food index).

Looking to the future, most simulations suggest a stabilization of prices at higher nominal prices than in the past, but not necessarily a continuous increase (see, for instance, OECD/FAO 2013). There are, however, substantial uncertainties regarding the assumptions underpinning these projections.

Future scenarios for agriculture will be heavily influenced by developments in energy markets and in climate change, which are themselves related.

Energy is an important input for agricultural production, one that plays a vital role in mechanization, irrigation, fertilization, drying, and storing. Agro-industrial production and commercialization also require energy for

processing, packaging, transportation, storage, and retail activities to place food and agricultural goods in the hands of consumers. Finally, different forms of energy are used by consumers to preserve, store, prepare, and cook food. At a more general level, energy costs affect disposable incomes and the demand for other goods and services, including agricultural goods. For example, sharp increases in the price of oil have been crucial factors in many recessions (Hamilton 2011), generating declines in aggregate demand and in commodity prices. World prices of oil and agricultural commodities have been correlated since at least the 1970s, but this phenomenon may have been accentuated more recently due to what has been called the financialization of commodities (that is, commodities becoming investment options, in part as hedges against inflationary developments; this connection is still debated).

Recently, the links between energy and agriculture have expanded even further for several reasons. One is related to the evolving connection between agriculture, energy, and climate change, associated with energy-related greenhouse gas (GHG) emissions. Whatever the uncertainties about the evolution of GHG emissions and the overall and geographical medium- and long-term impact on agriculture and food production, computer simulations suggest that the world may be on its way to surpassing the 2°C temperature increase threshold during the coming decades (IPCC 2014; Rosegrant et al. 2014). Such a scenario would affect agriculture and food production and would require sustained R&D investments in both adaptation and mitigation (Nelson et al. 2010). The high-energy intensification of agriculture seen in recent decades, starting with the Green Revolution, may not be possible in the future, not only because of the impact of higher energy costs but also because of the significant levels of GHG emissions implied in such an approach.

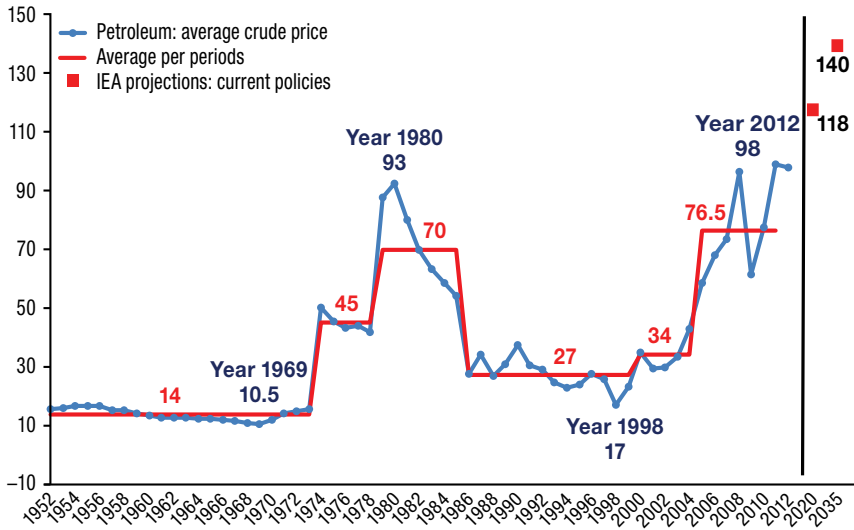
In the shorter term, however, of more immediate importance for agriculture is increased climate volatility around the long-term trend. The frequency of extreme weather events seems to have already increased (Hansen, Sato, and Ruedy 2012; IPCC 2014). This greater volatility, with a more frequent realization of extreme events such as droughts and floods, is the most important effect of climate change currently affecting food security.

The other much-discussed aspect of the new global context for agricultural production and food security is the growth of biofuel mandates. The significant and sudden increase in demand for corn and oilseeds in 2005–2009 has been singled out as one of the reasons behind the price spikes in these products (see OECD/FAO 2011, 2012, and 2013; Schnepf 2013; Laborde and Msangi 2012; Torero 2012). Going forward, OECD/FAO (2013) estimates that without significant policy changes, global production of ethanol (mainly

from coarse grains and sugar) and biodiesel (mainly from oilseeds) will require 12 percent of the world’s coarse grains, 29 percent of sugarcane, and 15 percent of vegetable oil production by 2022. Simulations by the International Food Policy Research Institute (see Rosegrant et al. 2013; Al-Riffai, Dimaranan, and Laborde 2010) suggest that biofuel policies, if maintained in their current state, will imply higher prices for food products in the coming decades. The evolution of this connection may thus be crucial in the coming years because the energy market is far larger than the food market.<sup>32</sup> Developments in energy markets may drive outcomes in agricultural markets, adding another source of volatility for food production, demand, and prices.

Looking at the evolution of energy prices during the last decades, it should be noted that while real prices of agricultural commodities are lower now in real terms than they were in the 1960s and 1970s, other energy commodities, particularly oil, experienced in the early 2010s the highest real prices in the last half century (Figure 3.10).

**FIGURE 3.10** Real world oil price (2009 US constant dollars per barrel)



Source: Author’s calculations based on IMF (2013c) and International Energy Agency.

32 Estimates for 2006 (Díaz-Bonilla and Robinson 2010) suggest that food energy amounted to about 28 exajoules, while the market for nonfood energy was some 460 exajoules for a population of about 6.4 billion people. In other words, the market for nonfood energy was about 16 times larger than the market for food energy. Projections only increase the disparity in the future; for instance, for 2050 the nonfood energy market would be 21 times bigger than the food energy market (Díaz-Bonilla and Robinson 2010; Meyer and Schmidhuber 2013).

The history of oil prices<sup>33</sup> over the last half century shows that only in two periods during the late 1970s and early 1980s, and now in the early 2010s, the real world price stayed for several years on average at or above 70 US\$/barrel, with peaks more than 90 US\$/barrel in 1980, 2007, and 2011. The strong global growth cycle during the 1960s and 1970s led to commodity price spikes in the mid-1970s, but it was then followed by a collapse in oil prices due to the 1980s global recession, the debt crises in developing countries, and technological innovations that led to the development of deep sea oil extraction in the North Sea, which weakened OPEC's price setting. In that context, the continuous advance of the Green Revolution was also supported by lower oil prices, which helped to keep fertilizer and energy costs in general under control.<sup>34</sup>

A key unknown is whether the world is going to experience a scenario similar to the 1980s and 1990s in which technological developments in energy (such as those related now to shale gas and unconventional oil) and depressed global economic conditions lead to a decline in energy (and agricultural) prices (as seems to be happening as of this writing) or whether the world is moving to a scenario of sustained real energy prices at levels not yet experienced in history.

There is a brief discussion of future scenarios in Chapter 12 that presents a more nuanced view than the projections based on the continuation of a super-cycle of commodity prices.

## Influence of Commodity Prices

A relevant aspect of the economic structure of developing countries is the fact that primary commodities represent a large (although declining over time) percentage of their exports (Table 3.12).

**TABLE 3.12** Primary products as percent of merchandise trade

Region	%
East Asia & Pacific (EAP)	16.6
Europe & Central Asia (ECA)	31.6
Latin America & Caribbean (LAC)	49.2
Middle East & North Africa (MENA)	77.7
South Asia (SA)	31.5
Africa south of the Sahara (SSA)	73.0
Low & middle income	33.9

**Source:** Author's calculations based on World Bank (2014), average of period 2005–2011.

**Note:** "Primary products" include those from agriculture, forestry, mining, and energy.

33 Here the focus is on oil because of its larger share in energy sources, the multiple uses in transportation, electricity, and manufacturing, and as the reference for the pricing of other sources of energy.

34 For a more detailed discussion of commodity price cycles, see Díaz-Bonilla 2010b.

Although with clear differences across regions (the share of primary products is smaller in Asian countries and larger in SSA and MENA), the large presence of commodities in the exports of developing countries highlights the need to consider the trend, cycles, and volatility of world commodity prices and their impact on those countries (see Chapter 1). This debate has a long history in development theory, from the Prebisch-Singer theory of the declining terms of trade (Prebisch 1950, 1968; Singer 1950) through the price stabilization schemes of the 1970s to the current debates about food prices and food security.

Different studies have analyzed the impact of commodity prices on developing countries. For instance, using a country-based export price for the specific basket of commodities exported in a sample of 32 SSA countries, Deaton and Miller (1995) found that about 20 percent of the decline in growth in those countries from 1970–1975 to 1980–1985 can be attributed to the fall in world commodity prices during that period. Similarly, looking at a subset of commodities in a sample of 56 developing countries during the period 1970–1993, Collier (2005) estimated that the price declines reduced GDP growth by around 1.4 percent per year over that period; output at the end of the period was around 5.6 percent lower than before the price shock, and the total loss of output as a percentage of initial annual income was around 14 percent. Collier also argues that because of the negative multiplier effects and the types of activities affected, including those in the nontradable sector, agricultural export price shocks are likely to be substantially borne by groups at high risk of poverty.

Another study by Birdsall and Hamoudi (2002) shows that the positive correlation found by Dollar and Kraay (2001) between growth and “globalizing” economies is related to the fact that the countries performing worse were commodity-dependent; thus, the collapse in prices reduced both growth and the value of the variable interpreted as a proxy for openness, creating a misleading correlation.<sup>35</sup> Birdsall and Hamoudi recalculated the growth equation developed by Dollar and Kraay (2001), using a dummy for commodity-dependent countries to show that the estimated growth effect of the openness variable becomes statistically insignificant (with a value of the coefficient that is less than half the original estimate).

On the other hand, the World Bank (2000a), in an analysis of the declining commodity price trend of the 1990s that separated oil and non-oil exporters in SSA, found that growth in the non-oil-exporting countries of that

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35 In Dollar and Kraay (2001), the globalization variable is trade/GDP. The collapse in prices reduces the numerator in commodity-dependent developing countries, as well as affecting growth, as shown in other studies. Therefore, the simultaneous declines in the globalization variable and in the growth rate generate a misleading correlation.



region has not been affected. The primary reason cited for that finding was that even if the prices of SSA exports declined, this loss was partly offset by lower import prices of energy and other products. This result calls attention to the fact that the behavior of global agricultural and food prices cannot be separated from the behavior of other commodity prices. Those prices moved together during the sudden increases of the 1970s and the price collapse of the mid-1980s and appear to have gone up again in a relatively synchronized manner in the 2000s, especially in late 2007 and early 2008 (see next chapter). Therefore, an analysis of the impacts of the changes in world commodity prices on developing countries should not consider them in isolation (such as food prices in the aggregate or a specific food product in particular), but rather it should analyze the combined effects of all those commodity prices.

Looking at the impact of nominal prices for oil, metals, food, beverages, and agricultural raw materials on total growth for the period 1960–2006, Díaz-Bonilla and Robinson (2010) found significant heterogeneity across developing regions. In their econometric estimates, LAC appeared to benefit across the board from increases in the prices of commodities (although only two results were statistically significant). MENA appeared to be negatively affected by increases in the price of agricultural raw materials, but it had a positive response to increases in oil prices. After LAC, the largest number of positive impacts of commodity prices on growth was in SSA, which benefited from increases in the prices of oil, metals, and beverages. EAP was positively influenced by the prices of metals and agricultural raw materials. However, many of these estimates have relatively low statistical significance.

In analyzing commodity prices, there are other points to be noticed. First, although primary commodities represent an important component of production, employment, and trade in many developing countries, this percentage has been constantly declining. In the 1960s and 1970s, food, agricultural raw materials, ores and metals, and fuels represented 80–90 percent of total exports in the aggregate for all developing countries, but by the early 2000s manufactured products accounted for about two-thirds of the total exports of developing countries as a whole (UNCTAD 2004). Primary products, however, still represented about 60–70 percent of exports in some developing regions, such as Africa, in the early 2000s (Table 3.12).

Second, the structure of trade (considering exports, imports, and net trade) differs greatly among developing countries. For instance, LAC as a whole has positive net trade in agricultural products, minerals, and fuels; Africa shows positive net trade in fuels and minerals but negative net trade in agricultural products, similar to the former republics of the Soviet Union; the Middle East

displays negative net trade in agricultural products and minerals but positive net trade in fuels; and Asia has negative trade balances in all three categories. Of course, regional aggregates conceal important differences across countries.

Third, although, as indicated, there is co-movement across commodity prices, the correlation between the prices of products varies. For instance, during the early 2000s the increases in the prices of metals and oil have clearly been more pronounced than those for agricultural products, for which real prices have stayed, in the aggregate, below the higher levels of the 1960s and 1970s (Table 3.8).

Fourth, the macroeconomic cross-effects of price increases must be considered; high prices of metals and energy may have contributed to the appreciation of the real exchange rates in several countries, affecting other tradable commodities, including agricultural products; this apparently happened in the 1970s in SSA during another period of high commodity prices (Díaz-Bonilla and Reza 2000).

Fifth, regarding agricultural commodities, the extent to which agricultural production is able to spread income-generation opportunities across large numbers of people (say, by numerous family farms as opposed to concentrated and highly mechanized plantations) changes with the commodities produced and the prevalent production structures.<sup>36</sup> Furthermore, some agricultural products (such as cereals and dairy products) can affect not only incomes and employment but also consumption for the poor, whereas others (coffee or sugar) would mainly affect incomes and employment but would not have a high incidence in the consumption basket. Therefore, the net effect on food security can vary by product.

Finally, another important characteristic of commodity prices is volatility. This affects the consumption and investment decisions of economic agents, with potential negative effects on welfare and growth. It also tends to complicate public-sector macroeconomic management in many developing countries that depend on taxes on commodities, directly or indirectly, to finance significant percentages of their public revenues. Table 3.13 shows changes in volatility using monthly data for the nominal indexes calculated by the IMF for oil, metals, food, agricultural raw materials, and beverages.

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36 It has also been noted that the positive social impact of growth based on ores and metals or energy products seems to be lower than that of other commodities (Sachs and Warner 1995; Tsangarides, Ghura, and Leite 2000). However, these general effects also depend on specific country effects. For instance, ores and metals represent a high share of merchandise exports in Chile (46 percent) and Peru (41 percent). But during the early 2000s, Chile has shown a better growth and poverty reduction performance than Peru: 4.4 percent growth and an overall poverty headcount of 2 percent of the population (using the World Bank measure of US\$1/day) in the case of Chile, compared to 4 percent and 14 percent, respectively, for Peru.

**TABLE 3.13 Nominal price volatility (annual)**

Product	1960s	1970s	1980s	1990s	2000–2009
Oil	1.0	82.8	32.3	14.8	49.6
Metals	15.0	28.4	25.2	12.3	47.8
Food	5.4	30.7	9.0	8.6	24.2
Beverages	6.9	63.0	16.6	22.4	30.2
Agricultural raw materials	2.3	36.8	19.3	10.4	7.7

Source: IMF/IFS (2013).

Price volatility increased sharply in the 1970s and then declined in the 1980s and 1990s, but nominal prices have never again reached the stability seen in the 1960s. Since the year 2000, an important increase has occurred in the volatility of oil and metals prices, and somewhat less so in the case of food and beverage prices. Transmitting better prices in levels to producers in rural areas could spur rural investment and overall growth in developing countries; at the same time, however, sudden increases in the prices of basic staples could hurt the poor, who are net food buyers and have occupations that might not immediately benefit from the employment and growth multiplier effects of higher prices.

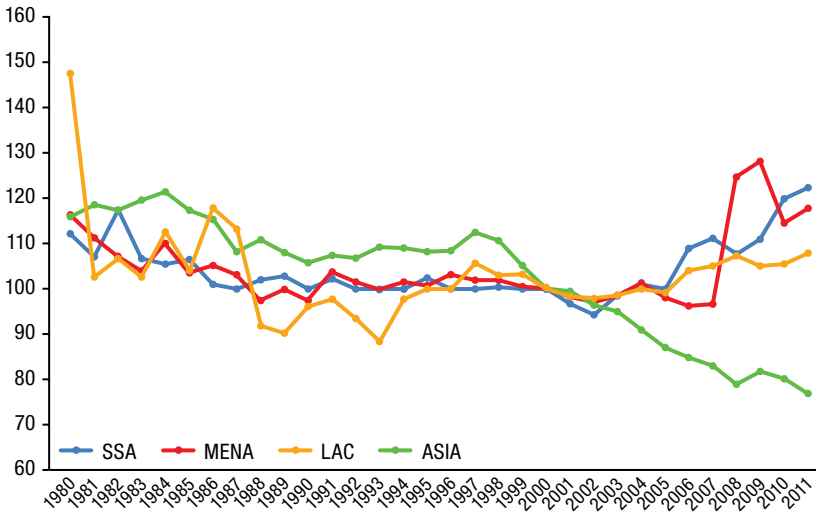
Another approach to analyzing the relationship between prices and development is to look at the evolution of the terms of trade (TOT) rather than focusing only on commodities. TOTs combine commodity prices with goods and services, as exports and imports. Figure 3.11 shows the median of the net barter terms of trade for a sample of countries in LAC, MENA, SSA, and Asia.<sup>37</sup>

The influence of the decline in commodity prices in the 1980s is clear in the median terms of trade of LAC, followed by MENA and SSA. Asia's terms of trade were more stable during the 1980s and 1990s. The recovery in commodity prices after the lows that coincided with the recession of the early 2000s is reflected more in the increases in the terms of trade of SSA and MENA and less in those of LAC. The terms of trade in Asia appear to have been affected negatively rather than positively by the recent increases in commodity prices, which is in line with Asia as a region being a net importer of commodities and an exporter of manufactured goods. On the other extreme, SSA remains a significant producer of commodities and has a larger percentage of metals and oil in its basket of exports. LAC is in an intermediate position, with more agricultural products than SSA and fewer

37 Terms of trade are defined as the price of exports divided by the price of imports. The ratio in the text is calculated from national accounts.

manufactured goods than Asia. All of these structural characteristics make the economies of developing countries more fragile and volatile, and they need to be taken into account in the design and operation of macroeconomic policies.

**FIGURE 3.11** Terms-of-trade index (2000 = 100), 1980–2011



**Source:** Author's calculations based on World Bank (2014).

**Note:** This corresponds to the median values for 36 countries for SSA (Africa south of the Sahara), 17 for LAC (Latin America and the Caribbean), 6 for MENA (Middle East and North Africa), and 12 for Asia.



## **PART 2**

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# **Macroeconomic Data, Balances, and Adjustment Processes**



## MACROECONOMIC DATA

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This chapter looks at the definition of macroeconomic variables, highlighting the four main macroeconomic balances related to national income and product accounts, balance of payments, monetary accounts, and public-sector accounts. Other macroeconomic variables and indicators are also discussed. It is imperative to understand the data, their meaning, and their limitations to be able to conduct solid policy analysis. That is the purpose of this perhaps tedious but necessary chapter.

### Background

Macroeconomic data may have different coverage and formats and therefore can be categorized in different ways. One possible distinction is between variables that reflect a “quantity,” others that reflect “prices,” and finally, some others that are a combination of quantities multiplied by prices. The words “quantity” and “prices” are in quotation marks here because they may not correspond to the usual notion of these concepts. The number of people employed (say, 5 million workers) is a quantity variable in the usual meaning of the word; however, gross domestic product (GDP) in constant prices (sometimes called “real” GDP)<sup>1</sup> is also considered a quantity variable, even though it is an aggregation of monetary values measured at the fixed level of prices of a specific year (called the base year).

The price of a ton of wheat (say, 230 US\$/ton) is also easily understood as the value of a clearly identified quantity (one ton of wheat of a certain quality

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1 As mentioned earlier, when economists say that a variable is presented in “real” terms, they mean that it is measured in fixed prices of a certain year or that it has been adjusted to eliminate the effect of price inflation. Again, “real” is in quotation marks because its usual meaning is that something exists, has happened, or is true. It is obvious that the typical meaning of the word is not what economists are referring to: for instance, the real GDP does not mean that it is the “true” one, but that it has been calculated at constant prices of some base year. In economic terms, the opposite of “real” is “nominal.” In fact, the new guidelines for national accounts prefer to use the phrase “at constant prices” instead of “real” to avoid these confusions (see, for instance, IMF 2007a). Another phrase to refer to “real” variables in the economic sense is “inflation adjusted.” Nominal variables are also called “current prices.”



at some particular geographical point). But the implicit price of the GDP (called the GDP deflator,  $P_{gdp}$ ) is also considered a price variable of a notional quantity, that is, the GDP at constant prices. Then, the multiplication of the GDP at constant prices by  $P_{gdp}$  generates the nominal GDP.

Quantity variables can be presented as flows (for example, a number of dollars or pesos over a certain period, say a year or a quarter) or as stocks (a number of dollars or pesos for a specific variable at a point in time, say December 31, 2012).<sup>2</sup> These concepts are related, considering that a stock variable at time “ $t$ ” is equal to what happens in flow terms to that variable between the previous period ( $t - 1$ ) and the current period ( $t$ ), plus the starting value of that stock variable at ( $t - 1$ ), or

$$\text{Variable “Y” Stock}(t) - \text{Variable “Y” Stock}(t - 1) = \text{Variable “Y” Flow} \\ \text{(during the period from } t - 1 \text{ to } t)$$

This equation can be thought of as the relationship between the Balance Sheet (stock variables) and the Income (or Profit and Losses) Statement in usual accounting methods:

$$\text{Balance Sheet}(t - 1) + \text{Profit/Losses (from } t - 1 \text{ to } t) = \text{Balance Sheet}(t)$$

In discrete time (say one year) for stock variables, “ $t - 1$ ” refers to the value at the closing date of that period (for instance, December 31, 2011), which is also the opening value for the next period “ $t$ ” (January 1, 2012). Then, the value for the stock variable at “ $t$ ” is now December 31, 2012. In the case of the flow variable linking both stock variables, the value corresponds to what happened between the start of January 1 and the end of December 31, 2012.

In applied macroeconomic analysis, it is important to be clear about the timing conventions for the macroeconomic variables. For instance, many of the flow variables are presented as the average value for the period and not the end of the period: a phrase such as “Benin’s GDP in 2012 was 7,557 billion dollars” most likely corresponds to the estimate for the midpoint of the year 2012 and not for the end of 2012. In several cases, data from the International Monetary Fund specifies whether it is the average for a period or the end value. But in national account statistics, not all variables are clearly dated.

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2 Many of the macroeconomic variables are presented in monetary terms. But some of those variables may be in nonmonetary units: for instance, the number of people that got a job in year  $X$  is a flow variable, and the number of employed people at a specific date is a stock variable, and both are presented in nonmonetary units.

Policy analysts must be aware of the timing conventions of the variables being analyzed.<sup>3</sup>

As noted, quantity variables in monetary units can be shown in nominal terms but also at constant prices (or inflation adjusted).

In what follows, we will look first at the main quantity variables in macroeconomics, starting with the four main sets of accounts that record transactions in the economy and provide data and structure for any macroeconomic analysis or policy recommendation:

1. National income and product accounts
2. Balance of payments
3. Monetary accounts
4. Public-sector accounts

Then, there will be a brief discussion of some data issues related to other quantity and price macroeconomic variables. Among the former, some important variables to be considered are the labor force and unemployment (this last variable is usually presented in percentages and not in pure quantity numbers). Among the latter, there are different price indexes (such as the Consumer Price Index, the Producer Price Index, the deflator of the GDP, export and Import Price Indexes, and their combination in the terms-of-trade index), the interest rate, the exchange rate, and wages.

## **Main Macroeconomic Accounts**

### **Basic Concepts**

The four main macroeconomic accounts mentioned previously (national income and product accounts, balance of payments, monetary accounts, and public-sector accounts) provide the basic skeletal structure for any macroeconomic analysis. Using consistent definitions and applying adequate data collection methods, these accounts link macroeconomic variables through the discipline of double-entry accounting of the different transactions and should, in principle, form an integrated and consistent whole. Through the interrelations across these consistent accounting relationships, it is possible to trace the repercussions of a change in a macroeconomic variable (say, investment or exports) on other quantity and price variables.

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3 We will touch upon the issue of timing of the macroeconomic variables as needed in the rest of the book. But in general it will be assumed that they comply with the timing rules assumed in the text. In real-life policy analysis, this is a fact that needs to be ascertained.

In reality, however, macroeconomic data from these accounts, particularly in developing countries, may not be as well integrated as suggested above. This is because definitions for the accounts follow different and evolving approaches and because gathering and collating the data are complex and costly exercises. Therefore, the application of separate methodologies for each one of the big four accounts has resulted in data that may not necessarily be consistent or comparable across accounts and variables. Also, some variables have been collected as flows, while others appear in stock format. Moreover, data for each account is collected and aggregated for different analytical purposes, and in many cases this is done by different public entities.

Faced with these problems, international and national organizations have tried in recent decades to improve and standardize the concepts, definitions, and criteria applied to macroeconomic data, thus enhancing consistency across those accounts. The System of National Accounts (SNA 2008), a joint work of the United Nations, the IMF, World Bank, OECD, and the European Union (with the support of many individual countries), is the latest effort to harmonize the different methodologies, as well as to present both flows and stocks—or, in common accounting terms, the income statement and the balance sheet—of the different sectors of the economy and the economy in general (IMF 2007a). Some of the basic concepts that have been harmonized are laid out in the following list (for more details, see IMF 2007a):

- **Sectors.** Economic units are grouped into five separate (and mutually exclusive) institutional sectors: households, nonfinancial corporations, financial corporations, general government, and nonprofit institutions serving households (NPISH).
- **Residence.** Macroeconomic statistics reflect the activities of all the resident economic agents (or institutional units) in an economy. “Residents” are those institutional units that have their center of economic interest within the economic territory of the country for which statistics are being

compiled.<sup>4</sup> Residence is not based on nationality or migration status but on where the center of economic interest of the units is located. Those units that do not fit the definition of residents of an economy are “nonresidents” and considered in the “rest of the world” category.<sup>5</sup>

- **Accounting Rules.** As mentioned, macroeconomic statistics are based on the double-entry accounting system, where every flow, operation, or transaction is recorded twice, as debit and credit entries. Another issue is whether those flows are recorded on an accrual basis (that is, when economic agents “exchange, transform, create, transfer, or extinguish economic value” as defined in IMF 2007a) or on a cash basis (when payments are made; an implication of this approach is that noncash transactions, such as in-kind transfers or barter, may not be recorded). The timing of the recording may vary significantly with one or another approach. During current revisions, it has become clear that accrual accounting is the better method because it ensures consistency of recording across units, time, and countries and encompasses all economic events. However, older manuals dealing with fiscal accounts or public-sector statistics that are still being used suggest the use of cash accounting.<sup>6</sup> Therefore, the transition from that approach to accrual accounting will take some time. When analyzing data from specific countries, it is important to know whether government statistics are on an accrual or cash basis and to make the necessary adjustments.
- **Valuation Procedures.** Macroeconomic transactions should be valued at market prices corresponding to the time they are made. Stock data (for example, data on assets and liabilities) should be valued on the basis of the market prices at the time of the balance sheet closing. When that is not

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4 This implies that the institutional unit has a specific location (as a dwelling place or a place of production or other economic activities) within the economic territory of the country where the unit engages in economic activities indefinitely or over a long period (usually defined as one year or more). For instance, a branch or subsidiary of a foreign corporation located in a given country is considered a resident of that country (conversely, foreign branches and subsidiaries of corporations resident in a country are regarded as nonresidents). Individuals who work abroad temporarily and then return to their country of origin within a year are considered residents of the original economy; alternatively, if that person works abroad continuously for one year or more, he or she becomes, for statistical purposes, a nonresident of his or her original country (IMF 2007a).

5 Governmental units located abroad (embassies, consulates, or other general government units) and the nationals working in those units are treated as residents of the home country (IMF 2007a).

6 This allows, for instance, for a government to show a smaller deficit (temporarily) just by moving the cash payments of an obligation already accrued from one year to the next.

possible, proxy measures should be utilized. When data are in foreign currency, they have to be converted into domestic currency using the exchange rates (usually an average of buying and selling rates) prevailing at the time of the transaction or the reporting date for valuation of stocks (IMF 2007a).

### National and Income Accounts

National and income accounts measure the production of goods and services that take place in the economy. The basic equation is

$$\text{GDP} = C + G + I_p + I_g + \text{EX} - \text{IM},$$

where Gross Domestic Product (GDP) is the amount of value-added (that is, total production minus intermediate uses to avoid double counting) generated by resident economic agents plus the value of taxes minus subsidies on products.<sup>7</sup> Therefore, GDP is measured at market prices. The income corresponding to GDP is distributed to various agents, who can use it to consume (C if it is private consumption and G if it is public consumption) or to invest ( $I_p$  by the private sector and  $I_g$  by the government).<sup>8</sup> Part of the domestic production goes to exports (EX), and the domestic supply is expanded through imports (IM). So the equation can be written as

$$\text{GDP} + \text{IM} = C + G + I_p + I_g + \text{EX}$$

or

$$\text{Supply side} = \text{Demand side}.$$

The total amount of goods and services produced in an economy (let's call it Q) is, of course, larger than GDP because it also includes the intermediate use or consumption (IC) of goods and services needed to produce Q.

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7 Taxes on products include items such as sales taxes and import duties, as well as other taxes on production. An example of the latter is payroll taxes that are added to the payment of factors to calculate the value of Total Output (Q) in what is called basic prices (the prices that producers charge before other taxes on products are assessed).

8 Changes in inventories can be shown separately or included in investments ( $I_p$  and  $I_g$ ). In the following, to save notation, we will include changes in inventories within investments.

Therefore, the following equation also holds:

$$Q^9 + (\text{taxes less subsidies on products}) = IC + C + G + I_p + I_g + EX - IM$$

or

$$Q + (\text{taxes less subsidies on products}) - IC = GDP = C + G + I_p + I_g + EX - IM.$$

There are three separate ways to calculate GDP: the Production Approach (estimating the total of goods and services from the different sectors of activity); the Income Approach (adding the incomes generated by different production activities, such as compensation to employees—including wages and salaries plus indirect benefits such as contributions to social security and pension funds—the operating surplus of producers, and taxes less subsidies on production); and the Expenditure Approach (adding the final use of the output produced, such as final consumption by households and government, gross capital formation including changes in inventories, and exports of goods and services, and then subtracting imports). Usually, all three methods are utilized to check the consistency of the data collected, considering that the total numbers obtained by each method should coincide.

As mentioned, national and income accounts can be presented in nominal terms (current values of the domestic currency, which will be called pesos here) or in constant terms (that is, measured in pesos of a specific year or base period). This discussion is postponed for later; here the issue of whether these equations are in real or nominal terms is left undefined until different definitions of prices are introduced. The data aggregated in these numbers come from different sources and include estimations and imputations of values, according to some general rules of international methodology (SNA 2008 and IMF 2007a).

Other related equations are the following:

\**Net Domestic Product* (NDP), which is GDP minus depreciation:

$$GDP - \text{depreciation} = NDP = C + G + ((I_p + I_g) - \text{depreciation}) + EX - IM.$$

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9 Q is measured at basic prices, including payroll taxes. Therefore, GDP includes these taxes as well.

\**Gross National Income* (GNI), which is GDP less primary incomes payable to nonresident units plus primary incomes receivable from nonresident units (that is, from the rest of the world).<sup>10</sup> The System of National Accounts (2008) notes that although the common usage emphasizes national as different from domestic, the real difference is between production and income, considering that both concepts are obtained with the same set of resident institutional units.

$$\text{GDP} + \text{Net Primary Income with Rest of the World (NPIr)}^{11} = \text{GNI} = C + G + I_p + I_g + \text{EX} - \text{IM} + \text{NPIr}.$$

\**Gross National Disposable Income* (GNDI, which we will call Y here), which is GNI minus transfers from resident institutional units to nonresident units plus transfers from nonresident units to resident units. These transfers (sometimes called unrequited or unilateral) include grants, donations, or any other flow that does not imply an exchange of goods, services, or assets between the unit giving the transfer and the unit receiving it. Typically, remittances from abroad from workers who are nonresidents to resident households are part of these transfers. GNDI basically<sup>12</sup> measures the income available to the total economy for final consumption and gross savings (if depreciation is subtracted, then it is Net National Disposable Income, and savings are also net).

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10 As the System of National Accounts (2008) mentions, "Primary incomes generated in the production activity of resident producer units are distributed mostly to other resident institutional units; however, part of them may go to non-resident units. Symmetrically, some primary incomes generated in the rest of the world may come from resident units." Primary incomes payable to the rest of the world include taxes (less subsidies) on production and imports, compensation of employees, operating surplus of enterprises, and property income payable to nonresident units. For example, profits sent by firms operating in a country to headquarters located in another or interests paid on loans abroad are primary incomes paid to the rest of the world. Primary incomes receivable from the rest of the world include similar items, but now they are payable to resident units. Property income refers to investment income from ownership of financial assets and rents from ownership of natural resources.

11 It should be noted that NPIr may be positive or negative. The plus sign in the equation is to maintain neutrality in the equation; if NPIr is negative, then it would be  $+(-\text{NPIr})$  or  $-\text{NPIr}$ ; if it is positive, it would be  $+(\text{NPIr})$  or  $+\text{NPIr}$ .

12 An additional adjustment is needed to make the statement an accounting identity. That adjustment should consider unilateral capital transfers, real holding gains or losses, and other changes in the quantity of assets due to the effect of events such as natural disasters (see System of National Accounts 2008, paragraph 8.25, page 160). To simplify the discussion, in what follows it is assumed that this adjustment has been done.

$$\text{GNI} + \text{Net Transfers with Rest of the World (NTrw)} = \text{GNDI} = Y = C + G + I_p + I_g + \text{EX} - \text{IM} + \text{NPIrw} + \text{NTrw}.^{13}$$

If we assume that in developing countries, NPIrw is usually negative (because of payments of external debt, outflows of dividends on foreign investments, and so on) and NTrw is normally positive (because of foreign aid grants and workers' remittances, for example), then we can write the GDP equation as

$$\text{GDP} - \text{NPIrw} + \text{NTrw} = Y = C + G + I_p + I_g + (\text{EX} - \text{IM} - \text{NPIrw} + \text{NTrw}).$$

The last terms of the equation between parentheses ( $\text{EX} - \text{IM} - \text{NPIrw} + \text{NTrw}$ ) are the crucial link to the next macroeconomic account, the balance of payments.

### Balance of Payments

The balance-of-payments account (BOP) registers operations between the domestic economy and the rest of the world. This account is frequently presented in foreign currency (here called “dollars”) but, if it is used for analytical purposes in conjunction with national and income accounts, then it must be transformed in domestic currency using the proper exchange rate.<sup>14</sup> To save notation in what follows, we assume that the dollar BOP has been converted into the peso BOP. Table 4.1 shows the usual components of a BOP using credits and debits in what is called the “analytical representation” (from IMF 2007b).

Both exports (line 1 in Table 4.1) and imports (line 2) are presented at free on board (FOB) values. The transportation and insurance costs included in CIF valuation of imports are considered to be a part of services. Exports, which represent an inflow of dollars, appear as a credit (a plus sign), and Imports, which are an outflow of dollars, are a debit (a minus sign). The difference of Exports minus Imports is the balance on goods.

13 Again, it should be noted that NTrw may be positive or negative, and therefore the comments made earlier about NPIrw apply here as well.

14 In addition to the fact that this account is many times presented in dollars, while the national and income accounts are calculated in pesos, there are differences in the definition, timing, and valuation of certain items and transactions that require some reconciliation of data to be able to merge both accounts. These methodological differences, however, have been greatly diminished in the latest version of the international manual for the System of National Accounts (2008).



**TABLE 4.1** Balance of payment: Analytical disaggregation

Category	Credit	Debit
Balance on goods = 1 – 2	1. Goods: exports f.o.b.	2. Goods: imports f.o.b.
Balance on goods and services = 1 + 3 – 2 – 4	3. Services: credit	4. Services: debit
Balance on goods, services, and income = 1 + 3 + 5 – 2 – 4 – 6	5. Income: credit	6. Income: debit
A. Current account balance = 1 + 3 + 5 + 7 – 2 – 4 – 6 – 8	7. Current transfers: credit	8. Current transfers: debit
B. Capital account balance = 9 – 10	9. Capital account: credit	10. Capital account: debit
<b>Total A + B = net lending/borrowing</b>		
	11. Direct investment abroad	12. Direct investment in reporting economy
	13. Portfolio investment assets	14. Portfolio investment liabilities
	15. Financial derivatives assets	16. Financial derivatives liabilities
C. Financial account balance = 11 + 13 + 15 + 17 – 12 – 14 – 16 – 18	17. Other investment assets	18. Other investment liabilities
<b>Total A + B + C</b>		
D. Errors and omissions		
<b>Total A + B + C + D</b>		
	19. Reserve assets: credit	20. Reserve assets: debit
	21. Use of IMF loans: credit	22. Use of IMF loans: debit
	23. Other: credit	24. Other: debit
E. Reserves and related items balance = 19 + 21 + 23 – 20 – 22 – 24		

**Source:** Author's elaboration based on IMF (2007a).

The country may be exporting and importing services as well.<sup>15</sup> If the net result of services exported (credit; line 3) and imported (debit; line 4), which may be a positive or negative number, is added to the previous balance, we have the balance on goods and services.

The third block of the current account refers to income received from (credit; line 5) or paid to (debit; line 6) the rest of the world. Those incomes, as mentioned before, include compensation of employees (labor income) and income resulting from direct investment, portfolio investment, and other

15 Services include transportation, travel, communications, construction, insurance, financial, computer, and information; royalties and license fees; other business services; personal, cultural, and recreational services, including tourism; and government services not included elsewhere.

investments (see below). In what follows, we will assume that all adjustments needed to make this block equivalent to NPI<sub>rw</sub> have been made.<sup>16</sup> Adding up the three blocks so far, we have the balance on goods, services, and incomes (which, again, can be positive or negative, as the sum of lines 1, 3, and 5 minus lines 2, 4, and 6).

The fourth block identifies current transfers (lines 7 and 8), which are defined the same way as in national and income accounts. It has already been noted that in developing countries, major transfers are foreign aid grants and workers' remittances. With some of the same caveats as before, we define the result of this block as the equivalent variable in national and income accounts: Net Transfers with Rest of the World or NTr<sub>rw</sub> (which may be positive or negative but, in developing countries, is usually positive).

The balance on goods, services, and incomes added to net transfers constitutes the current account balance<sup>17</sup> (the sum of lines 1, 3, 5, and 7 minus the lines 2, 4, 6, and 8).

Recent updates of the methodology of balance of payments have included a separate capital account in which there may be capital transfers (for example, if there is a donation of, say, heavy construction equipment to a developing country), but which may also include gains or losses on assets and liabilities and other changes in the volume of assets due to the effect of events such as natural disasters (lines 9 and 10). This definition corresponds to the capital account of national and income accounts (System of National Accounts 2008, 160). As in national and income accounts, adding the current account balance and this very specific definition of capital account (total A + B in Table 4.1) results in the net lending or borrowing of the reporting unit, which in the BOP is the country as a whole.

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16 In practice, as noted, different methodological and data-gathering issues mean that the national and income and the BOP concepts may not be numerically equal. The process of developing the 2008 System of National Accounts (SNA) has led to adjustments in the BOP methodologies in order to make the two accounts more homogeneous. In this book, I am more interested in showing the conceptual links for macroeconomic analysis than in delving into the complex statistical issues created by that harmonization. Those interested can consult System of National Accounts 2008 and IMF 2007a.

17 Interests on debt, other current account transactions, and capital flows should show plus signs (+) if the dollars are flowing into the country and should show minus signs (-) if the dollars are flowing out of the country. For instance, if the country is a net debtor and is paying interests, is transferring dollars to the rest of the world in other current account transactions, or there is a capital outflow from the country to the rest of the world, then the data would have a minus sign (and vice versa).

The reporting country's net lending or borrowing is then allocated across different financial transactions, which are reported in the financial account.<sup>18</sup> The components of the financial account are as follows (IMF 2007a):

- Direct investments, when the investor has an effective voice in the management of an enterprise (usually more than 10 percent equity ownership) (line 11 reports direct investments coming into the country, and line 12 shows direct foreign investments leaving the country)
- Portfolio investments (lines 13 and 14), which include investments in bonds and equity securities other than those included in direct investment (see above) and reserve assets (see below)
- Financial derivative instruments (lines 15 and 16), such as options, futures contracts, and swaps
- Other investments (lines 17 and 18), including instruments not covered by the other categories, such as trade credits, loans, currency and deposits, and other assets/liabilities

If the sum of the current and capital accounts mentioned before (total A + B) is negative (positive), then the country is a net borrower (lender) from (to) the rest of the world. Further, if all borrowing (lending) is done through the financial account (that is, there are no changes in reserve assets; see below), the balance of that account will be positive (negative), meaning that there are financial flows going into (leaving from) that country.

If we add up the current, capital, and financial accounts ( $A + B + C$  in Table 4.1), they should be equal to changes in the official net reserve assets (ONRA) of the monetary authorities (usually the central bank)<sup>19</sup> (block E of Table 4.1). But because data are collected from different sources and there may be unrecorded or differently recorded transactions, discrepancies may appear, and those will have to be acknowledged as Errors and Omissions (block D).

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18 Note that there now is a capital account and a financial account. In the past, this distinction was not made, and economists referred to both types of operations as the capital account. In what follows, and to avoid changing a very common practice among economists, we use "capital account" in the older sense to refer to the combination of what is now called the financial account and the new capital account.

19 Reserve assets are external assets controlled by the monetary authorities of a country and which are readily available to cover external payments. They include monetary gold, Special Drawing Rights (a liquid financial instrument created by the IMF), the monetary authority's net deposits (called the "reserve position") in the IMF, currency, and other deposits held by the monetary authorities, and may include other net foreign exchange assets such as securities, financial derivatives, and other claims if they are liquid enough to be utilized to make external payments when needed.

Therefore,

$$A + B + C + D = \text{Change in ONRA.}$$

If the left side is positive (that is, dollars are coming into the country), then ONRA increases ( $d\text{ONRA} > 0$ ; using “d” to indicate change from one period to the next, or  $d\text{ONRA} = \text{ONRA}(t) - \text{ONRA}(t - 1)$ ).<sup>20</sup> If the left side is negative and dollars are leaving the country, then ONRA declines ( $d\text{ONRA} < 0$ ).

The points made before can be written in equation form. To simplify, we will assume the balance of the capital account (in the new definition) is zero, that there are no errors and omissions,<sup>21</sup> and that all financial transactions can be aggregated into a variable called Foreign Capital (FC). We also consider exports and imports as including both goods and services. Then the BOP equation can be written as follows:

$$(\text{Pex} * \text{EX}) - (\text{Pim} * \text{IM}) - \text{NPIrw} + \text{NTrw} \pm d\text{FC} = d\text{ONRA.}$$

Exports and imports have been divided into a price component (Pex and Pim, the domestic currency price of exports and imports, respectively) and a quantity component (EX and IM, representing the volume of exports and imports, respectively).<sup>22</sup> FC and NTrw can be divided into a private-sector component (FCp, NTrwp) and a public one (FGg, NTrwg). If we further

20 It is always important to be clear about the time periods in macroeconomic accounts: if “d” is the change in ONRA from period  $t - 1$  to period  $t$ , then, as noted,  $d\text{ONRA} = \text{ONRA}(t) - \text{ONRA}(t - 1)$ . Usual macroeconomic accounts are measured in normal time units, such as a year, a quarter, a month. If the period is one year and we are using calendar time, say in 2010 and 2011, then  $\text{ONRA}(t - 1)$ , or  $\text{ONRA}(2010)$ , is the level of reserves at closing of business time by December 31, 2010, which is also the opening value for January 1, 2011; and  $\text{ONRA}(t)$ , or  $\text{ONRA}(2011)$ , is the level of reserves at closing of business time by December 31, 2011. In this book, to simplify notation, I generally omit the use of “t,” “ $t - 1$ ,” and similar time indexing. In real-life policy analysis, numerical applications need to be careful about the time indexing. The variables measured in this way are sometimes referred to as being presented in discrete time, to differentiate them from continuous or instantaneous time, which is only a fraction of a unit of time. In mathematical terms, macroeconomic equations in discrete time that show changes in assets or liabilities correspond to equations in differences or difference equations, while variables in continuous time are represented by differential equations. This book uses equations in discrete time but it does not apply advanced mathematical methods to analyze them.

21 If the variable “errors and omissions” is a large number, then it is very important to understand why before any consistency analysis can be conducted. By definition, that variable implies a departure from the discipline of double-entry accounting and that some transactions have not been captured. Therefore, in real-life policy analysis it is important to understand the sources of discrepancies and then try to reduce that variable to a relatively small number. Once this is done, that variable can be kept fixed in the analysis. In the rest of the book, the analysis is done assuming that there are no errors and omissions, or alternatively that the variable has been reduced to a relatively small number and then maintained unchanged for the period of analysis (perhaps after being subsumed into some of the large categories of the balance of payments).

22 The EX and IM variables here can be compared to similar variables in the previous national and income account only if the latter is assumed to have been presented in constant prices.

assume that  $NPI_{rw}$  includes only the return (which we will call  $R$ )<sup>23</sup> paid on foreign capital in domestic currency (which has a public- and private-sector component,  $FC_g$  and  $FC_p$ ),<sup>24</sup> and that, as before, the country is a net debtor, then the BOP equation can be written as

$$(Pex * EX) - (Pim * IM) - (R * FC_p) - (R * FC_g) + NTrwp + NTrwg \pm dFC_p \pm dFC_g = dONRA.^{25}$$

Referring to the definitions utilized before, we have

$$*Balance\ of\ goods\ and\ services: (Pex * EX) - (Pim * IM).$$

This is sometimes referred to as the trade balance, which may be confusing if someone uses this concept to talk only about trade in goods (sometimes called merchandise trade) when, in this equation, services are also included.

$$*Balance\ of\ goods,\ services,\ and\ income: (Pex * EX) - (Pim * IM) - (R * FC_p) - (R * FC_g)$$

It adds the net income of the rest of the world to the trade balance of goods and services. Here we have assumed that the country is a net debtor in the public ( $FC_g$ ) and private ( $FC_p$ ) sectors.

$$*Current\ Account\ Balance\ (CAB): (Pex * EX) - (Pim * IM) - (R * FC_p) - (R * FC_g) + NTrwp + NTrwg.$$

It adds to the previous balance the inflow or outflow of transfers that may go to the private sector ( $NTrwp$ , which may be labor remittances) and to the public sector ( $NTrwg$ , which may be foreign aid in grant form).

In this simplified version (assuming the special capital account defined by the System of National Accounts 2008 to be zero), then a negative CAB ( $CAB < 0$ ) means that the country is borrowing from the rest of the world ( $+dFC$ , with a positive sign because “dollars” are coming into the country) and/or reducing net official reserves ( $-dONRA$ , with a negative sign because

23 It is assumed that the rate of return  $R$  is equal for the public and private sectors. It can be considered as a general interest rate on foreign debt.

24 As mentioned earlier, in quantitative applications it is important to properly keep track of time when working on flows and stocks. Here we are simplifying the flow payment of interest to the interest rate  $R$  multiplied by the debt outstanding at the end of period  $t - 1$  (which is the opening value at time  $t$ ):  $R * FC_p(t - 1)$  and  $R * FC_g(t - 1)$ . As before, and to save notation, we will avoid “ $t - 1$ ” or similar time indexing.

25 The balance of payments is an equation in differences in  $FC$  and  $ONRA$  that can be written in real time as  $dFC = FC(t) - FC(t - 1)$  and  $dONRA = ONRA(t) - ONRA(t - 1)$  (abstracting in both cases from valuation issues) and with payments made on the capital owed up to the end of the previous period ( $t - 1$ ) (that is,  $R * FC(t - 1)$ ).

“dollars” are going out of the country). Conversely, if  $CAB > 0$ , the country is lending ( $-dFC$ ) and/or increasing net official reserves ( $+dONRA$ ). The latter is also lending to the rest of the world, considering the type of financial instruments in which the reserves are invested.

It must be noted that sometimes the BOP equation is presented with all the components on the left-hand side and, therefore, it adds up to zero:

$$(P_{ex} * EX) - (P_{im} * IM) - NPI_{rw} + NTrw \pm dFC - dONRA = 0.$$

This highlights the fact that it is incorrect to refer to a deficit or surplus in the balance of payments when the whole equation is an accounting identity in which the sum of all components is zero. The deficits or surpluses always refer to some of the partial balances, but not the BOP as a whole. Also, in an equation written with all the components on the left-hand side (and IMF data is many times presented with this implicit equation in mind),  $dONRA$  with a negative sign implies an increase in official reserves (conversely,  $dONRA$  with a positive sign implies a decrease). It is always important to check how the equation is presented in order to correctly interpret the sign of  $dONRA$ .<sup>26</sup>

### Monetary and Financial Accounts

Monetary and financial accounts represent the transactions of the banking or financial sector (one of the five institutional sectors in which the national accounts divide the economy) with the rest of the national economy and with the rest of the world. The System of National Accounts (2008) divides this account into three subsectors: the central bank, other depository institutions, and other financial institutions. Other depository institutions are entities that accept deposits (demand, time, savings), such as commercial banks, savings banks, and so on. They may include other institutions, but only if they have in their balance sheets financial instruments that are included in the national definition of “broad money” (this definition may vary from country

<sup>26</sup> A related point that will be discussed in detail later is how to treat the net foreign assets of the banking system other than the central bank (which will be called here NFAB). In the equation in the text, it can be temporarily assumed that they have been netted out within FC.

to country).<sup>27</sup> These depository institutions finance themselves by issuing liabilities (such as deposits, bonds, or other instruments) and then use the funds generated to lend to other entities, typically in the form of loans, bonds, or other financial instruments. The latter are then assets of the depository institution and liabilities of the borrowers. The key point is that the liabilities of these institutions (such as deposits or similar financial instruments with high levels of liquidity) are included in the national definition of “broad money.” The basic characteristic for a financial instrument to be part of some definition of “money” is its liquidity: these instruments must be easily and speedily utilized to settle payments in monetary terms without having to wait or without suffering nominal discounts. For instance, 1 peso in cash can be utilized on the spot to pay for 1 peso in goods and services without the economic agent paying that cash being affected by a discount and without the economic agent being paid having to wait to receive and utilize the nominal payment capacity of that peso. Checks against bank deposits that pay on demand are also liquid, although less than cash. On the other extreme, an equity share in a company that was bought at 1 peso may need some time to be sold and may suffer a discount when that happens. Therefore, equity shares are not part of the definition of “money,” although they are part of the financial instruments of an economy.

Other financial institutions include insurance corporations and pension funds, other financial intermediaries, and financial auxiliaries that provide services to financial intermediaries and financial markets but do not engage in financial intermediation (for example, security brokers, securities exchanges, operators in foreign exchange, and so on). The key characteristic is that their liabilities are not part of the definition of broad money, because they are not considered to have the appropriate liquidity characteristics (which may differ from country to country) (IMF 2007a).

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27 IMF (2007a) discusses the issue as follows: The instruments countries may include in money measures are currency, deposits, and securities other than shares. Countries always include national currency and transferable deposits in money measures, and most countries also include other deposits, unless these deposits are so highly restricted that they do not serve the purposes of money. Some countries include securities other than shares in money measures, when the securities are close substitutes for deposits. For example, negotiable certificates of deposit issued by financial institutions may have many of the same characteristics as deposits accepted by these institutions. Other categories of financial assets are rarely included in money measures. Many countries specify a range of money measures from M1 (currency and transferable deposits) through M2, M3, and so forth. The aggregates differ according to the degree of “moneyness” of the assets included. The higher-ordered monetary aggregates (MAs) include a broader range of monetary instruments, such as foreign-currency-denominated deposits and deposits of longer maturities or those with greater restrictions on conversion into transactions money.

The data for monetary and financial accounts are usually more accurate than the two previous accounts discussed because they come almost directly from the publicly available balance sheets and financial statements of banks and financial institutions. A further difference is that, while the previous two accounts are presented as flows, monetary and financial accounts are commonly presented as stocks. Monetary and financial statistics have been harmonized with the 1993 SNA, and there is work in process to continue that harmonization with the 2008 SNA. But unlike the other macroeconomic accounts discussed here, monetary and financial statistics do not consider current account transactions directly; transactions in the current account (goods and services, income, and transfers) are reflected in the assets, liabilities, and net worth of the monetary and financial entities included in the system (IMF 2007a).

Data are compiled from the balance sheet of monetary and financial institutions. In the case of the central bank and other depository institutions, the simplified format of the balance sheet is shown in Table 4.2 (IMF 2007a).

**TABLE 4.2** Balance sheet of the central bank and depository banks

Assets	Central bank Liabilities + Capital
ONRA (official net foreign assets)	Ch (currency held outside the central bank by the private sector other than depository banks)
DCbcb (credit to the depository banks by central bank)	Cb (currency held by depository banks)
DCpcb (credit to the private sector by central bank)	RD (deposits of depository banks in central bank)
DCgcb (credit to the government by central bank)	NWcb (net wealth of the central bank and other items)
Assets	Depository bank Liabilities + Capital
NFAb (net foreign assets held by banks)	DCbcb (credit to the depository banks by central bank)
Cb (currency held by banks)	DEPO (deposits)
RD (deposits of depository banks in central bank)	NWb (net wealth of the banks and other items)
DCpb (credit to the private sector by banks)	
DCgb (credit to the government by banks)	

Source: Author.



To simplify, it is assumed here and in the rest of the book that the government does not use cash; that is why  $Ch$  is defined as currency held only by the *private sector* (other than depository banks) outside the central bank.

The equation for the central bank is

$$ONRA + DC_{cb} + DC_{pcb} + DC_{gcb} = Ch + Cb + RD + NW_{cb}.$$

The equation for depository banks is

$$NFA_b + Cb + RD + DC_{pb} + DC_{gb} = DC_{cb} + DEPO + NW_b.$$

With this format, data can be aggregated to present different views (usually called monetary surveys) of the monetary and financial sector. Those aggregations also serve to define different types of monetary aggregates, as discussed below.

The more basic level of aggregation corresponds to data only from the central bank's balance sheet. In that case, the liability side will define what is commonly called the "monetary base," which we will label  $BM_0$ .<sup>28</sup> This is a narrow monetary aggregate that includes currency outside of the central bank ( $Ch$ ) plus currency held by depository banks ( $Cb$ , "cash in vaults") plus deposits in the central bank from depository institutions ( $RD$ ). This is the country's basic currency that serves as the foundation for the rest of the definitions of money:

$$\text{Monetary Base} = BM_0 = Ch + Cb + RD.$$

The next level of aggregation combines data from the central bank with data from other depository institutions, which have as liabilities financial instruments with liquidity characteristics. These institutions include banks that accept checking and generally transferable deposits, savings banks and similar institutions that receive savings and longer-term deposits, and other financial institutions that issue liquid securities that can be considered close substitutes for cash and deposits. The aggregation of the central bank with other depository institutions is called the Depository Institutions Survey. The liability side of this aggregate balance sheet helps to define more general monetary aggregates up to the more comprehensive definition of money:  $BM$ , or "broad money."

There are, therefore, different definitions of "money," such as Monetary Base,  $M_1$ ,  $M_2$ ,  $M_3$ , and so on, depending on what types of financial

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<sup>28</sup> The monetary base is sometimes called "high-powered money," "reserve money," and "narrow money."

instruments are considered (and these instruments are potentially issued by different financial institutions). These definitions vary by country.<sup>29</sup> Table 4.3 shows a possible example.

**TABLE 4.3** Potential definitions of money

Type of money	Monetary base	M1	M2	M3
Currency in circulation held by the public (Ch)	X	X	X	X
Currency held by depository banks (Cb)	X			
Deposits of the banks in the central bank (RD)	X			
Demand deposits and other similar financial instruments (perhaps including traveler's checks)		X	X	X
Time, savings, and foreign currency deposits			X	X
Other deposits and securities other than shares that can be used as substitutes for other money instruments, but with restrictions on the conversion into transactions money				X

**Source:** Author's elaboration based on IMF (2007a).

In what follows, I take the more aggregate definition and call it "Broad Money," or BM.

If we combine both the equation for the central bank and for the depository institutions, we have the following:

$$\text{ONRA} + \text{DCbcb} + \text{DCpcb} + \text{DCgcb} + \text{NFAB} + \text{Cb} + \text{RD} + \text{DCpb} + \text{DCgb} = \text{Ch} + \text{Cb} + \text{RD} + \text{NWcb} + \text{DCbcb} + \text{DEPO} + \text{NWb}.$$

Eliminating the variables that appear on both sides of the equation (such as Cb, currency held by depository banks; RD, deposits of depository banks in the Central Bank; and DCbcb, credit to the banking system by the central bank) and rearranging, we have

$$\text{ONRA} + \text{NFAB} + \text{DCgcb} + \text{DCgb} + \text{DCpcb} + \text{DCpb} = \text{Ch} + \text{DEPO} + \text{NWcb} + \text{NWb}.$$

29 For instance, the World Bank's World Development Indicators uses the following definitions: "Money and quasi money comprise the sum of currency outside banks, demand deposits other than those of the central government, and the time, savings, and foreign currency deposits of resident sectors other than the central government. This definition of money supply is frequently called M2; it corresponds to lines 34 and 35 in the International Monetary Fund's (IMF) International Financial Statistics (IFS). Data are in current local currency." "Broad money is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveler's checks; and other securities such as certificates of deposit and commercial paper."

Presenting the equation as a balance sheet and placing some of the items in similar groups (such as all net foreign assets, all credit to the government, and so on), it would look like the following (author's compilation):

<b>Assets</b>	<b>Liabilities and capital</b>
1. Net foreign assets (NFA) = ONRA + NFAB	3. Broad money (BM)
2. Total domestic credit (DC)	3.1. Currency outside depository corporations (Ch)
2.1. Net claims on cen- tral government (DCg = DCgcb + DCgb) <sup>30</sup>	3.2. Deposits (DEPO) (which may include transferable deposits, other types of deposits, and other financial instruments included in the definition of broad money, according to the conventions followed in the country)
2.2. Credit to other res- ident sectors (DCp = DCpcb + DCpb)	4. Net wealth (NW = NWcb + NWb)

Aggregating the additional types of financial instruments, such as checking deposits, savings deposits, and so on, into an overall category that we call here "deposits" (DEPO) and using a broad definition of money (such as M3) that includes those deposits, we can write the following equation:

$$\text{Broad Money} = \text{BM}_p + \text{BM}_g = \text{Ch} + \text{DEPO},$$

where Cb has been netted out as explained earlier. We have two views of broad money: one by holder (private sector and government),  $\text{BM}_p + \text{BM}_g$ , and another by monetary instrument,  $\text{Ch} + \text{DEPO}$ . Because we assumed that the government does not hold cash and separating DEPO into the government (DEPOg) and the private sector (DEPOp), we could write

$$\text{BM}_p = \text{Ch} + \text{DEPO}_p \text{ and } \text{BM}_g = \text{DEPO}_g.$$

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<sup>30</sup> It should be noted that claims on central government (DCg) may be net of deposits by the same central government in the depository institutions. IMF (2007b) argues that government deposits do not behave like private-sector deposits, and therefore, if they are included within the definition of broad money (BM) as part of the liabilities, they may confuse the analysis of monetary developments; thus the suggestion of presenting DCg in net terms (that is, gross DCg minus the deposits owned by the central government). Alternatively, DCg may be presented in gross terms; therefore, central governments' deposits should appear within the definition of BM. Credit to public-sector entities (such as state and local governments and public corporations) that are not part of the central government are included in credit to other resident sectors (DCp).

To simplify the presentation, we will mostly use BMp and BMg, rather than Ch, DEPOp, and DEPOg.

Finally, the last level of aggregation combines data from the central bank, other depository institutions, and other financial institutions and is called the Financial Institutions Survey (FIS). This survey is important because of the expansion of the activities of other financial institutions, such as insurance corporations and pension funds, which can manage financial assets and show financial liabilities that may represent an important percentage of the financial assets and liabilities of the whole monetary and financial sector. Depending on the disaggregation of the liability side of this survey, it may be possible to identify different definitions of monetary aggregates, but this is not the focus of the FIS; on the other hand, the FIS needs to identify important items for the sector, such as insurance technical reserves (IMF 2007b).

The focus here is the Depository Institutions Survey (the aggregation of banks and financial institutions with money-like financial instruments); the format presented above can be expressed in equation form, as follows:

$$\text{NFA} + \text{DCg} + \text{DCp} - \text{NW} = \text{BM},$$

where net wealth and other assets and liabilities (net) have been consolidated (as NW) and moved to the left side of the equation.

As the net foreign assets (NFA) include those of the central bank and other depository institutions, it may be useful to maintain NFA separated into the two components: official net reserve assets (labeled earlier as ONRA), which belong to the central bank, and those net foreign assets that belong to the depository institutions (which we call here NFAb; “b” for banks). Therefore, the equation is

$$\text{ONRA} + \text{NFAb} + \text{DCg} + \text{DCp} - \text{NW} = \text{BM}.$$

The equation can be presented in changes (represented by the letter “d” as before, so we omit the time-indexing “t” and “t – 1”):

$$d\text{ONRA} + d\text{NFAb} + d\text{DCg} + d\text{DCp} - d\text{NW} = d\text{BM}.$$

In this way, a link can be established with the BOP accounts (where dONRA appears) and with the government accounts, as will be shown immediately below.

It was noted before that DCg is usually presented as net of deposits from the public sector in depository institutions. It can also be presented in gross

terms ( $dDCg^{\wedge}$ ) and can separately identify the deposits of the public sector within the definition of broad money, as follows:

$$dONRA + dNFAb + dDCg^{\wedge} + dDCp - dNW = dBMp + dBMg.$$

In the section on consistency analysis, we will mostly use this last equation (but to save notation,  $DCg$  will appear without the sign “ $\wedge$ ”).

These monetary aggregates are discussed further in the chapters on macro-economic balances and monetary policies.

### Public-Sector Accounts

The first point to consider is the definition of the term “public sector,” which will determine what to include in this account. Obviously, the central government, with its general functions of providing public goods on a nonmarket basis, is part of the public sector, as are state and local governments. But there are some entities whose classification is less clear. The criteria to include an entity as part of the public sector includes two components: first, whether it is controlled by the government, and second, whether the goods and services provided are not sold at economically significant prices. If an entity is controlled by the government (first aspect) but sells its output at economically significant prices, it is classified as a corporation (not part of the public sector). Even in this case, economic flows between that corporation and the government (such as equity investments or the provision of subsidies by the government) must appear in the public-sector accounts, either in the capital/financial account (if, as in the example, it is an equity investment) or in the current account (if it is a subsidy). On the other hand, the complete operation of the entity will be included in the accounts of the corporations and not in the public sector.

In summary, the general government sector covers the central government, state and local governments, social security funds managed by the public sector, nonmarket nonprofit institutions controlled and financed by the government, and public corporations if they do not sell their output at economically significant prices (IMF 2007a).

The second issue is the criteria for recording these transactions. As mentioned before, previous manuals, such as the *Government Finance Statistics Manual* (IMF 1986), suggested recording transactions on a cash basis, and many governments continue to use that method. Although this approach allows for better management of liquidity, it may also give a misleading view of the overall fiscal situation, including the timing of the policy action and the impacts of fiscal operations on the economy (IMF 2007a). Therefore, the new manual for government statistics (IMF 2001a) suggests the use of the accrual

approach<sup>31</sup> to record transactions in order to give a broader view of the government's economic activity.

The presentation of the public-sector accounts can be summarized as follows, using the economic classification (adjusted by author from IMF 2007a):

**1. Revenues**

- 1.1 Taxes
- 1.2 Social security contributions
- 1.3 Grants
- 1.4 Other revenue

**2. Expenditures**

- 2.1 Compensation of employees
- 2.2 Use of goods and services
- 2.3 Consumption of fixed capital
- 2.4 Interest
- 2.5 Subsidies
- 2.6 Grants
- 2.7 Social security benefits
- 2.8 Other expense

**Net operating balance (1 minus 2) (NOB)**

**3. Net acquisition of nonfinancial assets (NANFA)**

- 3.1 Fixed assets
- 3.2 Inventories
- 3.3 Valuables
- 3.4 Nonproduced assets

**4. Net lending/borrowing (1 minus 2 minus 3) (NLB)**

- 4.1 Net acquisition of financial assets
  - 4.1.1 Domestic
  - 4.1.2 Foreign
- 4.2 Net incurrence of liabilities
  - 4.2.1 Domestic
  - 4.2.2 Foreign

The statement of government activities presents public operations using what is known as an economic classification. The statement presents

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<sup>31</sup> As mentioned before, recording on an accrual basis means that an operation is registered “when economic value is created, transformed, exchanged, transferred, or extinguished—not just when the cash flow takes place” (IMF 2007a).

information based on the type of revenue, expense, nonfinancial asset, and financial instrument.

The classification is mostly self-explanatory. Within revenues (Point 1), it is useful to distinguish taxes (1.1); social security contributions (1.2, payments from employers and employees to cover retirement, health insurance, unemployment, and so on); grants (1.3, transfers to the public sector from other governments, international organizations, charitable foundations, etc., including both current and capital grants); and other revenue (1.4, such as property income, sales of goods and services, and others).

Regarding expenses (Point 2), these can be classified into compensation of employees (2.1, salaries plus all benefits and additional payments that constitute the labor cost of the government); use of goods and services (2.2, the cost of all the items bought and consumed in the process of providing public-sector goods and services); consumption of fixed capital (2.3, including normal depreciation but also other aspects such as damages due to accidents or inadequate usage); interest payments on public debt (2.4); subsidies and grants (2.5 and 2.6, which are transfers of funds to households, corporations, or other units, including potentially nonresident ones, and which may be identified separately if there is a legal or analytical basis to do so); social security benefits (2.7, which are also transfers but are supposed to be the counterpart of obligations related to contributions made by employers and employees); and other expenses (2.8, which cover everything not mentioned before).

Calculating revenues minus expenses gives the net operating balance (NOB), which is an indicator of the strength of fiscal accounts before investments in physical capital (which is discussed next). Because some of the transfers also include capital grants, NOB shows the change in the government's net worth. If  $\text{NOB} < 0$ , the government is running a deficit even before what is usually called public investments (roads, schools, water and sanitation plants, and electricity equipment, if these services are provided by the public sector as defined before) are factored in. In practice, however, when people talk about fiscal deficits or public-sector deficits, they are referring to broader concepts, as discussed below.

The next category is net acquisition of nonfinancial assets (NANFA, Point 3), which considers the acquisition and disposal of several assets. This includes not only traditional "public investments" (as mentioned before) but also the formation of inventories, net purchase of valuables, and net acquisition of non-produced assets (such as land).

Calculating NOB minus NANFA gives a second fiscal balance: net lending/borrowing (NLB). If  $\text{NLB} > 0$ , the public sector has a surplus and it is

then a net lender to the rest of the economy and perhaps to the rest of the world as well. Conversely, with  $NLB < 0$ , the public sector has a deficit and is a net borrower from the domestic and/or international economy.

Usually when there is a reference to public deficits, people have the NLB balance in mind and not the NOB. The case can be made that NOB is a more important fiscal indicator because it measures changes in the government's net worth, while an NLB deficit (but with NOB equal to or greater than zero) is simply an exchange of assets and liabilities: the government is borrowing, but it is to acquire assets, not to finance current operations.

In fact, in some countries (mostly industrialized ones), there has been a discussion about what has been called the Golden Rule of fiscal policy. This rule postulates that, measured over an appropriately defined economic cycle, the government should borrow only to invest in assets and not to finance current spending. Current revenues should finance benefits for the current generation, while investments that would benefit future generations can be financed by borrowing (so the future generations, which will benefit from those investments, are also paying for them). However, given that public assets may not be easily sellable and that their rates of return may be lower than the cost of debt, many people focus directly on the deficits and surpluses of the NLB balance.

A related concept of deficit/surplus is the primary fiscal balance, in which interests paid by the government on its debt are added back to NLB:

$$\text{Primary fiscal balance} = \text{NLB} + \text{interests paid} \\ (\text{point 2.4 in economic classification}).$$

The argument given for this adjustment is that the primary balance reflects only current decisions; therefore, payments of interest over previously incurred debt, which are obviously the result of past decisions, should not be considered part of the primary balance.

The final section of the economic classification (points 4.1 and 4.2) shows whether the government is lending or borrowing domestically and/or with the rest of the world. A question in this regard is which financial instruments the government may be investing in (if  $NLB > 0$ ) or what financial instruments the government is using to borrow (if  $NLB < 0$ ).

The previous information was presented in flows, but there are also important stock variables to consider. The new approaches emphasize a balance-sheet perspective to all accounts, including the public sector. Therefore, NLB is further adjusted by changes in net worth due to other economic flows, such as valuation effects (for example, the external debt, which



may be denominated in different currencies, is updated with changes in exchange rates).

One crucial stock variable is public debt. This may include financial instruments that are held by the rest of the world (external or foreign public debt) or by domestic residents (internal public debt). It is important not to confuse public debt with external debt. The private sector in developing countries has been increasingly borrowing abroad, and with the expansion of domestic financial markets in developing countries, governments have increased their use of domestic credit. Thus it is necessary to consider all four quadrants in the following 2-by-2 debt matrix:

	<b>Domestic</b>	<b>External</b>
<b>Public</b>	A	B
<b>Private</b>	C	D

Public debt is  $A + B$ , while external debt is  $B + D$ . Different countries (developing and industrialized) have suffered debt crises because of unsustainable public domestic debt (A) as well as problems with private external debt (D) and different combinations of the four cells.

Public-sector debt statistics may distinguish gross debt and net debt. The concept of net may cover at least two different situations (which may also occur jointly): one happens when public-sector debt across different units is netted out, such as when the public social security system holds public debt, and it is subtracted from total debt; the other concept of net debt emerges when some or all of the assets of the government are also subtracted (for example, if currency and deposits owned by the government are subtracted from public debt or if the central bank's net official reserves, however defined, are deducted from gross debt). Therefore, it is also important to understand whether public debt is presented gross or net and, in the latter case, how it has been netted out. Another relevant issue is whether debt includes only the one that is currently issued and outstanding, or whether it considers the value of existing guarantees not yet executed (such as nongovernmental loans guaranteed by the government that are still in good standing) and of future obligations (such as social security obligations to future retirees).

Whatever the definition of public debt, other aspects to be considered are the currency of issuance, type of interest rates (fixed, floating, adjustable), and maturity. The debt crises of the 1980s and 1990s in several developing regions were the result of one or more of the following problems: (1) mismatches in currency between the revenues of the government (which are normally collected in domestic currency) and the payments of the debt (which may be denominated in foreign currency); (2) loans contracted at floating

rates; or (3) an accumulation of short-term debt that markets did not renew at maturity.

Going back to flows, we can write, with some simplifications and rearrangements, the equation of the public-sector account as follows:

$$\text{Current and Capital Expenditures} - \text{All Revenues} = \text{Financing} \\ \text{(or Borrowing).}$$

It is assumed that this country is a net borrower (note that instead of revenues minus expenditures, the order is inverted to have borrowing on the right-hand side as a positive variable). In a disaggregated form, it can be written as follows (with some of the variables divided into price and quantity components; the reason for the price used,  $P_q$ , which refers to the global good utilized in the economy, will be discussed later):

$$(P_q * G) + (P_q * I_g) + (INT * \text{Public Debt}) + ST - \text{Taxes} - \text{OTRN}_g = \\ dB + (dDCg - dBMg)^{32} + dFCg.$$

$P_q * G$  is the nominal expenditure that corresponds to compensation of employees (2.1 in the economic classification) plus use of goods and services (2.2). Simplifying, one can think of the government sector as producing the public-sector services (through the purchase of goods and services from the productive sectors of the economy and the purchase of the services of labor, capital, and probably other factors of production) and the government as an institutional sector buying those services on behalf of the society, valued at the cost of production (which includes 2.1 and 2.2). This is reflected in  $P_q * G$ .

The government invests as well,  $P_q * I_g$  in nominal terms, which corresponds basically to net acquisition of nonfinancial assets (point 3 in the economic classification) and particularly the accumulation of fixed assets. The depreciation component of consumption of fixed capital (2.3) can be deducted to get net investment. The government also pays interests,  $INT * \text{public debt}$  (2.4 in the economic classification;  $INT$  is the interest rate applicable to the public debt measured in domestic currency units), and provides subsidies and transfers,  $ST$  (points 2.5 subsidies, 2.6 grants, 2.7 social security benefits, and 2.8 other expenses).

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32 As noted before, currency and deposits from the government are netted out in the monetary survey. If currency and deposits are not netted out, then  $DCg$  will be in gross terms and we would need to consider another term,  $BMg$ , which indicates the monetary holdings of the public sector. In that case, the right-hand side can be written as  $dB + dDCg - dBMg + dFCg$ . Above, we are assuming that  $DCg$  is in gross terms and, therefore, government deposits ( $BMg$ ) need to be included in the equation.

The revenues of the government are aggregated into taxes (1.1 and 1.2 in the economic classification) and OTRNg (which includes grants 1.3 and other revenues 1.4).

The left-hand side of that equation can be seen as the net lending/borrowing (NLB) balance. If it is negative, it has to be financed with different types of debt: here we consider domestic bonds (B), domestic credit from the monetary/banking sector (DCg), net of government's deposits (dBMg), and external debt (FCg). Because the equation is in flows, the right-hand side shows changes (indicated by "d") in debt stocks.<sup>33</sup>

## Other Price and Quantity Data

### Price Indexes

The most common price indexes are the Consumer Price Index (CPI), the Producer Price Index (PPI), and the GDP deflator. They serve as indicators of inflationary trends and therefore can be utilized to calculate other variables in real terms, or more precisely, in inflation-adjusted terms, also referred to as being at constant prices, or at deflated values. These indexes may be utilized to adjust the value of payments or obligations in private contracts or in certain public payments, such as social security benefits (IMF 2007a).

The CPI is an indicator of the prices of goods and services consumed by households. It is usually collected monthly and is presented in levels (as an index) and as a rate of change (inflation) from time "t - 1" to time "t" (inflation =  $\{[CPI(t) - CPI(t - 1)]/CPI(t - 1)\} * 100$ ).

The time period for the calculation of inflation may be a month, a quarter, or a year. For the calculation of this index, statistical agencies collect prices of goods and services considered representative of an average consumption basket for the households in the economy. The number of prices monitored is usually large, in the tens of thousands or more, and they are usually collected from a sample of commercial outlets (although there are some imputed values; that is, they follow certain assumptions for the specific calculations and do not necessarily come from prices collected in the marketplace) (IMF 2007a). The average consumption basket is calculated from household surveys and serves to

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33 As in the case of the balance of payments, the government equation is also an equation in differences. While the former shows changes in external debt and foreign reserves, the government equation shows the evolution of government debt (B, DCg, FCg) and assets (BMg) between "t - 1" and "t."

define weights for different goods and services. Those weights are then used to calculate the aggregate.<sup>34</sup>

An important issue is that the consumption basket changes over time and therefore must be updated periodically (in many countries, the update happens every ten years during national censuses; more advanced countries may update the basket yearly using household surveys). Also, different social groups or regions may have different consumption baskets. If those different baskets are known (through specific national censuses or household surveys), then separate CPI indexes for different social groups and regions can be calculated.

There are different methodological issues related to questions such as how to account for substitution effects (for example, if the price of a product goes up, consumers may switch to alternative products that satisfy the same need); adjustments in product quality (if the quality of a product changes, then the new price must be adjusted to be comparable with the previous one—for example, more powerful computers); and the imputation of certain consumption values that may not have a market price (such as housing services for owners).<sup>35</sup>

The Producer Price Index (PPI) measures the prices of goods and services bought (the input PPI) and sold (the output PPI) by producers. It may cover different sectors such as agriculture, forestry, fishing, mining, manufacturing, public utilities, construction, and some services. As with the CPI, the PPI can be reported in levels or as a rate of change (inflation) and, in many cases, with a monthly periodicity. The calculation of the PPI also requires the collection of a large number of prices for the goods and services being transacted using a representative sample of establishments. This data is aggregated using weights that represent the relative importance of each good and service on producers' buying or selling side. In addition to its uses for inflation analysis and for

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34 For instance, let us assume that households consume two items, A and B, and that A represents 40 percent of the expenditures and B represents 60 percent. If at time  $t$  (which we assume is the base period) prices were 1 peso per each item, then the CP index at time  $t$  (transformed into a base value of 100) is  $CPI(t) = [(1 * 0.4) + (1 * 0.6)] * 100 = 100$ . If at time  $t + 1$  the price of A increased to 1.2 (a 20 percent increase) and B moved to 1.05 (a 5 percent increase), then  $CPI(t + 1) = [(1.2 * 0.4) + (1.05 * 0.6)] * 100 = 111$ . The inflation rate for that period is 11 percent  $([111 - 100]/100) * 100$ .

35 For a more detailed discussion of these questions, see "The Consumer Price Index Manual: Theory and Practice," prepared by the International Labor Office, the International Monetary Fund, the Organization for Economic Co-operation and Development, the Statistical Office of the European Communities (Eurostat), the United Nations Economic Commission for Europe, and the World Bank. It is available at <http://www.ilo.org/public/english/bureau/stat/guides/cpi/index.htm#manual>.

price adjustments in legal contracts, the PPI is crucial for the calculation of national accounts in constant prices.<sup>36</sup>

The GDP deflator (the price of the GDP, called before  $P_{gdp}$ ) results from the division of GDP at current prices (nominal GDP) by the GDP at constant prices (real GDP). An approach to calculating GDP at constant prices starts from the production side: gross value-added is measured at constant prices of the base year, and then intermediate consumption at constant prices of the same base year is subtracted. This is then added to the value of taxes minus subsidies on products after it has been adjusted for inflation. If there is not sufficient data to properly conduct this approach, another method is to project value-added in the base year using an index of output volume. Finally, a third alternative simply deflates current period value-added by a price index for output. The last two alternatives should apply an output volume index (second approach) or a price index (third approach) that uses relative expenditure/revenue values in the base period as weights in the aggregation (IMF 2007a). As in the case of the CPI and PPI, production and consumption patterns will change over time, and therefore the weights utilized should be updated regularly to reflect those changes. Annual updates of the weights are recommended, in which case the series are called linked or chained indexes (IMF 2007a).

The Export Price Index (which will be labeled here  $P_{ex}$ ) and Import Price Index ( $P_{im}$ ) try to capture the evolution of the prices of a country's traded goods and services. The  $P_{ex}$  considers the prices of goods and services sold to foreign buyers, while the  $P_{im}$  reflects the prices of goods and services purchased from abroad by residents of the home country. Those values can be collected as unit-value indexes from trade data as registered by customs authorities or be based on surveys sampling representative establishments and a set of well-defined commodities. The weights for aggregation are based on trade shares.

The ratio  $P_{ex}/P_{im}$  is an indicator of the evolution of the terms of trade (TOT) of a country. If the TOT moves in favor of a country (that is, if export prices grow more or decline relatively less than import prices), then that country can buy international goods and services with fewer resources than before; therefore, its domestic income improves (and vice versa if TOT declines).

Previously when we referred to the different concepts of GDP and national income and to the adjustments to move from one concept to another, the

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36 See "The Producer Price Index Manual: Theory and Practice," with the revisions coordinated by the IMF. It is available at <http://www.imf.org/external/np/sta/teggpi/index.htm>.

presentation was done in nominal terms. However, when talking about GDP at constant prices and real income, a further adjustment related to the trade gains or losses (TGL) from variations in the TOT is needed. The formula is as follows:

$$\text{TGL} = [(EX_{\text{nom}}/P) - (IM_{\text{nom}}/P)] - [(EX_{\text{nom}}/P_{\text{ex}} - IM_{\text{nom}}/P_{\text{im}})],$$

where exports ( $EX_{\text{nom}}$ ) and imports ( $IM_{\text{nom}}$ ) in domestic currency are both deflated by the same price index  $P$  (ideally the GDP deflator) in the first term; on the other hand, in the second term nominal exports and imports are deflated by their respective price indexes. TGL may be positive and negative, and this value must be added to or subtracted from GDP at constant prices to get the real gross domestic income and other definitions as follows (IMF 2007a):

Real Gross Domestic Income at constant prices (real GDI) = GDP at constant prices + TGL,

Real Gross National Income at constant prices (real GNI) = real GDI + real primary incomes from abroad – real primary incomes payable abroad, and

Real Gross National Disposable Income at constant prices (real GNDI) = Real GNI + real current transfers receivable from abroad – real current transfers payable abroad.

### Labor Indicators

Labor market indicators represent an important block of macroeconomic data. The most commonly utilized indicator is unemployment. Its calculation requires the definition of the economically active population (EAP), which is the potential labor force available in an economy.

The EAP is defined as the population older than a specified age (also referred as the working age) that is economically active (that is, they are willing to supply labor for the production of goods and services during a specified period, even though they may or may not be employed). The minimum age limit for the working-age population varies by country depending on the mandatory schooling age, minimum age for work, and child labor laws. A commonly used minimum working age is 15. It is not recommended to set a maximum age limit for the working-age population.

“Economically active” refers to the fact that the person is either working or looking for a job. Students, stay-at-home household members, retirees,

discouraged workers, and other people who are not looking for jobs, even though they may meet the minimum working age, are not counted in the EAP. Therefore, the number of people above the working age has two components: the EAP and the economically inactive population (EIP).

An important labor indicator is the participation rate, which is the ratio of EAP over the total population of working age:

$$\text{Participation rate: } EAP / (EAP + EIP).$$

Within the EAP, there are two mutually exclusive groups: unemployed and employed. For a person to be counted as unemployed (U), he or she must comply with three conditions. They must

1. be without work (that is, he or she did not have paid employment or was not self-employed according to the definition of employment);
2. be currently available for work during the period considered; and
3. be seeking work (the person has taken specific steps during the period considered to seek paid employment or self-employment) (IMF 2007b).

The employed population is composed of those persons above the minimum working age who worked for pay, profit, or family gain during the period used as reference for the measurement (which may be a month, week, or day), even though they may have been temporarily absent from work during that period (for instance, they were on vacation, maternity leave, sick, strike, or similar temporary conditions).<sup>37</sup>

The unemployment rate (UR) is

$$UR = (U/EAP) * 100.$$

Underemployment is a related indicator that identifies those who are working but are willing and available to work in positions that could use more fully their time, abilities, and capacities. It is an indicator of underutilization of labor.

For a more complete view of the operation of the labor market in a country, it is necessary to consider the three indicators discussed: unemployment, underemployment, and labor force participation. Data on these variables can be presented disaggregated by age, gender, sector of occupation, level of education or qualification, and so on. An important disaggregation for the analysis

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<sup>37</sup> See the details in ILO, <http://www.ilo.org/global/statistics-and-databases/statistics-overview-and-topics/underemployment/lang-en/index.htm>.

of macroeconomic issues and agriculture is the identification of agricultural and rural activities (two terms that are certainly not synonymous) in labor statistics. Rural labor statistics cover agricultural activities as well as other types of work and production in manufacturing, services, and the public sector that take place in the rural space. A relevant issue is how to define “rural” for statistical purposes. Data comes from national censuses, household surveys, business surveys, and accounting and administrative records (for instance, from the Social Security Administration or equivalent institution).

Other important labor statistics cover topics such as hours worked, wages and earnings, labor costs (which is the actual cost to employers of employing labor, including social security contributions and training expenses, housing and day care centers, and so on), and job vacancies. Data on health and safety issues related to labor markets, as well as aspects related to “decent” work (formal work benefiting from legally mandated benefits and protections) may also be collected.<sup>38</sup>

### Financial Indicators

In addition to the quantity data mentioned in the monetary and financial accounts, there are also price financial data—essentially interest rates. These data are usually disaggregated by financial instrument, maturity, and currency as applicable.

Another type of data is compiled in the financial soundness indicators (FSI), which are used to gauge the financial health of financial institutions and of the corporate and household sectors as counterparts of financial institutions (IMF 2007a). The *Financial Soundness Indicators: Compilation Guide* (IMF 2006) divides indicators into core and encouraged indicators. Core indicators focus on institutions that receive deposits and are divided into five categories (capital adequacy, asset quality, earnings and profitability, liquidity, and sensitivity to market risk), each one with several indicators. Encouraged indicators include further data for depository institutions, as well as data on other financial corporations, nonfinancial corporations, households, market liquidity, and real estate markets (see IMF 2006).<sup>39</sup>

38 More information can be found in ILO <http://www.ilo.org/global/statistics-and-databases/lang-en/index.htm>.

39 The full list is in Table 1.1 of this publication in <http://www.imf.org/external/pubs/ft/fsi/guide/2006/pdf/chp1.pdf>.



## Exchange Rates

As mentioned before, exchange rates are key macroeconomic prices; they define the price of the domestic currency in relation to a foreign currency or currencies. Typically, nominal exchange rates (ER) are quoted in units of domestic currency per unit of foreign currency (usually the US dollar), but this is not always the case. Therefore, it is always crucial to understand how the ER is quoted.<sup>40</sup> Appreciation (depreciation) of a currency means that the amount of that currency paid for one unit of foreign currency decreases (increases). A strong (weak) currency is one that has appreciated (depreciated) vis-à-vis others. There are different definitions of nominal and real exchange rates, which are discussed in Chapters 7 and 10.

## Balance Sheet Data

National accounts, balance of payments, and government accounts have traditionally been presented mainly in flows. More recent methodologies for those macroeconomic accounts, and in particular the 2008 SNA, have developed a full accounting system, including balance sheets for the five sectors mentioned (nonfinancial corporations, financial corporations, general government, non-profit institutions serving households [NPISH], and households), as well as for the aggregate of the economy.

The balance sheet information shows the assets and liabilities of the different sectors. In principle, a matrix could be constructed showing which sector is a net lender and which sector is a net borrower, as well the financial instruments used by them.

A special component of the government's balance sheet that usually receives special attention is public-sector debt, and within that, public-sector external debt. As mentioned already, it is important to differentiate between what debt is public, in general, and what part of it is external or foreign. The level, evolution, and composition (considering currency, maturity, interest rate, and residency) of both total and external public debt should be monitored to analyze the sustainability of current fiscal and balance-of-payment policies. Contingent claims in general, including guarantees and similar promises, on the public sector do not appear as liabilities in the balance sheets but should be recorded as memorandum items (IMF 2007a).

Although many debates center on public debt, several of the more recent financial crises have been related to private-sector debt incurred mostly by

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40 For instance, an exchange rate may be 10 pesos per 1 dollar. However, if the quote is in dollars per peso, it would be 0.1 dollars per 1 peso.

financial and nonfinancial corporations. Therefore, the accumulation of debt by any sector deserves monitoring in order to avoid excessive levels that may trigger financial and balance of payment crises. Again, the private debt may be internal or external.

Looking at the economy as a whole (which includes the five sectors mentioned), it is useful to consider the International Investment Position (IIP) of the country in its entirety. This balance sheet shows a country's financial assets and liabilities with respect to the rest of the world. Those assets and liabilities can be classified into direct investments, portfolio investments, financial derivatives, other investments, and international reserve assets (IMF 2007b).

Some of those categories of assets or liabilities may have special interest and be presented as separate information with greater detail, such as foreign direct investment (FDI)<sup>41</sup> in the country and its external debt.<sup>42</sup> These are usually gross values (that is, not netted out with outflowing FDI by the residents of that country or by debt owed to residents of the country). Of course, the IIP should not be confused with external debt to the extent that the former includes all financial assets and liabilities, while debt is only one component of the latter.

Another component of the IIP that may have a separate presentation is international reserves, which may also be combined with indicators of foreign currency liquidity to show both the availability of official foreign currency assets and the authorities' payment obligations, specifying the schedule and currency composition of debt payments. This information allows for the evaluation of a country's vulnerability to external developments that affect balance-of-payment transactions.

Finally, another source of disaggregated data is the Coordinated Portfolio Investment Survey (CPIS), which provides information on short- and long-term holdings of equity and debt securities from the perspective of security holders. That information may include the type of financial instruments

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41 According to IMF (2007b), FDI implies the "existence of a long-term relationship between the direct investor and the enterprise and a significant degree of influence by the investor over the management of the enterprise." Collected data usually covers direct investment statistics and other variables that reflect the operations and potential impact of multinational firms, such as sales, employment, and assets. That data may be divided by the country of origin of the FDI and the sector where it is invested (IMF 2007b).

42 As argued before, this is total external debt, both public and private. A country can be vulnerable to adverse external developments because of the accumulation of total external debt, even though the public and private debt may separately look sustainable.

issued, country of residence of the issuer, country of holder, the sector of holder, and currency of issuance (IMF 2007b).

The net IIP is external assets minus external liabilities; this value plus the stock of an economy's nonfinancial assets constitutes the net worth of that economy. Balance-of-payment flows (plus other adjustments) determine the evolution of the IIP from one period to the next.

### **Environmental and Economic Accounting**

More recently, countries have begun to complement economic information with environmental data, considering that economic activities may be using resources (soil, minerals, fisheries, air, water, and so on) in a nonsustainable manner (2003 "System of Environmental and Economic Accounting").<sup>43</sup>

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<sup>43</sup> Developed by the United Nations, European Commission, IMF, OCDE, and World Bank, available at <http://unstats.un.org/unsd/envAccounting/seea2003.pdf>.

## A SIMPLIFIED MACROECONOMIC FRAMEWORK

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This chapter presents the main macroeconomic accounts within a single framework called the Social Accounting Matrix (SAM), a basic consistency tool. The SAM provides the accounting foundation to discuss adjustments in the main macro balances, in production/utilization, and in factor and asset markets (Chapters 6 and 7).

### Background

As noted earlier, there are accounting constraints related to income/expenditure/savings (variables in flows) and balance sheets (variables in stocks) for all sectors of the economy. Putting together these constraints constitutes a minimum accounting framework. Such a framework in flow terms includes the four main national accounts related to national income, fiscal, monetary, and balance of payments. Its construction requires the identification of different economic sectors or agents, the estimation of their income/expenditures/savings, and, when possible, their balance-sheet accounts as well, while ensuring that they are all mutually consistent. That consistency implies that, in flow terms, any receipt by a sector or agent has the counterpart of a payment in another sector or agent; in stock terms, it means that assets of a sector or agent are liabilities of another sector or agent. This framework does not entail any particular behavioral or market assumption.

These accounting identities can be specified in nominal or in real variables (that is, adjusted by some price deflator). When the flow budget constraints are expressed in price-adjusted terms, then the real or quantity part of the variables is separated from relative price changes, and it is possible to make comparisons across periods of the real or quantity values. The same applies to accounts presented in stock terms, where changes in the quantity of asset holdings can be separated from capital gains and losses caused by inflation, changes in the exchange rate, or other similar price adjustments.

Usually, the short-to-medium-term financial and macroeconomic programming for developing economies is done using flow accounting identities.

When the accounting framework is specified only in flow terms (as it will be done later), it serves to ensure intratemporal consistency; that is, the accounting identities hold for the time period considered (say, one year). This could be seen as the accounting framework for what John Hicks (1939) called “temporary equilibrium”: every period (such as a year) in which economic agents make their production, employment, consumption, savings, investment, and related decisions, looking at the past and present information and forming expectations of the future (which may be of different types; Grandmont 2006). This temporary equilibrium does not have to be a competitive one; rather, it may result from different forms of imperfect and constrained or rationed markets (Grandmont 2006).

The balance-sheet accounting constraints also apply to the short-term period considered, imposing what has been called “adding up” constraints on the different components of individual, sectoral, and national wealth (money, loans, deposits, bonds, and equity shares on productive capital). This adding-up constraint simply says that, for the level considered—individuals, sectors, or the country as a whole—the sum of all components of their respective wealth must be equal to the total wealth at the level considered on the adding-up constraint (Brainard and Tobin 1968; Tobin 1969; Bourguignon, Branson, and de Melo 1989); a more detailed discussion of these issues can be found in Ali Khadr and Klaus Schmidt-Hebbe (1989).

But the balance-sheet accounts are also the link to longer-term issues of growth and investment (how capital is accumulated), solvency of the public and private (related to how other assets and liabilities evolve), and other intertemporal developments taking place over several periods (such as years). Along with population growth and technological developments, the variables in the balance sheet define the time evolution of the economy. Variables at the end of period “ $t$ ” are the starting point for the next temporary equilibrium at “ $t + 1$ ,” when macroeconomic variables must again satisfy the accounting constraints on flow and stocks and so on.

As discussed earlier, economic data in developing countries do not necessarily include a full depiction of the balance sheet of the different sectors or institutions of the economy. Therefore, what follows will focus on national accounting identities in flow terms.

## **A Social Accounting Matrix**

The previous chapter discussed the four main national accounts and presented simplified equations for them. They are reintroduced here in nominal terms by showing prices.

## National Product and Income Accounts

$$\text{Equation 1: } \text{GDP} = [\text{P}_q * (\text{C} + \text{G} + \text{I}_p + \text{I}_g)] + (\text{P}_{ex} * \text{EX}) - (\text{P}_{im} * \text{IM}).$$

Now GDP is in nominal terms. If Net Primary Income with the rest of the world (NPI<sub>rw</sub>) and Net Transfers with the rest of the world (NTr<sub>rw</sub>) are added to both sides, we have

$$\text{GDP} - \text{NPI}_{rw} + \text{NTr}_{rw} = Y = [\text{P}_q * (\text{C} + \text{G} + \text{I}_p + \text{I}_g)] + [(\text{P}_{ex} * \text{EX}) - (\text{P}_{im} * \text{IM}) - \text{NPI}_{rw} + \text{NTr}_{rw}].$$

If we assume, as before, that NPI<sub>rw</sub> is just (R \* FC) (the “interest,” R, multiplied by “foreign debt” or “foreign credit,” FC, measured in domestic currency), and differentiating between the private and public sectors, both NPI<sub>rw</sub> and NTr<sub>rw</sub>, then we can write<sup>1</sup>

$$\text{Equation 1a: } \text{GDP} - (\text{R} * \text{FC}_p) - (\text{R} * \text{FC}_g) + \text{NTr}_{wp} + \text{NTr}_{wg} = Y = [\text{P}_q * (\text{C} + \text{G} + \text{I}_p + \text{I}_g)] + [(\text{P}_{ex} * \text{EX}) - (\text{P}_{im} * \text{IM}) - (\text{R} * \text{FC}_p) - (\text{R} * \text{FC}_g) + \text{NTr}_{wp} + \text{NTr}_{wg}].$$

## Balance-of-Payment Account

$$(\text{P}_{ex} * \text{EX}) - (\text{P}_{im} * \text{IM}) - (\text{R} * \text{FC}) + \text{NTr}_{rw} \pm \text{dFC} = \text{dONRA} + \text{dNFAB}.$$

$$\text{Equation 2: } (\text{P}_{ex} * \text{EX}) - (\text{P}_{im} * \text{IM}) - (\text{R} * \text{FC}_p) - (\text{R} * \text{FC}_g) + \text{NTr}_{wp} + \text{NTr}_{wg} \pm \text{dFC}_p \pm \text{dFC}_g = \text{dONRA} + \text{dNFAB},$$

where, as before, “d” means change in that variable. For instance, dFC<sub>p</sub> means that the foreign debt of the private sector (FC<sub>p</sub>), measured in domestic currency, is changing. It has a plus (+) and a minus (−) sign because the private sector may be increasing its foreign debt (+dFC<sub>p</sub>) or it may be reducing it (−dFC<sub>p</sub>). The same happens with the government foreign debt (dFC<sub>g</sub>).

It should be noted that, unlike what we saw in the previous chapter, this equation now includes separate changes in net foreign assets of the central bank (dONRA) and of the rest of the banking system (dNFAB). Before, the latter was absorbed into total net foreign debt (FC) to simplify the presentation; but for more precise analyses it is preferable to separate the net foreign

<sup>1</sup> We continue to assume that the country is a net debtor (FC), but it also is a net recipient of grants and transfers from abroad (NTr<sub>rw</sub>). Also, to simplify, we assume that both public and private debt pay the same interest rate R on external debt.

assets of the private banking system (NFAB) from the debt of the nonbanking private sector (FCp).

Foreign debt (FC) can be also deconstructed into the exchange rate (ER) and the value of the debt in foreign currency (FCg\$ and FCp\$):

$$FCg = (ER * FCg\$), \text{ and}$$

$$FCp = (ER * FCp\$).$$

### Monetary and Financial Account

$$\text{Equation 3: } dONRA + dNFAB + dDCg + dDCp - dNW = dBMg + dBMp,$$

which assumes that the debt of the public sector with the monetary and financial sector (DCg) has not been netted out of deposits owned by the same public sector.

### Public Sector

$$\text{Equation 4: } (Pq * G) + (Pq * Ig) + (INT * \text{Public Debt}) + ST - \text{Taxes} - \text{OTRN}g = dB + (dDCg - dBMg) + dFCg.$$

As noted in the previous chapter, consistency across accounts has improved with methodological advances. The 2008 SNA and related adjustments in the other main accounts (BOP, monetary, and public sectors) have achieved a deeper level of harmonization. Although there is still some additional work to do in that regard, this section shows a simplified representation that assumes full harmonization of the different accounts, using a Social Accounting Matrix (SAM) in flows (Pyatt and Round 1985).<sup>2</sup>

Another point to be considered is that the SAM is calculated in nominal terms, using the domestic currency. Therefore, it is a combination of prices and quantities. In Table 5.1, all the variables are in nominal terms, but some of them have been divided into two components (there are price and a quantity parts for these variables). In some parts of the later exposition, in order to avoid carrying a full set of price adjustments from a nominal to a real representation, it is assumed that the SAM considered corresponds to the base year of the national accounts of the country analyzed, which means that all prices are

2 When fully implemented, the 2008 SNA and the other accounts would allow for an analysis of stocks as well. That type of balance-sheet data is rarely available in developing countries.

normalized at 1. Therefore, the adjusted equations can be interpreted to hold in both real and nominal values in the base year.<sup>3</sup>

The SAM is a table that records relevant economic transactions utilizing double-entry accounting. Consistent and complete macroeconomic models require, among other things, a definition of flows and stocks that follows double-entry conventions of accounting with regard to the income statement and the balance sheets of the economic agents (Christ 1991). Although macroeconomic accounts may still suffer from problems of data collection and aggregation, they are subject to the discipline of the double-entry convention. As noted, many mistakes in macroeconomic analysis and policy can be traced to inadequate attention paid to these accounting equations and the relations across variables enforced by double-entry accounting (Christ 1991). These accounting equations will be used as a basic framework to discuss macroeconomic options and policies in this book.

After the main economic entities or activities are defined in the rows and columns of the matrix (called “accounts”), then the transaction in any cell (where a column and a row intersect) represents both a buying operation (an outgoing flow of money) from the account going down the column and as a selling operation (an incoming flow of money) from the account across the row (therefore, the double-entry accounting is enforced). The SAM is thus a compact representation of all transactions. Because of the double-entry principle, the sum of the cells down a column for an account must equal the sum of the cells across the corresponding row for that account.

The structure and level of disaggregation of the SAM will depend on the objectives of the analysis. Here we present four main economic agents (sometimes called “institutions”): (1) the private sector (including firms and households), (2) the public sector, (3) the monetary/financial sector, and (4) the rest of the world. A country’s individual economic agents must be assigned in such a way that they belong to one, and only one, of those aggregate sectors. This is a simplification of the five domestic sectors of the 2008 SNA discussed before.<sup>4</sup>

The first simplification is that the private sector of the SAM fully encompasses three sectors of the 2008 SNA (households, nonfinancial corporations, and nonprofit institutions serving households), plus the

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3 It is easy to verify that in the macroeconomic accounts of any country the nominal and real variables for the base year have the same values, which implies prices equal to 1 in that base year.

4 They are households, nonfinancial corporations, financial corporations, general government, and nonprofit institutions serving households (NPISH) (see “Basic Concepts” section in Chapter 4).



**TABLE 5.1 Social Accounting Matrix (SAM)**

Expenditures by/receipt by		Activities	Commodities	Factors		Current account	
				Labor	Capital	Private sector	Government
Activities			$P_d * D$				
Commodities		$P_q * IO$				$P_q * C$	$P_q * G$
Factors	Labor	$YL = w * L$					
	Capital	$YK = \pi * P_q * K$					
Current Account	Private sector			$YL = w * L$	$YK = \pi * P_q * K$		$(INTR * B) + ST$
	Government	$Tind$	$Tm = tm * Pim * IM$			$TYp$	
	Monetary					$INTR * DCp$	$INTR * DCg$
	Rest world		$Pim * IM$			$R * FCp$	$R * FCg$
Capital Account	Private sector	$DEPRp$				$Sp$	
	Government	$DEPRg$					$Sg$
	Monetary						
	Rest world						
TOTAL		$Pz * Z$	$Pq * Q$	$YL$	$YK$	Payments + savings	Payments + savings

Source: Author.

$P_z$  Price of Composite Goods Produced  
 $P_q$  Price of Composite Goods Utilized  
 $P_d$  Price of the Domestic Goods  
 $w$  Salary rate  
 $\pi$  rate of return over value of capital ( $P_q * K$ )  
 $IO$  Intermediate Goods: Input-Output Table  
 $YL$  Labor Income  
 $YK$  Capital Income  
 $C$  Consumption  
 $G$  Government  
 $EX$  Exports  
 $IM$  Imports  
 $Ip$  Private Investment  
 $Ig$  Government Investment  
 $DEPR$  Depreciation

$Z$  Composite Good Produced  
 $Q$  Composite Good Utilized  
 $D$  Domestic Goods (produced and consumed)  
 $L$  Number of people employed  
 $K$  Physical "capital"  
 $Tind$  Indirect Taxes  
 $Tm$  Trade Taxes  
 $TYp$  Income Taxes (private sector)  
 $TYb$  Income Taxes (monetary sector)  
 $ST$  Subsidies and Transfers  
 $NTrwp$  Net Private Transfers from RoW  
 $NTrwg$  Net Public Transfers from RoW  
 $INTR$  Interest Rate (domestic debt)  
 $R$  Interest Rate (external debt)  
 $tm$  rate of import tax ad valorem

(income and expenditures)		Capital account (savings and investments)					TOTAL
Monetary	Rest world	Private sector	Government	Monetary	Rest world		
	Pex * EX					Pz * Z	
		Pq * Ip	Pq * Ig			Pq * Q	
						YL	
						YK	
	NTrwp					Receipts	
TYb	NTrwg					Receipts	
						Receipts	
						Receipts	
				dDCp	dFCp	Flow of liabilities and savings	
		dB		dDCg	dFCg	Flow of liabilities and savings	
Sb		dBMp	dB Mg			Flow of liabilities and savings	
	Srw			dNFA		Flow of liabilities and savings	
Payments + savings	Payments + savings	Flow of assets	Flow of assets	Flow of assets	Flow of assets		

- Pex Price of Exports
- Pim Price of Imports
- Sp Private Savings (Current Account)
- Sg Government Savings (Current Account)
- Sb Monetary Sector Savings (Current Account)
- Srw Rest World Savings (Current Account)
- BMp Broad Money holdings (private)
- BMg Broad Money holdings (government)
- B Government Bonds
- DCp Domestic Credit to Private Sector
- DCg Domestic Credit to Government
- FCp Foreign Credit to Private Sector
- FCg Foreign Credit to Government
- NFA Net Foreign Assets of the Monetary Sector

**Note:** All variables are calculated in domestic currency. The letter “d” indicates change in stocks from the baseline time to the next period considered. The letters “p,” “g,” “b,” and “rw” identify the private, government, monetary, and rest of the world sectors. The symbol \* is utilized to indicate multiplication.

nonmonetary part of the financial corporations sectors (the nondepository financial institutions). The second simplification is that the monetary sector in the SAM includes only the central bank and the depository financial institutions defined in the 2008 SNA, which are the ones that create money as part of their liabilities (as indicated, the nondepository financial institutions are merged in this SAM with the private sector). Because the monetary sector in the SAM combines the central bank with other banks, the net foreign assets of the former (ONRA) and of the latter (NFAB) are aggregated into one variable for net foreign assets (NFA). This aggregation also has implications for the monetary aggregate considered in the SAM, which will be a broader definition of money.<sup>5</sup>

The public sector of the SAM coincides with the definition of the general government sector in the 2008 SNA. This simplification of sectors facilitates a clearer discussion of different macroeconomic policies in the respective chapters.

While the classification of sectors aggregates some sectors of basic national accounts, it also adds another sector: the rest of the world.

Earlier, we mentioned the four main macroeconomic accounts: national income and product accounts, balance-of-payments accounts, monetary accounts, and public-sector accounts. The last three correspond, respectively, to transactions with the rest of the world, the monetary/financial, and public-sector accounts as economic agents or institutions. Considering that the national income and product accounts present the transactions for the whole economy, then, if the accounting system is properly structured, the private-sector account results from subtracting accounts for the balance of payments, the monetary sector, and the public sector from the national income and product account.

The sectors identified execute three basic functions: (1) they produce and commercialize, (2) they consume (and complete other transactions in their current account), and (3) they accumulate (save and invest). Combining functions and sectors, we have the simplified SAM matrix in Table 5.1.

As indicated, transactions recorded down the columns indicate payments made by the institution or sector at the top of the matrix. Reading transactions across the rows indicates payments received by the institution or sector at

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5 As noted earlier, for more detailed analyses it is necessary to separate ONRA and NFAB. It is also important to discuss separately the monetary base (which is issued only by the central bank) and the broader monetary aggregate (which is the result of the combined operations of the central bank and the rest of the depository financial institutions (banks) in the economy.

the left of the matrix.<sup>6</sup> For example, in the current account, where the column of government crosses with the row of the private sector, it reads  $(INTR * B) + ST$ . This means that the government is paying the private sector interest on the bonds (B) issued by the government and held by the private sector (the interest rate, INTR, times the stock of outstanding debt B), plus giving subsidies and other transfers (ST) to the private sector. Reading from the row perspective, of course, the private sector is receiving those payments.

Production is represented in the rows and columns of activities, while the distribution and commercialization of domestic production plus imports is represented in commodities. In line with aggregate macroeconomic analysis, we present here only one activity and only one commodity. However, both activities and commodities can be divided into many productive sectors, as is usually done in computable general equilibrium (CGE) models. In this way, specific activities and commodities for the agricultural sector may be included with different levels of disaggregation within it.

Activities generate the goods and services<sup>7</sup> produced domestically, which we call here Z (with a price, Pz). It is an aggregate with two main components: D, domestic production for domestic use, and EX, domestic production for exports. Commodities aggregate and commercialize the goods and services utilized in the economy for consumption (C), government activities (G), and investment (I). We call that good Q, with a price Pq. It also has two main components: D, as before, and IM, foreign goods and services for domestic use.

This allows for the separation, as is common in CGE models but not in macroeconomic models, between domestically produced and consumed goods (D), exports (EX), and imports (IM), each one with its own price (Pd, Pex, Pim, respectively). It also highlights the fact that the good produced by the country (Z, a combination of D and EX) is different from the good utilized in that country (Q, a combination of D and IM).

These distinctions are important in conceptual terms because of the different ways that the economy might adjust to changes in prices and other variables depending on the type of good involved. The model allows us to consider crucial relative prices, such as  $(Pd/Pex)$  (which would indicate the incentives to produce for the domestic or the foreign market);  $(Pd/Pim)$  (which would

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6 The way these transactions are placed in the table assumes a specific direction of payments and receipts (that is, who is paying and who is receiving). These transactions can be changed from cell to cell to represent a different direction of the flows, or they can be kept in the same cell with the sign reversed.

7 In what follows, I may sometimes refer simply to “goods,” but that word would normally include services as well.

indicate the incentives to utilize the domestic or the foreign good); and  $(P_{ex}/P_{im})$  (which defines the terms of trade for that country).  $P_z$  and  $P_q$  can also play important roles as deflators of other variables. Considering wages, for instance: if they are deflated by  $P_z$ , they will give the real wage from the point of view of producers and will be part of the labor demand function; but if wages are deflated by  $P_q$ , they will define the real wage from the perspective of workers and would be part of the labor supply function.

The distinctions between  $D$ ,  $EX$ , and  $IM$  are also relevant in empirical applications because even for a single sector of production, at the level of disaggregation at which statistics are collected, it is usual to observe all three types of goods coexisting in the same sector of activity. In other words, even for a single productive sector, data normally show nontraded, exportable, and importable components at the same time, with different levels of substitutability among them.

The variables  $Z$ ,  $Q$ ,  $D$ ,  $EX$ , and  $IM$ , with their prices, and highly disaggregated by productive sectors, are the basis for all multisectoral, economy-wide, CGE models (see, for instance, Dervis, de Melo, and Robinson 1982). As noted, this disaggregation is not considered in macroeconomic models, which limits the types of analysis that can be performed when sectoral composition matters.

In this book, however, instead of a highly disaggregated CGE, we will use the simplified structure of the so-called 1-2-3-2 model (1 country; 2 aggregate goods,  $Z$  and  $Q$ ; 3 products,  $D$ ,  $EX$ ,  $IM$ ; and 2 factors of production).<sup>8</sup>

The SAM introduces another block of rows and columns to represent the factors of production: labor and capital, in this simplified setting. Other factors of production, such as land, can also be added.<sup>9</sup> In disaggregated CGE models, factors are usually subdivided further; for instance, labor can be subdivided by gender, by education/skills, by sector (such as rural/nonrural), and so on. Capital ( $K$ ) may be subdivided as well.

In disaggregated models (those that have more than one  $Z$  and one  $Q$ ), a relevant assumption is whether  $L$  and  $K$  in a production activity may move

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8 The 1-2-3 model is explained in Devarajan, Lewis, and Robinson 1990 and 1993; and Devarajan et al. 1994. The 1-2-3-2 is explained in Robinson 2006. It is an extension of the dichotomy of traded/nontraded goods included in the Salter-Swan model (Salter 1959; Swan 1960), where  $EX$  and  $IM$  are combined and compared to  $D$  (see Chapter 7).

9 Capital can be broadly defined to include land in agriculture and other nonlabor factors. Otherwise, it is possible to include a separate account for land, which may be further subdivided by categories/uses. If land is separately identified, it will mainly appear as a specific factor for agricultural activities (although it may appear as a factor of production in other activities that use land, such as housing).

to other activities or whether they can work or operate only in one sector (in which case they are usually called “specific factors”; see Chapter 7).

The activity of production buys intermediate goods/services (IO, from the input-output matrix of intermediate uses) from commodities and also pays to factors the value-added, as wages, salaries, and other labor-related factor incomes (YL),<sup>10</sup> and profits and other nonlabor-related factor incomes (YK). In the SAM, they are simplified as  $YL = w * L$  (the average wage  $w$  times the number of people employed  $L$ , which may not necessarily represent all the potential labor supply, and therefore there may be unemployment), and  $YK = \pi * Pq * K$  (the profit rate  $\pi$  multiplied by the value of capital invested at a point in time; in turn, the latter results from multiplying the price  $Pq$  of the good  $Q$  utilized for productive investments in that country, times what would be considered physical units of capital,  $K$ ). This  $K$  is made of the  $Q$  product in this example. If there are more products  $Qs$ , as in disaggregated CGE models, then  $K$  will be made by a combination of those products, according to a matrix that reflects such a composition per sector of activity. Then the price of  $K$  will be a combination of the different prices  $Pqs$  of those  $Qs$ .

This representation does not say anything about how  $w$  and  $\pi$  are determined (Chapter 7).

Activity pays to factors all value-added ( $YL + YK$ ); in turn factors transfer those payments to the private sector. In this SAM, we consider a single private sector, which, as explained before, combines several sectors of the 2008 SNA. But again, in more detailed SAMs utilized for disaggregated CGE models, the private sector is divided first into households and firms; subsequently, there may be additional subdivisions within each one of these categories.

If the types of households in disaggregated models receive their incomes from different activities, have dissimilar propensities to consume or save (that is, how much of an additional unit of income goes to consumption or savings), and also differ in their structures of consumption, then the results of any policy intervention will have a variety of income distribution effects and overall macroeconomic effects depending on how the types of households are affected.

The productive sector in activity also pays indirect taxes ( $Tind$ ) to the government, and those taxes are then added to the sales of its products; it also pays depreciation:  $DEPRp$  (private sector) and  $DEPRg$  (public sector).

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10 As explained in the section on national accounts, other taxes on production are included as well. This is ignored here to simplify the presentation.

The productive sector in activity sells the domestic goods/services  $D$  to commodities at price  $P_d$ , for their commercialization in the domestic market, and to the rest of the world (ROW) as exports  $EX$ , at price  $P_{ex}$ . This price can be written as

$$P_{ex} = ER * P_{ex\$},$$

where  $ER$  is the exchange rate (defined in a certain amount of domestic currency per unit of foreign currency, say 10 pesos per dollar), and  $P_{ex\$}$  is the world price of the exports of that country.

The operations in commodities include buying the domestic goods/services ( $D$ ) from activity and imports ( $IM$ ) from ROW (part of which may be used as intermediate inputs), paying import taxes ( $T_m$ ) over the value of imports ( $P_{im} * IM$ ).

In the SAM, the total value of import taxes  $T_m$  is presented as a tax rate (say 0.2, which represents a 20 percent import tax) multiplied by the value of imports (it would be an “ad valorem” import tax or import tariff), such as

$$T_m = tm * P_{im} * IM.$$

Therefore, the value in domestic currency of the imports would be

$$(tm * P_{im} * IM) + (P_{im} * IM) = (1 + tm) * P_{im} * IM.$$

Then the domestic price, inclusive of the tax is  $(1 + tm) * P_{im}$ . As with  $P_{ex}$ , we can consider the exchange rate ( $ER$ ) and the world price ( $P_{im\$}$ ) in  $P_{im}$ :

$$P_{im} = ER * P_{im\$}.$$

Therefore the domestic price of the imports can be written as  $(1 + tm) * ER * P_{im\$}$ , which highlights the three components that may affect that price, two of which can be affected by policy interventions:  $tm$  (a component of trade policies) and  $ER$  (influenced by exchange rate and other policies).

If the country cannot influence the world prices of its exports and imports, then  $P_{ex\$}$  and  $P_{im\$}$  are exogenously fixed (the country is said to be small in world markets). If a country is not small, it may influence  $P_{ex\$}$  and  $P_{im\$}$  through its own behavior and performance, and a complete model would need to consider demand and supply functions from the rest of the world. In this book, the usual assumption is that the country considered is small.

Across the row, commodities sell final goods and services for consumption and investment ( $C$ ,  $G$ ,  $I_p$ , and  $I_g$ ), to the private sector and the government.<sup>11</sup> Because the purchase is from the same product  $Q$  (a combination of  $D$  and  $IM$ ), the consumption and investment activities all carry the same price  $P_q$ . In disaggregated CGE models, as noted, there will be multiple  $Q_s$ , each one with its own price,  $P_{qs}$  (where “ $s$ ” is an index of the different sectors in the model): therefore the consumption and investment activities buying those products will pay the specific price for each one of them (represented by a specific  $Q$ ).

It is also assumed that the monetary sector (which may be simplified as the central bank only or may include all depository financial institutions) does not perform activities of final consumption and investment on this account.<sup>12</sup>

Factors (capital and labor) transfer their respective income ( $Y_K$  and  $Y_L$ ) to the private sector.

The table shows two important submatrixes, highlighted in gray. First, the block where activities (down) intersects with commodities (across) corresponds, in more disaggregated matrixes, to the input-output table (here there is only an intermediate product, called  $IO$ ). Second, the block formed by the intersection of the row and column of the capital account corresponds to another important submatrix that is sometimes known as the flow-of-funds matrix. The private sector, government, monetary sector, and ROW transfer their savings ( $S_p$ ,  $S_g$ ,  $S_m$ , and  $S_{rw}$ , respectively) from the current account to the capital account, which, along with the depreciation allowances, will be utilized to finance physical and financial investments. The intermediation

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- 11 As mentioned before, the accounting conventions of the System of National Accounts distinguish an activity sector, government, producing public-sector services (through the purchase of goods and services from the different productive branches and the purchase of factor services from labor and capital) and government as an institutional sector buying those services at the cost of production. Here we show only government as an institution in the SAM; the other concept of government as producer is absorbed into the single activity/commodity. The value of  $G$  is financed through taxes, other revenues, and increasing liabilities (borrowing) or decreasing assets, in the current and capital accounts of the government as an institution.
- 12 Financial intermediaries, as with the government, have one or more rows and columns in activities. It requires a special adjustment to capture the output of the depository institutions because of the special financial services provided by those entities: they receive deposits (paying an interest rate) and then provide loans (and charge a higher interest rate). The difference in interests paid and received by the banks is usually called financial intermediation services indirectly measured (FISIM) and requires some special calculations not discussed here. Those financial services may be treated as intermediate consumption in the input-output matrix  $A$  (that is, the firms use those financial intermediation services to produce their final value-added) or final consumption in  $C$  (households consume those financial services) (2008 SNA). Normally, national accounts consider a mix of both approaches, using the first one for firms and the second for consumers. This division broadly coincides with the economic specification of money in the production function or money in the utility function (see, for instance, Blanchard and Fischer 1989). All these complexities are ignored here.



between savings and investments takes place within the flow-of-funds matrix, using the simplified number of financial instruments considered here: broad money (BM), domestic loans (DC), foreign loans (FC) valued in domestic currency, and bonds (B) (this financial menu can be further expanded in more detailed SAMs).

If the conceptual, statistical, and numerical aspects of the various transactions have been treated adequately, the vertical sum (column) and the horizontal sum (row) of the same sector, activity, or institution must be equal.

For instance, the column

$$P_z * Z = (P_q * IO) + YL + YK + T_{ind} + DEPR_p + DEPR_g$$

has to be equal to the row

$$P_z * Z = (P_d * D) + (P_{ex} * EX).$$

Or

$$(P_q * IO) + YL + YK + T_{ind} + DEPR_p + DEPR_g = P_z * Z = (P_d * D) + (P_{ex} * EX).$$

The equations simply say that, from the supply side, the value of the product produced ( $P_z * Z$ ) includes the cost of intermediate products IO (bought at the price  $P_q$ ), the use of labor and capital that are paid YL and YK respectively, the payment of certain taxes ( $T_{ind}$ ) and the consideration of depreciation ( $DEPR_p + DEPR_g$ , on the capital utilized). From the demand side, Z is sold domestically (D) or in foreign markets (EX), at the respective prices  $P_d$  and  $P_{ex}$  (which makes  $P_z$  a weighted average of those prices).

Also the columns and row for  $P_q * Q$  must be equal:

$$P_q * Q = (P_d * D) + T_m + (P_{im} * IM),$$

$$P_q * Q = (P_q * IO) + (P_q * C) + (P_q * G) + (P_q * I_p) + (P_q * I_g).$$

Or

$$(P_d * D) + T_m + (P_{im} * IM) = P_q * Q = (P_q * IO) + (P_q * C) + (P_q * G) + (P_q * I_p) + (P_q * I_g).$$

This equation simply says that Q (which is the combination of D and IM) is sold for consumption and investment purposes ( $C + G + I_p + I_g$ ), and their value must coincide, evaluated at the price of Q.

All other summations of rows and columns must be equal. Those summations produce different equations of fundamental importance for macroeconomic analysis, as shown below.

### Basic Equations from the SAM

For instance, the activities and commodities can be combined by adding them up as follows:

$$(P_q * IO) + YL + YK + T_{ind} + DEPR_p + DEPR_g = (P_d * D) + (P_{ex} * EX)$$

added to

$$(P_d * D) + T_m + (P_{im} * IM) = (P_q * IO) + (P_q * C) + (P_q * G) + (P_q * I_p) + (P_q * I_g).$$

Then

$$(P_q * IO) + YL + YK + T_{ind} + DEPR_p + DEPR_g + (P_d * D) + T_m + (P_{im} * IM) = (P_d * D) + (P_{ex} * EX) + (P_q * IO) + (P_q * C) + (P_q * G) + (P_q * I_p) + (P_q * I_g).$$

Eliminating  $(P_q * IO)$ , and  $(P_d * D)$ , which are on both sides of the equation, moving  $(P_{im} * IM)$  to the right-hand side (with the sign changed), and rearranging terms, we have

$$YL + YK + T_{ind} + T_m + DEPR_p + DEPR_g = (P_q * C) + (P_q * G) + (P_q * I_p) + (P_q * I_g) + (P_{ex} * EX) - (P_{im} * IM).$$

This is gross domestic product at market prices (GDP) in nominal terms: it includes value-added at net factor cost ( $YL + YK$ ); indirect taxes ( $T_{ind} + T_m$ ), which transforms it at market prices; and depreciation ( $DEPR_p + DEPR_g$ ), which makes it gross, not net, domestic product. It corresponds to Equation 1:

$$\text{Equation A: } YL + YK + T_{ind} + T_m + DEPR_p + DEPR_g = \text{GDP} = [P_q * (C + G + I_p + I_g)] + (P_{ex} * EX) - (P_{im} * IM).$$

For every sector, there is a current account and a capital account equation that can be written by adding up, first down the columns and then across the rows.

### Private Sector

Current account:

$$YL + YK + (INTR * B) + ST + NTrwp = (P_q * C) + TY_p + (INTR * DC_p) + (R * FC_p) + Sp.$$

This equation indicates that the private sector receives the payment to factors ( $YL + YK$ ), the interest on the government's debt ( $INTR * B$ ), and transfers from the government ( $ST$ ) and from the rest of the world ( $NTrwp$ ). The private sector then uses those funds to buy consumption goods ( $Pq * C$ ), pay income taxes ( $TYp$ ), and pay interest on their banking debt ( $INTR * DCp$ ) and on their external debt ( $R * FCp$ ). This latter variable can be broken down, as before, into the exchange rate ( $ER$ ) and the value of the foreign debt in foreign currency ( $FCp\$$ ) as ( $R * ER * FCp\$$ ).

The balancing variable is savings ( $Sp$ ), which can be positive or negative. Those savings are allocated to the capital account as shown:

Capital account:

$$DEPRp + Sp + dDCp + dFCp = (Pq * Ip) + dB + dBMp.$$

This equation indicates that depreciation ( $DEPRp$ ) plus savings ( $Sp$ ) plus borrowing from the monetary sector ( $dDCp$ ) and from the rest of the world ( $dFCp$ ) are utilized to finance investments ( $Pq * Ip$ ), to lend to the government ( $dB$ ), and to accumulate deposits ( $dBMp$ ).

### Government

Current account:

$$Tind + Tm + TYp + TYb + NTrwg = (Pq * G) + (INTR * B) + ST + (INTR * DCg) + (R * FCg) + Sg.$$

This equation indicates that the government collects taxes ( $Tind + Tm + TYp + TYb$ )<sup>13</sup> and receives net transfers from the rest of the world ( $NTrwg$ ). It then uses those funds to finance government activities ( $Pq * G$ ), pay interest on the debt with the private sector ( $INTR * B$ ), the monetary sector ( $INTR * DCg$ ), and the rest of the world ( $R * FCg$ ); and finally to give some transfers to the private sector ( $ST$ ). The savings of the government ( $Sg$ ), which may be negative (a public-sector deficit), are then used to lend (if positive) or need to be financed (if negative) through operations considered in the capital account.

Capital account:

$$DEPRg + Sg + dB + dDCg + dFCg = (Pq * Ig) + dMBg.$$

This equation indicates that depreciation ( $DEPRg$ ), savings ( $Sg$ ), and borrowing from the private sector ( $dB$ ), monetary sector ( $dDCg$ ), and the rest of

13 Here we have indirect taxes ( $Tind$ ), trade taxes ( $Tm$ ), and income taxes ( $TYp$  and  $TYb$ ), but the range of taxes can be expanded and disaggregated further.

the world ( $dFCg$ ) are used to finance public sector investments ( $Pq * Ig$ ) and build up government deposits in the monetary sector ( $dMBg$ ).

Combining both accounts, we have the overall government budget constraint:

$$Tind + Tm + TYp + TYb + NTrwg + dB + dDCg + dFCg = (Pq * G) + ST + (INTR * B) + (INTR * DCg) + (R * FCg) + (Pq * Ig) + dMBg.$$

Rearranging the variables, the equation can be written as Expenditures – Revenues = Financing, as follows:

$$\text{Equation B: } [(Pq * G) + (Pq * Ig) + (INTR * B) + (INTR * DCg) + (R * FCg) + ST] - [(Tind + Tm + TYp + TYb + NTrwg + DEPRg)] = dB + (dDCg - dMBg) + dFCg.$$

This corresponds to Equation 4 at the beginning of this chapter:  $(Pq * G) + (Pq * Ig) + (INT * \text{Public Debt}) + ST - \text{Taxes} - \text{OTRN}g = dB + (dDCg - dMBg) + dFCg$ . The new equation also includes taxes disaggregated into several components; also,  $\text{OTRN}g$  (which was defined in Chapter 4 as including grants and other revenues received by the government) is absorbed now into  $NTrwg$  (net transfers from the rest of the world to the government), and the public sector's monetary holdings ( $BMg$ ) are not netted out from government's debt with the monetary sector ( $DCg$ ).

### Monetary Sector

Here the monetary sector<sup>14</sup> may be the central bank only or the aggregate of depository institutions. If it is only the central bank, then  $TYb$  can be interpreted as the transfer of profits generated by that institution to the government sector (if the central bank suffered losses, then  $TYb$  would be negative).

Current account:

$$(INTR * DCp) + (INTR * DCg) = TYb + Sb.$$

Capital account:

$$Sb + dBMp + dMBg = dDCp + dDCg + dNFA.$$

The capital account corresponds to Equation 3 ( $dONRA + dNFAb + dDCg + dDCp - dNW = dBM$ ), rearranging terms, disaggregating  $dBM$  into the private and government components, combining net foreign assets

<sup>14</sup> In order to simplify the discussion, this formulation ignores all the complications, discussed earlier, linked to the calculation of FISIM.

from the private monetary sector ( $dNFAB$ ) and from the monetary authorities ( $dONRA$ ) into  $dNFA$ , and defining changes of net wealth ( $dNW$ ) as  $S_b$ .  $NFAB$  and  $ONRA$  are expressed in domestic currency, and they can be divided into the exchange rate ( $ER$ ) and the value of those reserves in foreign currency  $NFAB\$$  and  $ONRA\$$ . Therefore,

$$NFAB = ER * NFAB\$, \text{ and}$$

$$ONRA = ER * ONRA\$.$$

$$\text{Equation C: } dNFA + dDCp + dDCg = dBMp + dBMg + S_b.$$

The capital account in the SAM (Equation C) is the relevant equation for macroeconomic analysis: it says that accumulation of net foreign assets by the central bank and depository institutions ( $dNFA$ ) and the provision of credit to the government ( $dDCg$ ) and the private sector ( $dDCp$ ), which are the variables on the left-hand side of the equation, are the sources that expand or reduce the money supply. This money, in turn, is held by the government and the private sector ( $dBMp$  and  $dBMg$ , respectively) (the variables on the right-hand side; we assume that  $S_b$  is kept fixed).

Normally this equation is presented in stock terms (that is, without the operator “d” that indicates changes) and therefore shows the total amount of money supply in the economy ( $BMg$  and  $BMp$ ). This level of money supply can then be compared to an estimation of money demand for different analyses of the impacts of monetary and other policies (more on this later).

### Rest of World

Current account:

$$(P_{ex} * EX) + NTrwp + NTrwg + S_{rw} = (P_{im} * IM) + (R * FCp) + (R * FCg).$$

Capital account:

$$dFCp + dFCg = S_{rw} + dNFA.$$

Combining current and capital accounts and dividing  $dNFA$  into the central bank ( $dONRA$ ) and other depository institutions ( $dNFAB$ ), we have the equation for the balance of payments:

$$[(P_{ex} * EX) - (P_{im} * IM)] + [(-R * FCp) - (R * FCg)] + NTrwp + NTrwg + (dFCp + dFCg) = dNFAB + dONRA.$$

This corresponds to Equation 2 ( $EX - IM - (R * FCp) - (R * FCg) + NTrwp + NTrwg + dFCp + dFCg = dONRA$ ), if as before we consider all

prices normalized to 1 in the base year of the SAM. Also, we assume here that the country is borrowing (positive signs for  $dFCp$  and  $dFCg$  imply capital flows to the country, meaning that the country is borrowing from ROW) and that the monetary sector includes not only the central bank ( $dONRA$ ) but other depository institutions ( $dNFAB$ ), and both add up to  $dNFA$ . In the final formulation (Equation D), we move  $dNFAB$  to the left-hand side, showing that it can be combined (and, eventually, netted out) with  $FCp$ :

$$\text{Equation D: } (P_x * EX) - (P_{im} * IM) - (R * FCp) - (R * FCg) + NTrwp + NTrwg + (dFCp - dNFAB) + dFCg = dONRA.$$

## Assumptions and Adjustment Processes

Domestic macroeconomic policies, discussed in the respective chapters, focus on some of the equations mentioned here. For instance, fiscal policy will center on the government budget constraint (Equation B); exchange rate and trade policies focus mainly but not only on the balance of payments (Equation D); and monetary policy may use a version of the monetary accounts (Equation C), sometimes in stock form, usually expanded to the whole financial system and not only the central bank. But whatever component of macroeconomic policy is analyzed, it is clear that there are important linkages across all equations and that changes in any of the variables affect the whole economy (Equation A), as shown in the SAM in Table 5.1.

The analysis of how macroeconomic variables adjust in an open economy (one integrated with international markets, especially regarding trade and financial flows) is complex because for most issues there is a range of assumptions, and therefore there are multiple combinations of potential scenarios. For instance, Table 5.2 presents different assumptions about some key variables and economic aspects.

The macroeconomic accounting identities must balance, whatever the underlying assumptions mentioned in Table 5.2. However, the way in which those balances occur and their final shape will be affected by the type of assumptions made. As noted in the introduction, this book aims to avoid debates about opinions, instead pointing out the range of them, when necessary, always within the context of a consistency framework and letting the policy analyst decide which combination of assumptions better represents the economy under study.

The adjustments in the macro balances discussed influence and are influenced by changes in the structure of production and consumption, in factor markets, and in asset markets (Figure 5.1).

**TABLE 5.2** Variables and assumptions

Variables		Assumptions	
Prices	Fixed	Flexible	Intermediate
Wages	Fixed	Flexible	Intermediate
Factors of production	Fixed/specific	Homogeneous/mobile across sectors	Intermediate, differentiating by types of factors
Exchange rate	Fixed	Flexible	Intermediate
Capital mobility	Immobile/policy controls of capital flows and related transactions	Fully mobile/no policy controls	Intermediate
Expectations	Static	“perfect foresight” “rational”	Variety of options from adaptive expectations to different ways of learning and forecasting
Technology	Constant returns to scale	Increasing returns to scale	Different technologies in different products
Operation of markets	Imperfect competition	Perfect competition	Different types of competition depending on markets
Risk aversion, time preference	Neutrality	Non-neutrality	Diverse types of assumptions regarding different economic agents

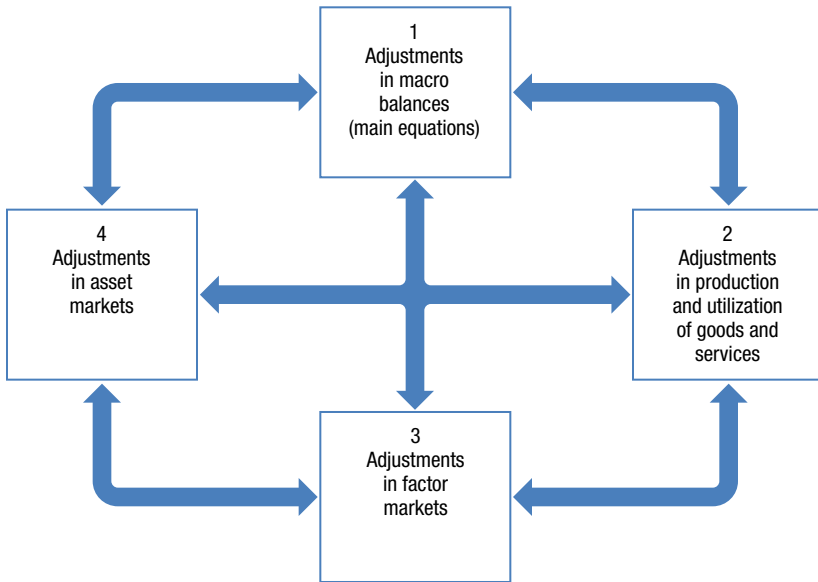
**Source:** Author.

**Note:** Risk aversion and time preference refer to the decision to consume something now for certain, compared to a potential consumption in the future, which may materialize or not. Time preference is an indicator of impatience, the relation between what I have now for certain versus what I may have in the future for certain; risk aversion is an indicator of uncertainty: the relation between what I have for certain versus what I may not get in the future. Real-life decisions combine risk aversion and time preference in ways that make it difficult to distinguish between them.

In the next two chapters, we look first at different uses of the four macro-economic equations from the SAM, repeated in Table 5.3 as a reference.

Adjustments in macro balances (block 1 in Figure 5.1) are discussed in Chapter 6. Here the adjustments are mainly in quantity variables, and relative prices do not appear prominently. Then, in Chapter 7, we consider the other three blocks, discussing further changes in production and utilization of goods and services (block 2), factor markets (block 3), and assets (block 4). In that chapter, relative prices are an important part of the discussion.

**FIGURE 5.1** Four blocks of adjustments



Source: Author.

**TABLE 5.3** Summary of macroeconomic equations

**National and income account**

Equation A

$$YL + YK + Tind + Tm + DEPRp + DEPRg = GDP = [Pq * (C + G + Ip + Ig)] + (Pex * EX) - (Pim * IM)$$

**Government sector**

Equation B

$$[(Pq * G) + (Pq * Ig) + (INTR * B) + (INTR * DCg) + (R * FCg) + ST] - (Tind + Tm + TYp + TYb + NTrwg + DEPRg) = dB + (dDCg - dBMg) + dFCg$$

**Monetary sector**

Equation C

$$dNFA + dDCp + dDCg = dBMp + dBMg + Sb$$

and  $dNFA = dONRA + dNFAb$

**Balance of payment**

Equation D

$$(Px * EX) - (Pim * IM) - (R * FCp) - (R * FCg) + NTrwp + NTrwg + (dFCp - dNFAb) + dFCg = dONRA$$

Source: Author.





## MACROECONOMIC CONSISTENCY: MAIN MACRO BALANCES

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This chapter covers different types of macro balances, combining the four equations identified in the previous chapter (equations A–D within the Social Accounting Matrix). They can be utilized to discuss some basic consistency analyses of macroeconomic policies. Within a fully defined macroeconomic model, in order to perform more complex analyses, the simple equations must be complemented with behavioral equations (such as production, consumption, investment, and money demand functions). Market clearing conditions should be elucidated, as well. Here I will use the basic accounting equations to highlight some consistency issues, without presenting a fully specified macroeconomic model. First, the national income and product account is combined with the balance of payments. Then, the monetary account is added, and finally the government account is integrated.

### General Absorption Issues

In order to simplify the discussion here, it is assumed that the Social Accounting Matrix (SAM) and equations considered correspond to the base year of the national accounts, where all prices are normalized at 1, and therefore, nominal and inflation adjusted (or real) variables have the same value for that year.

### Absorption Equation 1

Equation A (Table 5.3 in Chapter 5) is repeated here:

$$\text{GDP} = P_q * (C + G + I_p + I_g) + (P_{ex} * EX) - (P_{im} * IM).$$

It can be written as

$$\text{GDP} - P_q * (C + G + I_p + I_g) = (P_{ex} * EX) - (P_{im} * IM).$$

GDP in nominal terms can be separated into the two components: price ( $P_{\text{gdp}}$ , which is usually called the GDP deflator) and quantity ( $\text{GDP}_r$ , which is the GDP in real terms):

$$P_{gdp} * GDP_r = P_q * (C + G + I_p + I_g) = (P_{ex} * EX) - (P_{im} * IM).$$

When working with the base year of the SAM, then all prices can be normalized to 1, and the equation can be written as

$$GDP_r = C + G + I_p + I_g + EX - IM,$$

which is the usual representation of GDP in real values.

The expression  $P_q * (C + G + I_p + I_g)$  is the total expenditure by a country's residents in nominal terms, which is also called absorption:  $A = P_q * (C + G + I_p + I_g)$ . This is different from total nominal GDP because there is a portion of goods and services that is exported (EX), and a percentage of that absorption is supplied by the rest of the world (IM).

The basic absorption equation (which we will call Absorption Equation 1) can be written

$$\begin{aligned} \text{Absorption Equation 1: } GDP - P_q * (C + G + I_p + I_g) = \\ (P_{gdp} * GDP_r) - A = (P_{ex} * EX) - (P_{im} * IM), \end{aligned}$$

where the second part of the equation, nominal GDP, has been replaced by the price ( $P_{gdp}$ ) and quantity ( $GDP_r$ ) components.

If a country absorbs more goods and services than it produces ( $A > GDP$ ), using the nominal version of  $GDP = P_{gdp} * GDP_r$ , then  $(GDP - A)$  is a negative number;  $(P_{ex} * EX) - (P_{im} * IM)$  must also be negative, meaning that there is a trade deficit in goods and services.<sup>1</sup>

The absorption equation can be utilized to discuss some simple general equilibrium results. For example, a government decides to implement policies to expand A, perhaps by reducing the interest rate to increase private consumption (C) or investment ( $I_p$ ), or by expanding public expenditures (G) and investments ( $I_g$ ). If the economy is at full employment or there are other rigidities that keep  $GDP_r$  more or less fixed in the short term, and if we consider for now that prices are fixed (in this setting,  $P_{gdp}$  is fixed), then the result must be an increase in the trade deficit (if  $GDP < A$  before the policy changes) or a decline in the trade surplus (if  $GDP > A$  before those policy changes).

On the other hand, if there are unused domestic resources and  $GDP_r$  can be expanded using those resources only (that is, no additional imports, IM, are required), then an increase in A would lead to a rise in  $GDP_r$ . But if the

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1 For instance, if in a country  $GDP = 70$  billion dollars and  $A = 80$  billion dollars, then  $GDP - A = 70 - 80 = -10$  billion dollars; therefore, the trade balance  $[(P_{ex} * EX) - (P_{im} * IM)]$  must also be  $-10$  billion dollars.

increase in GDP<sub>r</sub> requires imported items, then there may be an expansion in GDP<sub>r</sub> and some deterioration in the trade balance.

Until now it has been assumed that P<sub>gdp</sub> is fixed. If government policies expand nominal absorption (A) so that it is larger than nominal GDP (P<sub>gdp</sub> \* GDP<sub>r</sub>), and GDP<sub>r</sub> is assumed not to change in the short run, this may lead to a negative trade balance  $((P_{ex} * EX) - (P_{im} * IM) < 0)^2$  as before, but there may also be another effect: P<sub>gdp</sub> may go up to equate the nominal values (GDP and A) in Absorption Equation 1. Therefore, if nominal absorption exceeds nominal GDP, there may be an increase in domestic prices (an internal disequilibrium), a larger trade deficit (an external disequilibrium), or a combination of both effects.

If the government wants to eliminate these imbalances, then it has three options: policies that reduce absorption A; policies that expand the real GDP, GDP<sub>r</sub> (particularly the traded components); or a combination of both.

Those who believe that real GDP cannot change much in the short term would argue that A has to be adjusted down, particularly G (government expenditures) or the expansion of money supply in general (which, as discussed later, may be fueling the expansion of several components of A). This approach, used by many programs, corrected inflationary and balance-of-payment problems in developing countries.

This approach has been criticized by those who believe that it is better to focus on growth of GDP<sub>r</sub>. This argument is typically based on one or both of the following assumptions: first, there may be unused productive resources in the country that can be mobilized in the short term without the need to combine them with a substantial level of additional imports; or, second, even if the first option is not possible, it is argued that some of the policies to reduce A may negatively affect GDP<sub>r</sub> even more, with perverse effects that aggravate internal and external disequilibria.

In fact, policymakers and analysts in developing countries need to consider all those aspects: what is the proper level of absorption, A; how to ensure growth of the GDP<sub>r</sub>; and the cross effects (positive or negative) of policies that may jointly affect A and GDP<sub>r</sub>. How to sustain adequate economic growth with price stability (internal equilibrium) and a sustainable position in the balance of payments (external equilibrium) has always been a matter of debate among policymakers and economists. The discussions between

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2 If the country is small, then the terms of trade P<sub>ex</sub>/P<sub>im</sub> (in domestic currency) or P<sub>ex</sub>\$/P<sub>im</sub>\$ (in foreign currency) are exogenous. Here, therefore, I make adjustments for the terms-of-trade (TOT) effect (they are discussed later in this book).

monetarists and structuralists in Latin America during the 1960s, between Keynesians and supply-siders (mostly in developed countries) later, and the debates over how to deal with the debt crises in many developing countries during the 1980s and 1990s were manifestations of the more general problem of how to articulate growth in A and growth in GDP, while avoiding internal and external disequilibria. More recently, the different approaches in industrialized and developing countries to confront the results of the 2007–2008 financial and economic crisis also reflect similar conceptual issues, focusing mainly on the internal equilibrium: as A has come down because of declines in private-sector consumption (C) and investment (Ip), the question is how to expand governments' consumption (G) and investment (Ig) to sustain growth in A that also offers enough demand for growth in GDP.

So far we have focused on the reduction of the level of absorption A (which is called expenditure reduction) as opposed to changing the composition of A (which would imply expenditure switching and production switching between traded and traded goods and services). Changes in the composition require adjustments in relative prices, which is discussed in Chapter 7.

### Absorption Equation 2

In the presentation of national and income accounts, it clearly shows that, starting from the GDP, it is possible to calculate another concept: the gross national disposable income (GNDI), which we have called Y, as follows:

$$\text{GDP} + \text{Net Primary Income with Rest of the World (NPI}_{rw}) + \text{Net Transfers with Rest of the World (NTr}_{w}) = \text{GNDI} = Y = P_q * (C + G + I_p + I_g) + (P_{ex} * EX) - (P_{im} * IM) + \text{NPI}_{rw} + \text{NTr}_{w}.$$

Additionally, we further simplified the equation by assuming that the net primary income was basically payments from this average developing country on its debt and that the country was a net debtor; therefore, NPI<sub>rw</sub> was reduced to payments on the external debt FC, both public and private, at an interest rate R:

$$\text{NPI}_{rw} = -(R * \text{FC}_p) - (R * \text{FC}_g).$$

Dividing NTr<sub>w</sub> into its public and private components, we can write GNDI or Y as follows:

$$\text{GDP} - (R * \text{FC}_p) - (R * \text{FC}_g) + \text{NTr}_{wp} + \text{NTr}_{wg} = \text{GNDI} = Y = P_q * (C + G + I_p + I_g) + (P_{ex} * EX) - (P_{im} * IM) - (R * \text{FC}_p) - (R * \text{FC}_g) + \text{NTr}_{wp} + \text{NTr}_{wg}.$$

As noted in Chapter 4,  $Y$  measures the income available to the total economy for final consumption and gross saving.<sup>3</sup>

Let's consider now the equation for the balance of payments (BOP):

$$\text{Equation D: } (P_{\text{ex}} * EX) - (P_{\text{im}} * IM) - (R * FC_{\text{p}}) - (R * FC_{\text{g}}) + NTr_{\text{wp}} + NTr_{\text{wg}} + (dFC_{\text{p}} - dNF_{\text{ab}}) + dFC_{\text{g}} = dONRA.$$

It is clear that  $Y$  shares the block  $[(P_{\text{ex}} * EX) - (P_{\text{im}} * IM) - (R * FC_{\text{p}}) - (R * FC_{\text{g}}) + NTr_{\text{wp}} + NTr_{\text{wg}}]$  with the BOP equation.

Writing the equation for  $Y$  using absorption  $A$ , as before, we have

$$Y - A = P_{\text{ex}} * EX - P_{\text{im}} * IM - R * FC_{\text{p}} - R * FC_{\text{g}} + NTr_{\text{wp}} + NTr_{\text{wg}}.$$

With the simplifying adjustments mentioned in note 3 (that is, no unilateral capital transfers, no capital gains or losses, and no destruction of assets), the expression  $[(P_{\text{ex}} * EX) - (P_{\text{im}} * IM) - (R * FC_{\text{p}}) - (R * FC_{\text{g}}) + NTr_{\text{wp}} + NTr_{\text{wg}}]$  indicates how much a country is borrowing or lending to the rest of the world.

Also, Equation D can be written as follows:

$$(P_{\text{ex}} * EX) - (P_{\text{im}} * IM) - (R * FC_{\text{p}}) - (R * FC_{\text{g}}) + NTr_{\text{wp}} + NTr_{\text{wg}} = dONRA + dNF_{\text{ab}} - dFC_{\text{p}} - dFC_{\text{g}},$$

where we moved to the right side of the equation changes in net foreign assets of the banking sector ( $dNF_{\text{ab}}$ ) and in foreign debt by the private sector ( $dFC_{\text{p}}$ ) and the public sector ( $dFC_{\text{g}}$ ) (changes in official net reserves  $dONRA$  are maintained on the right-hand side). Note that the expression on the left-hand side  $[(P_{\text{ex}} * EX) - (P_{\text{im}} * IM) - (R * FC_{\text{p}}) - (R * FC_{\text{g}}) + NTr_{\text{wp}} + NTr_{\text{wg}}]$  is usually called the current account (CA) of the balance of payments.

Then we can write Absorption Equation 2 as

$$Y - A = (P_{\text{ex}} * EX) - (P_{\text{im}} * IM) - (R * FC_{\text{p}}) - (R * FC_{\text{g}}) + NTr_{\text{wp}} + NTr_{\text{wg}} = dONRA + dNF_{\text{ab}} - dFC_{\text{p}} - dFC_{\text{g}}.^4$$

3 It was mentioned that an additional adjustment was needed to calculate  $Y$ , which considers the possibility of unilateral capital transfers, real gains or losses on assets and liabilities, and other changes in the volume of assets due to the effect of events such as natural disasters. All these adjustments are ignored here to simplify the exposition.

4 Remember that the time dimension has been eliminated to save notation, but recalling the discussion in previous chapters on timing and the meaning of "d" (the change from time  $t - 1$  to time  $t$ ), then the equation can be written as  $Y(t) - A(t) = [P_{\text{ex}}(t) * EX(t)] - [P_{\text{im}}(t) * IM(t)] - [R(t) * FC_{\text{p}}(t - 1)] - [R(t) * FC_{\text{g}}(t - 1)] + NTr_{\text{wp}}(t) + NTr_{\text{wg}}(t) = [ONRA(t) - ONRA(t - 1)] + [NF_{\text{ab}}(t) - NF_{\text{ab}}(t - 1)] - [FC_{\text{p}}(t) - FC_{\text{p}}(t - 1)] - [FC_{\text{g}}(t) - FC_{\text{g}}(t - 1)]$ .

This equation shows that if a country tries to absorb goods and services for values exceeding its disposable income ( $A > Y$ ), then  $(A - Y) < 0$  (that is, the first part of the equality is negative). Therefore, the CA is negative (the second block of the equation), indicating that this country is borrowing from the rest of the world and/or reducing official net reserves or the reserves of the private banking system. Finally, the third block is negative as well, showing how the CA deficit is being financed.<sup>5</sup>

Note that the second part of the equation  $[(Pex * EX) - (Pim * IM) - (R * FCp) - (R * FCg) + NTrwp + NTrwg]$  can also be separated into three balances: the trade balance  $[(Pex * EX) - (Pim * IM)]$ , the primary income balance  $[-(R * FCp) - (R * FCg)]$ , and the net transfers balance  $(NTrwp + NTrwg)$ .<sup>6</sup> We wrote the signs assuming that in this average developing country, the primary income balance is negative (the country is a net debtor to the rest of the world), but that the net transfers balance is positive (the country is a net recipient of remittances, foreign aid in grant form, and so on). Therefore, the whole expression can be negative for a combination of reasons. For instance, the trade balance may be negative while the other two balances could cancel each other out. Or the trade balance is positive, but the country has important payments on its foreign debt that more than compensate for the trade balance and the positive transfers. Similarly, a country may receive a large amount of remittances (say, 20 percent or more of the GDP, which is the case in Haiti, Lebanon, Samoa, Tajikistan, and Tonga);<sup>7</sup> this may compensate for a trade deficit and external payments, making the expression  $[(Pex * EX) - (Pim * IM) - (R * FCp) - (R * FCg) + NTrwp + NTrwg]$  equal to zero. In that, case  $Y = A$  (or  $Y - A = 0$ ) and the third block is also zero, meaning that

5 For example, if  $Y = 160$  billion dollars and  $A = 165$  billion dollars, then  $Y - A = 160 - 165 = -5$  billion dollars; the CA is also negative in 5 billion dollars. The third block is also negative in 5 billion dollars, which may come from the country running down reserves in the banking system or borrowing from abroad for that amount. Note that a capital inflow or borrowing ( $dFCp$  and  $dFCg$ ) has a positive sign in the capital account, which turns negative when moved to the right-hand side of the economy. Therefore, if, say, the private sector is borrowing 5 billion dollars, then  $dFCp = 5$  billion dollars; and in the equation with capital flows on the right-hand side, it is  $-dFCp = -5$  billion dollars. If the deficit is not financed by the private sector but by the central bank running down reserves for 5 billion dollars, a decrease in ONRA for that amount is accounted as a negative value: that is,  $dONRA = -5$  billion dollars.

6 In a previous chapter it was noted that errors and omissions were assumed here to be nonexistent or to be a small number absorbed into another category of the BOP, and kept fixed. In real-life policy analysis, if the value of the variable errors and omissions is a big number, it is important first to understand why this is so before moving to any consistency analysis.

7 There are 34 developing countries that, on average during the 2000s, had remittances of 5 percent of the GDP or more.

the country is not borrowing, lending, accumulating, or diminishing official and banking foreign assets.

It can also be noted that although Absorption Equation 1 [ $GDP - A = (P_{ex} * EX) - (P_{im} * IM)$ ] may be negative (the country is a net receiver of goods and services from the rest of the world through a negative trade balance), that does not necessarily mean that Absorption Equation 2 [ $Y - A = (P_{ex} * EX) - (P_{im} * IM) - (R * FC_p) - (R * FC_g) + NTrwp + NTrwg$ ] must be negative, too. To see that, we can use the definition of  $Y$  as equal to [ $GDP - (R * FC_p) - (R * FC_g) + NTrwp + NTrwg$ ] to rewrite Absorption Equation 2 as

$$[GDP - (R * FC_p) - (R * FC_g) + NTrwp + NTrwg] - A = (P_{ex} * EX) - (P_{im} * IM) - (R * FC_p) - (R * FC_g) + NTrwp + NTrwg.$$

If the country receives large unilateral transfers, such as workers' remittances or foreign grants, or, contrary to the previous assumption, the country is a net foreign creditor and then  $[(R * FC_p) + (R * FC_g)]$  is positive, it may happen that even though  $GDP - A$  is negative (and therefore  $(P_{ex} * EX) - (P_{im} * IM)$  is also  $< 0$ ), net income from foreign assets or unilateral transfers finance the deficit in the trade balance and the country may absorb ( $A$ ) more than it produces ( $GDP$ ).

It is always important to analyze the structure of the CA of the balance of payments, considering the three components (trade, income, and net transfers blocks) to understand where problems may exist. The third block of the Absorption Equation 2, which indicates how the CA is financed if it is negative, or how the country invests in the rest of the world if it is positive, will be discussed later.

### Savings-Investment Equation

Another useful representation of Absorption Equation 2 is as follows, where  $A$  has been separated into consumption and investment again (that is,  $A = P_q * (C + G + I_p + I_g)$ ):

$$[(Y - (P_q * C) - (P_q * G))] - [(P_q * I_p) + (P_q * I_g)] = (P_{ex} * EX) - (P_{im} * IM) - (R * FC_p) - (R * FC_g) + NTrwp + NTrwg.$$

We can call this the Savings-Investment Equation, considering that national disposable income ( $Y$ ) in nominal terms minus private consumption ( $P_q * C$ ) and current public expenditures ( $P_q * G$ ) (the first parenthesis) represents savings for the whole country, and those savings are used to finance private and public investments  $[(P_q * I_p) + (P_q * I_g)]$ . Therefore, we can



write (using “nom” to indicate nominal values of savings,  $S_{nom}$ , and investments,  $I_{nom}$ )

$$S_{nom} - I_{nom} = (P_{ex} * EX) - (P_{im} * IM) - (R * FCp) - (R * FCg) \\ + NTrwp + NTrwg = dONRA + dNFAb - dFCp - dFCg$$

Now, if savings are not enough to finance total investment ( $S_{nom} < I_{nom}$ ) and therefore  $(S_{nom} - I_{nom})$  is negative, then the country must use official or banking reserves ( $dONRA + dNFAb$ ) and/or borrow from the rest of the world ( $-dFCp - dFCg$ ). Of course, the use of official or banking reserves can continue only until they are depleted, and there are also limits to the increase in foreign debt. Alternatively, if a country saves more than it invests in the economy ( $S_{nom} > I_{nom}$ ; or  $S_{nom} - I_{nom} > 0$ ), then it can lend to the rest of the world and/or accumulate official and banking reserves. We can label the right-hand side (RHS) of the equation ( $dONRA + dNFAb - dFCp - dFCg$ ) as “savings received from the rest of the world.” These savings (expressed in nominal terms) can be written  $-S_{rw}$ .<sup>8</sup> Therefore, the whole equation in compact form would be

$$S_{nom} - I_{nom} = -S_{rw} \\ \text{or} \\ S_{nom} + S_{rw} = I_{nom},$$

meaning that country savings plus savings from the rest of the world finance total investment.

An important debate in macroeconomic modeling is what has been called the closure rules: which variables are assumed to be the exogenous or forcing drivers, and which ones are the adjusting ones. In the context of this equation, it means deciding whether investments are the autonomous variable to which savings adjust (which has been called the Keynesian closure) or to assume that savings are the driving force and that investment adjusts (called the neoclassical closure) (Robinson 2006). We will return to these issues later.

As a reference, the main equations are reproduced here:

Absorption Equation 1

$$GDP - A = (P_{gdp} * GDP_r) - P_q * (C + G + I_p + I_g) = (P_{ex} * EX) - \\ (P_{im} * IM).$$

8 Remember the accounts for the rest of the world in the SAM. Current account:  $(P_{ex} * EX) + NTrwp + NTrwg + S_{rw} = (P_{im} * IM) + (R * FCp) + (R * FCg)$ . Capital account:  $dFCp + dFCg = S_{rw} + dNFA$ . Also  $dNFA = dONRA + dNFAb$ . Therefore,  $(P_{ex} * EX) - (P_{im} * IM) - (R * FCp) - (R * FCg) + NTrwp + NTrwg = -S_{rw} = dONRA + dNFAb - dFCp - dFCg$ .

### Absorption Equation 2

$$Y - A = [\text{GDP} - (R * \text{FCp}) - (R * \text{FCg}) + \text{NTrwp} + \text{NTrwg}] - Pq * (\text{C} + \text{G} + \text{Ip} + \text{Ig}) = (\text{Pex} * \text{EX}) - (\text{Pim} * \text{IM}) - (R * \text{FCp}) - (R * \text{FCg}) + \text{NTrwp} + \text{NTrwg} = \text{dONRA} + \text{dNFAb} - \text{dFCp} - \text{dFCg}$$

### Savings-Investment Equation

$$\text{Snom} - \text{Inom} = [(Y - (Pq * C) - (Pq * G)) - [(Pq * Ip) + (Pq * Ig)]] = (\text{Pex} * \text{EX}) - (\text{Pim} * \text{IM}) - (R * \text{FCp}) - (R * \text{FCg}) + \text{NTrwp} + \text{NTrwg} = \text{dONRA} + \text{dNFAb} - \text{dFCp} - \text{dFCg} = -\text{Srw}$$

Or, in simplified form,

$$\text{Snom} + \text{Srw} = \text{Inom}$$

## Monetary Balances

The previous section used Equation A (national and income account) and Equation D (balance of payment) to discuss the macroeconomic consistency of some policy scenarios. Both equations are also linked to Equation B (government sector) and Equation C (monetary sector) due to the presence of several variables that all those equations share. Therefore, adjustments in the first two equations will have repercussions on the other two that must be considered as well. Here Equation C (monetary sector) is added to the discussion of the previous section, allowing us to look at the general outlines of monetary policy and monetary balances. In what follows, first the supply of money is considered, then its demand, and finally, some aspects of the adjustment between supply and demand are discussed.

### Money Supply

The supply side of money aggregates two different types of financial institutions into a single balance sheet for the sector (Chapter 4): the central bank (or monetary authority) and the rest of the banks in the financial system (those institutions that can receive deposits, which are the components of the definition of broad money, BMg and BMp). It is necessary to analyze both components separately because from the point of view of the economic authorities as a whole, the activities of the central bank can be considered part of the policy levers that can be utilized to implement monetary policies, while the operations of the other banks are not under the direct control of economic authorities (except in the case of some public banks), although they can be influenced by monetary policies.

Recalling Chapter 4, we can separate the balance sheets of these two types of monetary/banking institutions and write them in equation form (as in Chapter 4) as follows.

Central Bank:

$$\text{ONRA} + \text{DCbcb} + \text{DCpcb} + \text{DCgcb} = \text{Ch} + \text{Cb} + \text{RD} + \text{NWcb}.$$

where, as before, ONRA is official net foreign assets, DCbcb is credit to the depository banks by Central Bank, DCpcb is credit to the private sector by Central Bank, DCgcb is credit to the government by Central Bank, Ch is currency held outside the Central Bank by the private sector other than depository banks, Cb is currency held by depository banks (“cash in vaults”), RD is deposits of depository banks in Central Bank, and NWcb is net wealth of the Central Bank and other items.

Depository Banks:

$$\text{NFAb} + \text{Cb} + \text{RD} + \text{DCpb} + \text{DCgb} = \text{DCbcb} + \text{DEPO} + \text{NWb}.$$

The variables are NFAb (net foreign assets held by banks); Cb (currency held by banks or “cash in vault”); RD (deposits of depository banks in the central bank); DCpb (credit to the private sector by banks); DCgb (credit to the government by banks); DCbcb (credit to the depository banks by the central bank); DEPO (deposits of the private sector and government with the depository banks); and NWb (net wealth of the banks and other items).

As noted before, in these equations there are several simplifications, such as that the government does not hold cash or have deposits at the central bank; and the category “deposits” (DEPO) is an ample one that includes a variety of checking, savings, and other deposits and instruments with high liquidity characteristics, as discussed elsewhere. From Chapter 4 we can recall that those balance sheets can be aggregated to present different views (usually called monetary surveys) of the monetary and financial sector and to define different types of monetary aggregates.

Starting with the central bank, we can look at the asset side (the left-hand side of the equation), which consists of the sources of money creation. The type of money created in this way from the liability side of the central bank’s balance sheet (the right-hand side of the equation), as discussed in Chapter 4, is called the monetary base (labeled  $\text{BM}_0$ ), because the rest of the banking system’s broad monetary aggregates are built on it.

As shown in the equation, it is a monetary aggregate that includes currency outside of the central bank (Ch) plus currency held by depository banks (Cb, cash in vaults) plus deposits in the central bank from depository institutions (RD):

$$\text{Monetary Base} = \text{BM0} = \text{Ch} + \text{Cb} + \text{RD}.$$

The monetary base can be expanded if the central bank issues local currency to buy incoming foreign currency (because of exports, remittances, foreign aid, external credit, foreign direct investment, and other capital inflows). This increases ONRA. Conversely, selling foreign currency from ONRA (to pay for imports, interests and capital on different types of external debt, and other payments to the rest of the world) will reduce ONRA and, other things being equal, will decrease money supply as well.

The central bank can also expand money supply by lending to the financial/banking sector (DCbcb), to the nonfinancial private sector (DCpcb), and to the government (DCgcb). Historically, central banks, and not only in developing countries, have lent to all three sectors through a diversified menu of instruments.

Central banks lend money to governments by buying government bonds and through a variety of loans to finance their fiscal deficits.<sup>9</sup> Central banks also finance the private sector through different instruments, such as rediscounts or lines of credit to banks for specific purposes or sectors; the banks then borrow from the central bank (DCbcb) and then lend to nonfinancial firms that comply with the criteria established for those rediscounts by the government. Sometimes central banks lend directly to private nonfinancial firms (DCpcb) through loans or by buying other debt instruments (such as bonds issued by those firms).

Central banks from developing countries—but including institutions from industrialized countries as well that have used different types of instruments to manage credit to the private sector—have been called developmental central banks. The process of creating modern central banks in industrialized countries has been one of reducing the use of such developmental instruments, mainly because of concerns about (1) their past use (and abuse) leading to high inflation in many developing countries (see Brimmer 1971); (2) their potential to transform from general financing instruments to instruments used to

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<sup>9</sup> A central bank may also buy public bonds not from the governments directly (primary market) to finance deficits but from the banks and the private sector (secondary market) to regulate the amount of money in the economy and influence interest rates.

pick winners (and losers); and (3) other potential distributive effects. However, distributive effects (including the potential generation of winners and losers) may be unavoidable with any mechanism of money creation: although monetary policy is in theory supposed to be distribution neutral, this does not seem to be the case in practice.<sup>10</sup> So the main questions are whether the misuse of those instruments may lead to inflation and how to design monetary interventions to efficiently achieve the desired objectives (old debates about developmental central banks can be found in Bloomfield 1957 and Brimmer 1971; a recent discussion is in Epstein 2005).

During the recent global recession, some of the older developmental instruments that directly supported the private sector were used again. For example, some central banks lent directly to firms, both financial and nonfinancial (Fettig 2008) as they did during the Great Depression of the 1930s.<sup>11</sup> In addition, some of the central banks in industrialized countries have become large buyers of private-sector liabilities (such as mortgages), in addition to government debt.

Besides expanding the BM0 through direct lending to depository banks, the private sector, and the government, the central bank can also allow for depository banks to create additional monetary aggregates through other instruments.

One direct way to expand or restrict the money supply has been the creation or subtraction of the required reserves (RR) in banks. Usually, central banks determine a percentage of banks' total deposits that must be kept in cash at the banks (Cb) or in deposits in the central bank (RD), mainly to ensure that those institutions have enough liquidity to face sudden increases in the demand for cash by the public. The cash and deposits by the banks are part of the definition of the monetary base.

To proceed further, as in Chapter 4, we can aggregate the equation of the central bank ( $ONRA + DC_{cb} + DC_{pcb} + DC_{gcb} = Ch + Cb + RD + NW_{cb}$ ) and of the depository banks ( $NFA_b + Cb + RD + DC_{pb} + DC_{gb}$ )

10 See, for instance, Coibion, Gorodnichenko, Kueng, and Silvia (2012). Money always gets into the economy through specific economic actors, not by equally endowing each citizen with some amount of currency (in the latter case, even if allocated equally per capita, there may still be distributional effects).

11 Fettig (2008) notes that "When describing the Federal Reserve's response to the Bear Stearns episode, observers have used words like 'extraordinary' and 'unprecedented.' And that's true, to a point; namely, this is the first time the Federal Reserve has used this power since the Federal Reserve Act was amended in 1991. . . . But it's not the first time that Federal Reserve banks have made loans to businesses—all types of businesses, not just those related to the financial services industry. It won't surprise you to learn that these loans began during the Great Depression, but they also continued for nearly 20 years."

= DCbcb + DEPO + NWb) to obtain the following equation, presented as Assets = Liabilities + Capital:

$$\text{ONRA} + \text{DCbcb} + \text{DCpcb} + \text{DCgcb} + \text{NFAB} + \text{Cb} + \text{RD} + \text{DCpb} + \text{DCgb} = \text{Ch} + \text{Cb} + \text{RD} + \text{NWcb} + \text{DCbcb} + \text{DEPO} + \text{NWb}.$$

Rearranging and eliminating terms that appear on both sides (such as DCbcb, RD, Cb), we have:

$$\text{ONRA} + \text{NFAB} + \text{DCpcb} + \text{DCgcb} + \text{DCpb} + \text{DCgb} = \text{Ch} + \text{DEPO} + (\text{NWcb} + \text{NWb}).$$

This equation is the disaggregated version of the Equation C that was presented in the monetary and financial account in flows, but here the central bank is differentiated from other banks. We repeat Equation C in stocks:

$$\text{ONRA} + \text{NFAB} + \text{DCg} + \text{DCp} = \text{BMg} + \text{BMp} + \text{NWb},$$

where NWb represents accumulated savings over time (that is, net wealth; in the original equation, this variable was flow savings for the period).

There are two main differences between Equation C and its disaggregated version above. First, in Equation C credit to the private sector (DCp) and to the government (DCg) does not indicate the source, but the disaggregated version shows whether credit comes from the central bank (DCpcb, to the private sector; DCgcb, to the government) or from the depository banks (DCpb and DCgb). Second, Equation C shows broad money (BM) divided into what is held by the private sector (BMp) and the government (BMg), while the disaggregated version ignores the division among potential holders of money and concentrates on the different components of BM in terms of the financial instruments and financial institutions: currency held outside the central bank (Ch) and deposits (DEPO).<sup>12</sup> But the two representations must add up to the same amount of total money:

$$\text{BMp} + \text{BMg} = \text{Ch} + \text{DEPO}.$$

Let's consider both the equation for the monetary base BM0 and the equation for broad money (calling the largest monetary aggregate M3):

12 Currency held by the banks at the central bank (Cb) is a liability of the central bank and an asset of depository banks. When considering the aggregate of the central bank and of depository banks, Cb is netted out of the aggregate equation.

$$BM0 = Ch + Cb + RD.^{13}$$

$$M3 = BMp + BMg = Ch + DEPO.$$

The last equation uses a broad definition of money that includes different types of financial instruments, such as checking deposits, savings deposits, and so on, which have been aggregated into an overall category called deposits (DEPO).

If we divide the equation of M3 by the equation of BM0 (and focus on the components of money and not the holders, as mentioned before), we have

$$M3/BM0 = (Ch + DEPO)/(Ch + Cb + RD).$$

The expression M3/BM0 indicates how much of the broad monetary aggregate is created as a multiple of the monetary base; that ratio is, therefore, called the money multiplier. In what follows, I will ignore Cb because it is usually a small number.<sup>14</sup>

Dividing the second expression by deposits, DEPO, we have

$$[(Ch/DEPO) + (DEPO/DEPO)]/[(Ch/DEPO) + (RD/DEPO)] = (c + 1)/(c + rd),$$

where  $Ch/DEPO = c$  (this ratio shows the amount of cash that people want to hold in relation to their deposits) and  $RD/DEPO = rd$  (which is the ratio of deposits in the central bank or reserves that banks want to maintain in relation to the deposits held by their clients). Going back to the equation M3/BM0 and rearranging terms, we have

$$M3 = [(c + 1)/(c + rd)] * BM0.$$

It indicates that the monetary base (BM0) multiplied by the money multiplier (the expression  $(c + 1)/(c + rd)$ , which means that  $c + 1$  is divided by  $c + rd$ ) results in the value of broad money (M3), the more encompassing definition of money supply.

For instance, if  $c = 0.3$  (that is, people want to hold in cash 30 percent of the total value of their deposits) and  $rd = 0.4$  (the banks hold reserves

13 Now Cb reappears because we are considering only the central bank, which is the one that generates the monetary base.

14 Alternatively, Cb can be added to RD to consider the reserves of the depository banks, including both cash in vaults and deposits in the central bank, such as  $Cb + RD = RD'$ . The following analysis is similar, whether we consider RD or RD' (it has been mentioned already that we are ignoring cash in the hands of the government outside the central bank to simplify the equations and the analysis.)

equivalent to 40 percent of the deposits of their clients), then the money multiplier is  $(1 + 0.3)/(0.3 + 0.4) = 1.857$ . This means that M3 is 85.7 percent larger than BM0. If  $c$  and/or  $rd$  go up (that is, people want to hold more cash and/or banks decide to increase the reserves as a proportion of their clients' deposits), the money multiplier goes down (and, vice versa, if  $c$  and/or  $rd$  go down, then the money multiplier goes up).

A final point to note is that banks may be holding more reserves ( $RD$ ) than the required reserves ( $RR$ ) (that is, the proportion of reserves mandated by the central bank to ensure that the financial institutions have enough liquidity to conduct their operations), but they cannot hold less, given the minimum ratio imposed by government ( $rr$ ). We can call  $(c + 1)/(c + rr)$  the maximum money multiplier, given by applying the ratio mandated by the central bank; on the other hand,  $(c + 1)/(c + rd)$  would be the observed money multiplier (which cannot exceed the maximum).<sup>15</sup>

In summary, the supply side of money comes from (1) changes in the monetary base  $BM0$ , which in turn depends on the accumulation or loss of foreign assets in the central bank ( $ONRA$ ) and from net credit extended by the central banks to other banks ( $DCbcb$ ), to the private sector ( $DCpcb$ ), and to the government ( $DCgcb$ ); and (2) changes in the money multiplier (how much broad money  $BM$  can be created from a given monetary base), mostly by decreasing or increasing the ratio of required reserves ( $rr$ ).<sup>16</sup> In this section, we are interested only in the general outlines of monetary policy; thus, the complications related to the money multipliers and the financial sector will be largely ignored.

The basic ideas related to the supply of money, aggregating the monetary/banking system as a whole, can be presented in the simple framework embodied in the Equation C (in flows) repeated below:

$$dNFA + dDCp + dDCg = dBMp + dBMg + Sb,$$

15 Historically, banks have been operating at  $rd$  close to  $rr$  (the excess reserves were small or nil). However, if banks are concerned about liquidity and decide to increase  $rd$  far above  $rr$ , then the money multiplier will go down and the expansion of the monetary base ( $BM0$ ) by the central bank will not be reflected in equivalent increases in broader monetary aggregates such as M2 or M3. In that case, monetary policy will be less effective to reactivate the economy. Banks increased  $rd$  (the ratio of reserves) during the Great Depression of the 1930s and have done the same during the financial crisis that started in 2007–2008. Banks have argued that rather than the increases in reserves being their decision, it resulted from the behavior of the private sector that expanded deposits but did not increase the demand for credit.

16 This is the usual textbook presentation in which the central bank takes the initiative. There are other theories that reverse the causality: money is created by the banks extending loans (which expands the deposits), and then they borrow from the central bank the necessary reserves. We will not discuss this endogenous money creation approach.



where, as before,  $dNFA = dONRA + dNFAb$ .

Therefore, the creation of money (that is, the expansion of broad money in the hands of the public [ $dBMp$ ] or in the hands of the government [ $dBmG$ ]) can occur via three potential sources according to the left-hand side of the equation. It can arise because (1) the country accumulates foreign assets in the banking system  $dNFA$  (which may result from accumulation of official foreign reserves by the central bank [ $dONRA$ ] or by the rest of the banking sector [ $dNFAb$ ]); (2) the banking sector lends to the government ( $dDCg$ ); or (3) the banking sector lends to the private sector ( $dDCp$ ).

### Money Demand

We have thus far discussed the supply of money; now we need to consider the demand side. We assume that the level of money held by the government ( $BMg$ ) is fixed (or that it is a policy variable that is defined exogenously).<sup>17</sup> Therefore, we concentrate on the money demand by the private sector, which we call  $BMp$  demand. That demand is related to the functions that money plays in the economy, which usually have been identified as (1) a medium of exchange (money is used to settle transactions, present and future);<sup>18</sup> (2) a unit of account (money is used to indicate the price of goods, services, and assets in an economy); and (3) a store of value (money serves to carry purchasing power from one period to the next).

The two primary reasons why people may want to hold money (a piece of paper with little intrinsic value) are related to functions 1, medium of exchange, and 3, store of value. Therefore, the first reason to hold money is the transactions motive: money is an important medium of exchange (function 1); people need to have some liquid balances<sup>19</sup> to pay for the things they need.<sup>20</sup> The other reason is what has been called the speculative motive. Money is held as a store of value (function 3) because it is an asset that has two very important characteristics: it is very liquid and, except for inflation, is

17 Also, remember that in the “Monetary and Financial Accounts” section in Chapter 4, we also discussed the possibility of using a government’s debt net of its deposits ( $dONRA + dDCp + (dDCg - dBMp) = dBmG$ ).

18 Some may refer to the use of money as the standard for future payments as a fourth function.

19 Remember from Chapter 4 that  $BMp$  includes currency in the hands of the public plus different types of bank deposits that can be used to pay transactions on demand (that is, they are very liquid).

20 Financial innovations such as credit cards and, more recently, virtual currencies have been reducing the need to have money for transactions purposes. In developing countries, however, currency and banking deposits are widely used for transaction purposes.

risk free (that is, 1 peso or 1 dollar always has that value, while bonds, equity shares, physical capital, and so on may go up or down in nominal value).

We assume a very simple demand for money by the private sector that incorporates both motives:<sup>21</sup>

$$\text{Bmpdemand} = (1/v) * \text{Pgdp} * \text{GDPr},^{22}$$

where “v” is called the velocity of circulation of money (v). Mechanically, money velocity (v) is nominal GDP (Pgdp \* GDPr) divided by the money indicator used (Bmp, in this case) ( $v = (\text{Pgdp} * \text{GDPr})/\text{Bmp}$ ). It is called velocity because it can be interpreted as how many times the currency has to circulate in the economy to contribute to the materialization of the nominal GDP. But it can be given a more behavioral interpretation by assuming that 1/v has two components: one, more stable, related to the “transactions motive” and another, more variable, related to the speculative motive.

The transactions motive is represented in the equation by the notion that people demand a fraction of the whole nominal value of value-added production in the economy (Pgdp \* GDPr), which acts as a proxy for the value and number of transactions in the economy.<sup>23</sup> It can be thought of as a relatively more stable part of 1/v that depends on the financial and technological innovations that reduce the need to use money for transactions.

The speculative motive is embedded in the more variable part of “v,” which reflects the desire to hold domestic currency depending on various

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- 21 There are two general ways of thinking about the demand for money: one comes from the needs of the consumers and another from the requirements of the producers. In the first case, the demand for money derives from some optimization of the utility function of consumers (with money as a component of the utility function) and in the second case from an optimization exercise considering the production function of firms (in this case, money is part of the production function). Including money in the utility function to derive a money demand function yields similar results as cash-in-advance models, where the demand for money is related to the levels of consumption (Feenstra 1986). Including money in the production function would lead to some equivalent cash-in-advance model, but now it is the production of goods that requires that the firm has some money in hand (see Blanchard and Fischer 1989 for a discussion of both approaches). Finally, it was already noted that the methodology followed by the System of National Accounts allows for both approaches: the imputed value added of monetary transactions can be calculated as part of private consumption and/or of the production costs. Some countries use the consumption approach and others utilize both. The use of the production approach alone to calculate national accounts seems less frequently used.
- 22 Moving the variable “v” to the other side of the equation and assuming it is fixed, we have the naïve quantity theory of money, which says that the amount of broad money (BM) times the circulation in the economy (defined by “v”), is equal to nominal GDP:  $\text{BM} * v = \text{Pgdp} * \text{GDPr}$ .
- 23 There are different opinions about what is the proper proxy for the value and number of transactions in an economy. Some suggest using consumption (as in the type of model that has been called “cash-in-advance”; see Lucas 1982) or absorption ( $A = \text{Pq} * (C + G + \text{Ip} + \text{Ig})$ ) instead of the nominal GDP, which is also influenced by exports and imports that involve fewer domestic transactions.

factors such as interest rates, current and expected inflation, and current and expected changes in the nominal exchange rate (ER).

### Monetary Balances

Let's start with the market-clearing equation for money, where money supply (BM<sub>p</sub>) equals money demand (BM<sub>p</sub>demand):

$$BM_p = BM_{p\text{demand}}$$

or

$$dNFA + dDC_p + (dDC_g - dBM_g) - S_b = (1/v) * P_{gdp} * GDP_r.$$

If we assume for now that “*v*” is fixed, as well as *S<sub>b</sub>* (that is, the net wealth of the banking system does not change) and that *BM<sub>g</sub>* (the cash and banking deposits held by the government) is a policy variable (and we keep it fixed), then an expansion of the money supply because of increases in *dNFA*, *dDC<sub>p</sub>*, and/or *dDC<sub>g</sub>* will affect *P<sub>gdp</sub>* and/or *GDP<sub>r</sub>*. If it is assumed that there is unemployment of resources (the economy is operating below full employment), then an expansion of the money supply (for example, by expanding credit to the private sector, *dDC<sub>p</sub>*, or the government, *dDC<sub>g</sub>*) may lead to an expansion of the *GDP<sub>r</sub>* without inflationary pressures. In this case, the expansion of the *GDP<sub>r</sub>* would increase money demand, and the money market might balance without affecting *P<sub>gdp</sub>*.

If, on the other hand, there were critical bottlenecks that limited the expansion of the *GDP<sub>r</sub>* (or if the creation of money exceeded the amount needed to move the economy to full employment), then the expansion of money may end up increasing *P<sub>gdp</sub>* as well.

We previously assumed “*v*” to be constant, but increasing the amount of money could also affect this variable; for instance, if the public decides to hold less local currency because the increase in money supply leads to expectations of higher inflation and/or of a devaluation, then the velocity of currency circulation increases (that is, people are trying to get rid of the local currency), *1/v* declines, and the amount of money demanded for a given level of nominal *GDP<sub>r</sub>* declines.

Next we look closer at the different sources of money creation and outline some possible ways in which the macro accounts may balance.

#### MONEY CREATION THROUGH DOMESTIC CREDIT

It was shown before that the creation of money may be due to internal sources, such as the extension of credit to the private sector (*dDC<sub>p</sub>*) or to

the government ( $dDCg$ , perhaps to finance a fiscal deficit). As before, if the  $GDP_r$  is at or close to full employment, there will be an impact on prices. Depending on the price level at which the money market may equilibrate, and with a nominal  $ER$  unchanged, there could be a continuous deterioration in the trade balance. This, with fixed payments of interest  $[(R * FCp\$) - (R * FCg\$)]$ , receipts of net transfers  $[NTrwp\$ + NTrwg\$]$ , and unchanged capital flows  $[dFCp\$ + dFCg\$]$ , implies a loss of net foreign assets of the banking system. Assuming that private banks, seeing the deterioration of the trade balance, would rather hold onto their “dollars” (that is,  $dNFAb\$ = 0$ ), the decline in net foreign assets will affect only the central bank, which will lose official reserves ( $-dONRA\$$ ).<sup>24</sup> When reserves are low compared to imports or in relation to payments of external debts, a devaluation would follow (and in developing countries, this would usually be accompanied by an IMF stabilization program).

A way to try to restore equilibrium in the money market and the trade balance would be a reduction in domestic credit (negative flows of  $dDCp$  and  $dDCg$ ), which reduces money supply, forces prices and/or  $GDP_r$  down, and, through price and income effects, restores the trade balance. This approach has been called the monetary approach to the balance of payments and has provided the underpinnings for most of the IMF programs aimed at restoring balance in the external accounts (see Frenkel and Johnson 1976).

The description so far corresponds mostly to an economy with capital controls and prohibitions to hold and circulate dollars in the domestic economy, such as was the case of most countries, developed and developing, during the 1950s, 1960s, and part of the 1970s. During this period, the process leading to devaluations involved a relatively slow-motion event, fueled by the deterioration of the trade balance. However, since the late 1970s and increasingly during the 1980s and 1990s, many countries have liberalized the transactions of the current and capital accounts of the balance of payments. The increasing use of hard foreign currencies in the domestic economy (a phenomenon that has been called dollarization but that may involve other foreign currencies) transformed the nature of the adjustment to an increase in unwanted money supply.

In this new scenario, the impact of monetary policy can operate through a sustained selling of domestic currency (which has been called currency

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<sup>24</sup> The rest of the banking system (outside the central bank) may include some public as well as private banks. Public banks at times of exchange rate stress have borrowed in world markets, thus bringing in dollars at the cost of larger indebtedness in the short term and a potentially deeper debt crisis later.

substitution)<sup>25</sup> and capital flight ( $-dFCp$ ). When economic agents see an important deterioration in the ratio of official reserves compared to some indicator of monetary aggregates (for example, the ratio  $ER * ONRA\$/BMp$ , or other monetary aggregate), they would buy dollars with the excess pesos (currency substitution) and would then most likely transfer those dollars outside the formal financial system and, possibly, outside the country (capital flight).<sup>26</sup> Without controls on domestic and external financial transactions in dollars, imbalances between supply and demand of domestic currency (for instance, fueled by fiscal deficits that are monetized) could lead to sudden attacks on the foreign reserves held by the monetary authority (the basic model is Krugman 1979).

With the elimination of controls on external financial transactions (that is, the opening of the capital account of the balance of payments), the limits of what was called the “impossible trinity” began to be recognized: a country could not have a fixed exchange rate, an open capital account, and an independent monetary policy at the same time; rather, it could select only two out of those three policies. This has been an issue mainly for urbanized economies, because the agriculture-based and transition economies, in the categorization of the World Bank (2007c), have usually maintained more controls on the capital account (Chapters 9 and 10). But in urbanized economies, considering their tendency to try to maintain stable exchange rates and an open capital account, the consequence appears to have been more constrained monetary policies and/or recurrent financial crises. Also, the developmental state approach of the 1950s and 1960s, which provided ample credit for production through the central banks, became seriously constrained once the current and capital accounts were liberalized. These issues are discussed in greater detail in Chapters 9 and 10.

#### **FURTHER IMPLICATIONS OF DOLLARIZATION**

A crucial point to be noticed regarding dollarization is the impact on the banking system. In the previous paragraphs, it was not discussed where the foreign currency is being held and how it circulates. A possibility is that it affects only the informal economy—coming in and out of mattresses, so to speak. But this would be a very limited view of the phenomenon (see further

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25 “Currency substitution” usually refers to the behavior of domestic agents who abandon local currency in favor of foreign currencies considered to be better stores of value for their liquid savings.

26 Those dollars might be placed under the mattress, which is also considered a form of capital flight.

discussion in Chapter 9). Rather, in several developing countries—particularly those with problems of high inflation—foreign currency may be allowed to be deposited in banks, and these institutions in turn make domestic loans also in foreign currency. Previously we have written Equation C in stocks as follows:

$$\text{ONRA} + \text{NFAb} + \text{DCg} + \text{DCp} = \text{BMg} + \text{BMp} + \text{NWb}.$$

With dollarization, it would be necessary to distinguish deposits and loans in foreign currency as follows (where we assume that only the private sector utilizes foreign currency for deposits and loans; also, the presence of the exchange rate [ER] is made explicit):

$$\begin{aligned} (\text{ER} * \text{ONRA}\$) + (\text{ER} * \text{NFAb}\$) + \text{DCg} + \text{DCp}(\text{dom}) + (\text{ER} * \text{DCp}\$) \\ = \text{BMg} + \text{BMp}(\text{dom}) + (\text{ER} * \text{BMp}\$) + \text{NWb}, \end{aligned}$$

where the symbol \$ indicates a variable in dollars and “dom” is for domestic currency. Total domestic credit has been separated into its two components, in local and foreign currency, and the same for total broad money:

$$\text{DCp} = \text{DCp}(\text{dom}) + (\text{ER} * \text{DCp}\$)$$

and

$$\text{BMp} = \text{BMp}(\text{dom}) + (\text{ER} * \text{BMp}\$).$$

In this case, the definition of broad money includes (at least some of) the deposits in foreign currency. Therefore, it would not be adequate to consider a simple overall demand for broad money, and there must be separate estimates for the domestic and foreign currency components.

With a supply and demand of loans and deposits in both local and foreign currency, any change in the availability of foreign reserves and the desire of holding foreign currency will operate through the banking system. A shift in demand to foreign currency or a perceived lack of availability of the latter (for instance, because of low official reserves in the central bank) may lead to a devaluation of the ER, with potentially significant implications for the banking system and the whole economy: firms indebted in dollars may get bankrupt and depositors with dollars in the banks may want to withdraw them, with catastrophic results for the viability of the banks. A banking crisis might ensue (more on this in Chapters 7, 9, and 10).

Finally, note that even if deposits in dollars are not allowed but banks offer dollar loans ( $\text{ER} * \text{DCp}\$$ ) by borrowing abroad (changes in their net foreign assets,  $\text{ER} * \text{NFAb}\$$ ), then a strong devaluation will also affect the banking

system (as happened in the case of several Asian countries during the 1997–1998 crisis).

**MONEY CREATION THROUGH ACCUMULATION OF NET FOREIGN ASSETS: TRADE**

As noted, one of the sources of money creation comes from increases in net foreign assets (dNFA). To analyze this source, we need to recall that NFA is expressed in domestic currency; therefore, we can write

$$\text{NFA} = \text{ER} * \text{NFA\$} = \text{ER} * (\text{ONRA\$} + \text{NFAB\$}),$$

where ER is the exchange rate (measured as the amount of pesos per dollar) and NFA\$, ONRA\$, and NFAB\$ represent the value of the net foreign reserves (total, official at the central bank, and in the rest of the banking system) in dollars. So we can write the simplified equation of the banking system as follows:

$$\text{ER} * (\text{dONRA\$} + \text{dNFAB\$}) + \text{dDCp} + \text{dDCg} = \text{dBMp} + \text{dBMg} + \text{Sb}.$$

Note that we are keeping ER constant. If there is a change in ER (dER) because of a devaluation (that is, economic agents must pay more pesos per dollar in the domestic foreign exchange market), the nominal values of ONRA and NFAB in domestic currency increase; if there is a revaluation (that is, agents pay fewer pesos per dollar), the nominal value of ONRA and NFAB in domestic currency decreases.<sup>27</sup> We will work here only with the case in which the amount of dollars considered in ONRA\$ and NFAB\$ increases.<sup>28</sup>

NFA\$ increases or decreases with changes in the balance of payments. As previously discussed, the BOP equation in domestic currency is as follows (showing all the variables with the dollar component multiplied by the exchange rate; as before, all variables expressed in dollars have the sign \$ at the end):

$$\begin{aligned} & (\text{Pex\$} * \text{ER} * \text{EX}) - (\text{Pim\$} * \text{ER} * \text{IM}) - (\text{R} * \text{ER} * \text{FCp\$}) \\ & - (\text{R} * \text{ER} * \text{FCg\$}) + (\text{ER} * \text{NTrwp\$}) + (\text{ER} * \text{NTrwg\$}) + (\text{ER} * \text{dFCp\$}) \\ & + (\text{ER} * \text{dFCg\$}) = \text{ER} * (\text{dONRA\$} + \text{dNFAB\$}). \end{aligned}$$

27 Usually ONRA, and perhaps NFAB, include several international currencies. If there are changes in the exchange rates of the currencies involved, then there will be valuation changes in a common international currency (say Special Drawing Rights, the basket of currencies issued by the International Monetary Fund), which will then be reflected in changes in the value of ONRA and NFAB in domestic currency. We ignore these complications.

28 The devaluation would be reflected in an increase in Sb (and the revaluation in a decrease), which is measured in domestic currency. Some countries may consider that the increase in the value of ONRA in domestic currency resulting from the devaluation is a profit of the central bank, and therefore it may turn it over to the central government. In that case, the portion transferred helps to finance public expenditures. We ignore those valuation effects here.

The balance-of-payment equation can be written in dollars by dividing the previous values in pesos by the exchange rate (ER):

$$(Pex\$ * EX) - (Pim\$ * IM) - (R * FCp\$) - (R * FCg\$) + NTrwp\$ + NTrwg\$ + dFCp\$ + dFCg\$ = dONRA\$ + dNFAb\$.$$

Assume that the banking system is increasing its holding of foreign assets ( $dONRA\$ + dNFAb\$$ ) because of a positive trade balance [ $(Pex\$ * EX) - (Pim\$ * IM) > 0$ ], positive net transfers ( $NTrwp\$ + NTrwg\$$ ), or capital inflows ( $+dFCp\$ + dFCg\$$ ).

Now, consider the equation of the monetary/banking sector:

$$ER * (dONRA\$ + dNFAb\$) + dDCp + dDCg = dBMp + dBMg + Sb.$$

It is clear that if there are no changes in  $DCp$  and  $DCg$ , then the money supply ( $dBM = dBMp + dBMg$ ) is expanding (assuming  $Sb = 0$  or fixed). This increase in money supply interacts with money demand, as discussed before.

If this expansion in money supply (in this case because of surpluses in some of the accounts of the BOP) exceeds the demand for domestic currency, there are various possible adjustments, depending on the type of goods, services, or assets to which the unwanted excess supply of money may flow. Further effects will depend on whether velocity (“ $v$ ”) and  $GDP_r$  remain constant.

As before, if there is idle productive capacity and an unutilized labor force, the monetary expansion due to external surpluses could lead to increases in  $GDP_r$ . This in turn would increase money demand, and a new equilibrium could be reached at a higher level of economic activity. But if  $GDP_r$  is fixed (at least in the short run) and “ $v$ ” does not change, then the increase in money supply would push up prices ( $P_{gdp}$ ).

Because of this increase in domestic prices, and if the nominal exchange rate (ER) is not adjusted, then exportable goods and services will become more expensive in domestic currency and also in world markets; therefore their external demand will decline, other things being equal. The increase in domestic prices will also make imported goods and services less expensive in the domestic market, and the internal demand will shift toward them. The decline in exports and the expansion in imports will eventually lead to a decline in the trade balance [ $(Pex\$ * EX) - (Pim\$ * IM)$ ]. If the original



source of money creation is a positive trade balance, this process would eliminate the trade surplus and close the source of money creation.<sup>29</sup>

**MONEY CREATION THROUGH ACCUMULATION OF NET FOREIGN ASSETS: CAPITAL FLOWS (AND NET TRANSFERS)**

In recent decades, a related issue has been the impact of capital inflows and outflows on development, and the implications for monetary and exchange rate policies. To understand the mechanisms involved, let us recall the BOP equation in dollars:

$$(Pex\$ * EX) - (Pim\$ * IM) - (R * FCp\$) - (R * FCg\$) + NTrwp\$ + NTrwg\$ + dFCp\$ + dFCg\$ = dONRA\$ + dNFAb\$.$$

This can be simplified as

$$\text{Current account (CA) + Capital account (KA) = Change in official reserves (dONRA\$),}$$

where CA is the sum of the trade balance  $[(Pex\$ * EX) - (Pim\$ * IM)]$ ; of payments related to capital, such as interests and profits  $[-(R * FCp\$) - (R * FCg\$)]$ ; of payments such as remittances, and of other transfers to or from a country, such as donations  $[ + NTrwp\$ + NTrwg\$]$ . In turn, KA includes various types of lending, borrowing, and net investment, including the foreign assets of the rest of the banking system  $(dFCp\$ + dFCg\$ - dNFAb\$)$ ; dONRA\$, as before, is the change in value of official reserves held by the central bank (or the monetary authority).

As an accounting identity, this equation always holds, although the balancing can happen in various ways. In fact, the configuration of CA, KA, and dONFA\$ has shown significant variation across countries and over time. First, a country could have a negative CA for several reasons, depending on the possible combinations of its various components, as discussed before. For instance, a trade deficit  $[(Pex\$ * EX) - (Pim\$ * IM) < 0]$  might not be compensated by other components of the CA; a country could also have a trade surplus  $[(Pex\$ * EX) - (Pim\$ * IM) > 0]$ , but it may face even larger interest payments on its debt  $[-(R * FCp\$) - (R * FCg\$)]$  (which was the case in many developing countries during the debt crisis of the 1980s); in other instances, highly concessionary foreign aid and/or remittances from abroad  $(NTrwp\$ + NTrwg\$)$

29 This is the so-called price-specie-flow mechanism attributed to David Hume (1711–1776) (a Scottish economist and philosopher) who criticized the idea that it was possible to maintain permanent trade surpluses. He argued that a trade surplus would lead to increases in money supply and domestic prices, reducing exports and increasing imports until the trade surplus disappears.

may help finance (or create) trade deficits and/or also cover interest payments on external debt (which may be the case for several low-income countries now, such as Haiti).

Second, whether a country is accumulating foreign reserves (+dONRA\$) or losing them (-dONRA\$) depends not only on the sign of the current account (CA) mentioned in the previous paragraphs, but also on what is happening in the capital account (KA). Table 6.1 shows several possible combinations.

A country with a negative CA (for whatever reason) might simultaneously have inflows of capital (a positive KA: the country is borrowing from the rest of the world) and declines in ONRA\$ (the country is using accumulated assets to finance the negative CA). As mentioned in Table 6.1, this configuration can last only to the extent that the country has foreign reserves. When the country runs out of ONRA\$ or, more likely, when ONRA\$ falls below a minimum threshold, the country will suffer an exchange rate crisis, and, in those countries with extensive use of dollar debt in the domestic economy, there will also be a banking/financial crisis because of the difficulties of debtors to pay the debt denominated in foreign currency.

At the other extreme, a country might have positive CA and KA, which means that ONRA\$ is increasing, expanding the money supply. For example, China has increased reserves from below US\$200 billion in the early years of the century to an estimate of close to US\$4 trillion in late 2013.<sup>30</sup> It is unlikely that a configuration of positive CA, KA, and accumulation of foreign assets can be maintained indefinitely. A possible mechanism that might end this configuration is that high growth rates may push the economy to full employment and increase prices and wages, all of which would eventually reduce the surplus in the current account because of the decline in external competitiveness. This process would also reduce or stop capital flows into that country because it has become more expensive in dollars (that is, the foreign currency does not buy the same level of domestic investments) and/or because export and general growth opportunities have declined with the appreciation of the domestic currency.

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30 This accumulation of ONRA\$ is usually held in assets denominated in foreign currency instruments (such as government bonds in US dollars, euros, or others), which means that the increases in ONRA\$ in a country imply the financing of the CA by the countries that issue the assets in which the reserves are invested. This demand for foreign debt puts downward pressure on the interest rates in those instruments, but makes the issuing countries vulnerable to changes in market sentiment.

**TABLE 6.1** Combinations of CA, KA, and ONRA

CA	KA	ONRA	Comments
Negative	Negative	Negative	This implies that the country is using foreign reserves to finance both a negative current account and capital flight from that country. This configuration can last only while there are foreign reserves in the central bank, and it usually ends in exchange rate and financial crises.
Negative	Positive	Negative	Here capital inflows help finance a negative current account. But the country is also losing foreign reserves; therefore at some point, the country runs out of foreign reserves and there are exchange rate and financial crises.
Negative	Positive	Positive or zero	Capital inflows are more than (or at least equal to) the amounts needed to finance a negative current account; therefore, $dONRA$ is positive or zero. The issues to be monitored are (1) whether the different types of capital flows are stable or volatile and (2) whether those capital inflows (which are a liability of the country) are generating enough economic activity so that the country can pay those investments and debt later. If those capitals are unstable and at some point leave the country and/or there is no additional production to pay back the foreign creditors, then exchange and financial crises may happen later.
Positive	Negative	Negative or zero	This country has a positive CA, but it is suffering capital outflows (perhaps because of a lack of confidence in the economy). If $dONRA$ is negative, the country is losing reserves (that is, the central bank is financing the capital flight). In this case, as before, there is a limit for this configuration when the country runs out of foreign reserves. If $dONRA$ is zero, there is no loss of official foreign reserves and the positive CA is financing the capital flight.
Positive	Positive	Positive	This country not only has a positive CA, but it is also receiving capital inflows. There is a strong accumulation of foreign reserves in the central bank, with potentially significant impact on the expansion of domestic money supply. This configuration may also be difficult to maintain for very long periods of time because the monetary expansion will appreciate the real exchange rate and reduce or eliminate the positive CA and KA.

**Source:** Author.

**Note:** CA = Current Account, KA = Capital Account, ONRA = Official Net Reserve Assets.

### OTHER RELATED POLICY ISSUES

It has already been discussed that another implication of the balance-of-payment and monetary accounts is that increases in  $ONRA$  usually lead to the expansion of the domestic money supply in developing countries (and conversely, decreases in  $ONRA$  lead to a contraction of the money supply). The value of net monetary expansion depends on the use (or not) of parallel sterilization policies that could absorb part of the increases in the money supply through

measures such as issuing domestic bonds by the central bank (which implies a financial cost for that institution)<sup>31</sup> or increasing reserve requirements at the banking system (which is a financial cost for the banks that will most likely be passed on to the depositors and/or borrowers).

Another issue to be considered is the possibility that a government considers ONRA\$ as a policy variable: it may decide that ONRA\$ at any point in time has to amount to “x” months of yearly imports or that ONRA\$ must cover a certain percentage (usually a high one) of the payments of external debt that are due within some specified period (such as a year). In that case, it is important to maintain a policy of money creation compatible with that target, or it will be necessary to establish controls on capital flows and/or other components of the BOP. These controls create their own challenges related to microeconomic efficiency effects and the rent-seeking activities that they may generate.

Increases or decreases in the money supply resulting from changes in ONRA\$ can happen for a variety of reasons, including trade imbalances, payments of interest, remittances, foreign aid, and capital flows. In particular, global cycles in capital flows may significantly affect the conduct of monetary policies in developing countries with open capital accounts.

More generally, a monetary expansion (or contraction) can happen as a result of different domestic and external factors, affecting prices, GDP and employment, the exchange rate, and external accounts. The precise form and distribution of the impacts will depend on a variety of factors, including the structure of the economy, as discussed earlier. However, macroeconomic variables will adjust within the consistency framework provided by Equations A–D. Policy analysts must try to understand and anticipate how these balances will be restored.

## **Government Balances**

### **General Equation**

In the previous sections, the discussion on aggregate macroeconomic balances focused first on Equations A (national product and income account) and D (balance of payments), and then Equation C (the monetary/banking sector) was added. Here the analysis is completed with the consideration of Equation

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31 The central bank can absorb part of that liquidity (sterilization) by offering economic agents instruments of debt from the central bank (usually short term). But this would eventually generate a deficit of the central bank, which can lead to (1) a true sterilization of the excess liquidity by a fiscal adjustment to cover the central bank deficit, or (2) more monetization by the central bank, which will compound the problem of excess liquidity and generate a deeper macroeconomic crisis.

B, which specifies the accounts of the public sector as a starting point for the analysis of fiscal policies:

$$\text{Equation B: } [(Pq * G) + (Pq * Ig) + (INTR * B) + (INTR * DCg) + (R * FCg) + ST] - (Tind + Tm + TYp + TYb + NTrwg) = dB + (dDCg - dMBg) + dFCg.$$

As discussed in Chapter 5, this equation indicates that the government collects taxes  $(Tind + Tm + TYp + TYb)^{32}$  and receives net transfers from the rest of the world  $(NTrwg)$ . It then uses those funds to finance current government activities  $(Pq * G)$  and public-sector investments  $(Pq * Ig)$ , to pay interest on the debt with the private sector  $(INTR * B)$ , the monetary sector  $(INTR * DCg)$ , and the rest of the world  $(R * FCg)$ , and finally to give some transfers to the private sector  $(ST)$ . The left-hand side of the equation may be negative (a public-sector deficit) or positive (a public-sector surplus) and leads to changes in public assets/liabilities on the right-hand side of the equation, such as changes in borrowing from the private sector  $(dB)$ , from the monetary sector  $(dDCg)$ , and from the rest of the world  $(dFCg)$  and/or by using government's deposits in the monetary sector  $(dMBg)$ .<sup>33</sup>

To understand better the configuration of the macroeconomic balances when the public sector accounts are included, it is useful to start with a variation of Equation A  $[GDP = Pq * (C + G + Ip + Ig) + (Pex * EX) - (Pim * IM)]$  that focuses on the gross national disposable income (GNDI, or  $Y$ ), as it was in the case of Absorption Equation 2:

$$GDP - (R * FCp) - (R * FCg) + NTrwp + NTrwg = Y = Pq * (C + G + Ip + Ig) + (Pex * EX) - (Pim * IM) - (R * FCp) - (R * FCg) + NTrwp + NTrwg,$$

32 As noted before, the range of taxes considered in the SAM include indirect taxes  $(Tind)$ , trade taxes  $(Tm)$ , and income taxes  $(TYp$  and  $TYb)$ , but it can be expanded and disaggregated further.

33 Let's recall that the timing or dating conventions mean that the stock of debt is the one outstanding at the end of "t - 1" (which is also the opening value for period "t") multiplied by the interest rate that corresponds to the period "t." Therefore, the expressions are  $INTR * B(t - 1)$  (the payment of interest on domestic bonds, B);  $INTR * DCg(t - 1)$  (the payment of interest on loans from the banking system, DCg); and  $R * FCg(t - 1)$  (the payment of interest on public foreign debt, FCg). Note that the interest rate on domestic debt (INTR) is named differently from the interest rate on foreign debt (R) to allow for the possibility of segmented domestic and international debt markets due to capital controls. In the domestic market, however, we are assuming just one interest rate (INTR). Note further that the public external debt (FCg) is quoted in domestic currency:  $FCg = ER * FCg\$$  (that is, the foreign debt in dollars  $FCg\$$  times the exchange rate ER). Then the interest payments on foreign debt, measured in domestic currency, are equal to  $R * ER * FCg\$$ .

where, as discussed before, GDP is adjusted by net payment of factors (which in this case we assume is external debt, FC, that pays an interest rate R; that is, the flow payments are  $R * FC_p$  and  $R * FC_g$ , with a negative sign as payments) and by net transfers from the rest of the world, such as workers' remittances and foreign aid in the form of grants ( $NTrwp$  and  $NTrwg$ , with positive signs).

Rearranging the terms to separate the private sector, the government, and the transactions with the rest of the world, we have

$$\begin{aligned} & [GDP - (R * FC_p) + NTrwp] - (P_q * C) - (P_q * I_p) = \{(P_q * G) \\ & + (P_q * I_g) + (R * FC_g) - NTrwg\} + \{(P_{ex} * EX) - (P_{ex} * IM) \\ & - (R * FC_p) - (R * FC_g) + NTrwp + NTrwg\}, \end{aligned}$$

where the left-hand side of the equation refers to the private sector, and the expressions in curly brackets  $\{\}$  on the right-hand side relate to the public-sector accounts (the first curly bracket) and to the rest of the world (the second curly bracket).

Comparing the first curly bracket with Equation B, we can see that there are several variables still missing, such as

$$[(INTR * B) + (INTR * DC_g) + ST] - (T_{ind} + T_m + T_{Yp} + T_{Yb}).$$

Therefore, the expression in the first curly bracket is not yet a full representation of the public-sector accounts.

Without breaking the equality, we can add the missing variables on both sides of the equation. After rearranging terms we have the following expression:

$$\begin{aligned} & \{[(GDP + NTrwp + (INTR * B) + (INTR * DC_g) + ST) - (T_{ind} + \\ & T_m + T_{Yp} + T_{Yb}) - (R * FC_p)] - (P_q * C)\} - (P_q * I_p) = \{(P_q * G) + \\ & (P_q * I_g) + (R * FC_g) + (INTR * B) + (INTR * DC_g) + ST\} - (T_{ind} + \\ & T_m + T_{Yp} + T_{Yb} + NTrwg)\} + \{(P_{ex} * EX) - (P_{ex} * IM) - (R * FC_p) \\ & - (R * FC_g) + NTrwp + NTrwg\}. \end{aligned}$$

The first term in curly brackets  $\{[(GDP + NTrwp + (INTR * B) + (INTR * DC_g) + ST) - (T_{ind} + T_m + T_{Yp} + T_{Yb}) - (R * FC_p)] - (P_q * C)\}$ <sup>34</sup> on the left-hand side indicates total private savings (that is, disposable income after taxes and transfers, including the monetary/banking

34 GDP is gross, including depreciation from the government, DEPRg.

sector,<sup>35</sup> minus consumption). Let us call that term  $Sp'$ .<sup>36</sup> Therefore, the whole expression for the private sector can be written as

$$(Sp' - Pq * Ip).$$

Looking now at the right-hand side, the first term in curly brackets represents the public-sector account. Moving that expression to the left-hand side and rearranging terms, the equation for the public sector can be written as follows:

$$\{(Tind + Tm + TYp + TYb + NTrwg) - [(Pq * G) + (R * FCg) + (INTR * B) + (INTR * DCg) + ST]\} - (Pq * Ig).$$

The first part of the expression  $\{(Tind + Tm + TYp + TYb + NTrwg) - [(Pq * G) + (R * FCg) + (INTR * B) + (INTR * DCg) + ST]\}$  is the fiscal surplus or deficit before public investments ( $Pq * Ig$ ). We can call that expression the savings of the government or  $Sg'$ <sup>37</sup> (with its proper sign, depending on whether it is a surplus or a deficit). Therefore, the expression can be simplified as

$$(Sg' - Pq * Ig).$$

Now the remaining term on the right-hand side is part of the equation of the balance of payments that indicates whether the country as a whole is borrowing or lending to the rest of the world. As noted, from the point of the view of the rest of the world, these savings have to be written with a negative sign ( $-Srw$ ). Taking that into account, we can present another version of the savings-investment equation in which domestic savings and investments have been separated into the private and the public sector:

35  $[GDP + NTrwp + (INTR * B) + (INTR * DCg) + ST]$  is total private income (including the monetary/banking sector), while  $(Tind + Tm + TYp + TYb)$  represents all taxes paid, and  $(R * FCp)$  is the payment of the external debt by the private sector. The payments and receipts of domestic debt between the private sector and the monetary sector cancel out. Aggregating the private and the monetary sectors is a simplification that omits all the complexities related to the treatment of the imputed value-added of depository institutions (FISIM). In the SAM, we assumed that the monetary/banking system does not invest (that is, there is no  $Ib$ ) and it simply intermediates funds in the economy. To simplify further, we set savings by the monetary/banking system to zero:  $Sb = 0$ .

36 We call it  $Sp'$  to differentiate it from the more limited notion of private savings ( $Sp$ ) in the SAM.

37 Again,  $Sg'$  is somewhat different from  $Sg$  in the SAM because of  $DEPRg$ .

$$\begin{aligned} & \{[(GDP + NTrwp + (INTR * B) + (INTR * DCg) + ST) - (Tind \\ & + Tm + TYp + TYb) - (R * FCp)] - (Pq * C)\} - (Pq * Ip) + \{(Tind + \\ & Tm + TYp + TYb + NTrwg) - [(Pq * G) + (R * FCg) + (INTR * B) + \\ & (INTR * DCg) + ST] - (Pq * Ig)\} = \{(Pex * EX) - (Pim * IM) - \\ & (R * FCp) - (R * FCg) + NTrwp + NTrwg\}, \end{aligned}$$

or

$$\text{Savings and Investment Equation 2: } (Sp' - Pq * Ip) + (Sg' - Pq * Ig) = -Srw.$$

This equation shows the links of the government equation (Equation B), which we have simplified here to  $[(Sg' - Pq * Ig)]$ , to the equation of national product and income (Equation A). The equation can be also presented as

$$Sp' + Sg' + Swr = (Pq * Ip) + (Pq * Ig).$$

This indicates that we need savings from the private sector ( $Sp'$ ), the public sector ( $Sg'$ ), and the rest of the world ( $Swr$ ) to finance public and private investments  $[(Pq * Ig) + (Pq * Ip)]$ . If the country does not have enough domestic savings to finance investments  $[Sp' + Sg' < (Pq * Ip) + (Pq * Ig)]$ , then it would need to borrow from the rest of the world (and if  $Sp' + Sg' > (Pq * Ip) + (Pq * Ig)$ , then it would be able to lend to the rest of the world). This structure has been called the three-gap model, because it shows the constraints on investments (and therefore on growth) from the potential lack of private savings (first gap) and government savings (second gap) and from the limitations to access foreign savings (third gap) (Bacha 1990).

Because this section focuses on fiscal issues, we are more interested in the equation that clearly identifies the government account (the simplified expression  $Sg' - Pq * Ig$ ), so we return to the following representation of the equation:

$$[Sp' - (Pq * Ip)] + [Sg' - (Pq * Ig)] = -Swr.$$

This basic equation indicates that if the government is running an overall deficit  $[Sg' < (Pq * Ig)]$ , or  $Sg' - (Pq * Ig) < 0$ , then, to balance the equation, it should borrow from the private sector ( $Sp' - (Pq * Ip)$ , the excess private savings over private investments), from the rest of the world ( $Swr$ ), or from both.

How the government is borrowing can be seen using the full Equation B, which was used to derive the simplified expression  $[Sg' - (Pq * Ig)]$ . It must be remembered that in Equation B, the order of the components



was reversed to have debt flows on the right-hand side with positive signs. Therefore, we can write

$$[(Pq * G) + (Pq * Ig) + (INTR * B) + (INTR * DCg) + (R * FCg) + ST] - (Tind + Tm + TYp + TYb + NTrwg) = [(Pq * Ig) - Sg'] = dB + (dDCg - dBMg) + dFCg.$$

The left-hand side is the whole public budget, where  $[(Pq * G) + (Pq * Ig) + (INTR * B) + (INTR * DCg) + (R * FCg) + ST]$  are expenditures and investments; and  $(Tind + Tm + TYp + TYb + NTrwg)$  represents taxes, other revenues, and grants received.

As shown before, the expression in the middle  $[(Pq * Ig) - Sg']$  is the simplified version of that equation, with the variables reordered accordingly. If  $[(Pq * G) + (Pq * Ig) + (INTR * B) + (INTR * DCg) + (R * FCg) + ST]$  is larger in value than  $(Tind + Tm + TYp + TYb + NTrwg)$  (which means as well that  $(Pq * Ig) > Sg'$ ), then there is a deficit, which must be financed by borrowing from the nonbanking private sector ( $dB$ , an increment in public bonds held by the public), from the banking sector ( $dDCg$ ), or from the rest of the world ( $dFCg$ ) or by drawing down the government's deposits in the banking system ( $-dBMg$ ). On the other hand, a fiscal surplus  $[(Pq * Ig) < Sg']$  leads to an accumulation of deposits ( $dMg$ ) or to the payment of some or all three of the components of public debt ( $-dB$ ,  $-dDCg$ ,  $-dFCg$ ).

Each one of these ways of financing a deficit will have different macroeconomic effects, mainly through the expansion of the supply of different financial liabilities of the government, which are assets to other sectors of the economy.

### Financing Deficits

Earlier we discussed the impact of borrowing from the monetary/banking system to cover the deficit ( $dDCg$ ), using Equation C for the whole monetary/banking system:

$$dNFA + dDCp + dDCg = dBMp + dBMg + dNW.$$

Recalling that domestic credit ( $DC$ ) in general and domestic credit for the government ( $DCg$ ) in particular could come from the central bank or from the rest of the banking system, we can separate that variable into the different components:

$$dNFA + dDCpcb + dDCgcb + dDCgcb + dDCpcb = dBMp + dBMg + dNW,$$

where “p” and “g” indicate that credit goes to the private sector (p) and the government (g), while “cb” and “b” indicate the source of that credit (cb from the central bank and b from the rest of the banking system); therefore  $dDC_{pcb}$  is change of credit to the private sector by the central bank, and so on. Most likely, domestic credit to the government will come from the central bank ( $dDC_{gcb}$ ), but in developing countries the rest of the banking system, which includes public banks as well as private ones, may also lend to the government, voluntarily or not.

If  $dDC_{gcb}$  (credit from the central bank to the government) increases and the other items in the left-hand side do not change (that is, we assume that there are no changes in those variables:  $dNFA = dDC_{pcb} = dDC_{pb} = dDC_{gb} = 0$ ), and if  $BM_g$  (public-sector deposits with the central bank) are also kept fixed, then  $dBMP$  (money and deposits in the hands of the public) must expand. In this case, the central bank has monetized the fiscal deficit by printing money, and thus the domestic money supply increases.

As discussed earlier, the effect depends on the reaction of the money demand and on whether or not there are enough unutilized productive resources in the economy that can be mobilized by the expansion of aggregate demand generated by the public-sector deficit. For instance, different central banks, particularly in industrialized countries, have financed the fiscal deficits after the world financial crisis that started in 2007–2008 with important expansions of the money supply. However, in a context of unemployment, such additional money supply has not led to inflation so far, and households and the private sector in general seem to have been willing to hold the additional amount of domestic currency created by central banks (that is, the money supply has increased, but so has the money demand).

On the other hand, if the money supply exceeds the money demand, the result may be inflation in goods, services, and/or assets. The increase in money supply resulting from the financing of the deficit can be divided into two parts. One component relates to the fact that if there is growth in real GDP, there is an increase in the demand for real monetary balances as well. This is called seigniorage and is not supposed to be inflationary; the government can finance itself at no cost (except for the small operational expenses to print money). The other component is the inflationary tax, which results from the fact that if the public has a demand for the monetary base in real terms ( $BM_0/P$ , the monetary base divided by an appropriate price index) and inflation goes up (an increase in  $P$ ), then the demand for money in nominal value ( $BM_0$ ) also goes up, allowing the government to print money to cover

that additional money demand.<sup>38</sup> While seigniorage is collected in relation to growth on a more stable basis, the inflation tax may show nonlinearities if the private sector decides to reduce rather than increase money demand in the face of high inflation. This is related to the phenomena of currency substitution and dollarization: countries with high inflation tend to experience a shift of money demand from the domestic currency to a foreign currency, which is supposed to better perform the monetary functions, particularly that of store of value.<sup>39</sup>

Going back to the adjustment process, from the equation of the banking system it can be seen that if the public wants to hold only some specific amount of  $BM_p$  and the money created through the central bank financing of the public deficit ( $dDC_{gcb}$ ) exceeds that, then some other variables must adjust to balance this accounting identity.

One possibility is that  $dONRA$ , the central bank component of net foreign assets (NFA), declines. This can happen because people start to buy dollars if there is too great a supply of the domestic currency (currency substitution). Also, economic agents may allocate at least part of the excess domestic money to buy imports, generating a deficit in the trade balance of the balance of payments (which reduces the amount of dollars in the central bank—that is,  $dONRA$  as part of  $-dNFA$ ).

Another option to consider is that the central bank may be financing the deficit (expanding  $dDC_{gcb}$ ) while using different measures to reduce the credit to the private sector ( $-dDC_p$ ) in order to not affect official reserves ( $dONRA$ ) or the money supply ( $dBMP$ ). This would be one of several ways that what has been called the “crowding out” effect of a fiscal deficit can take place: financing of a government’s deficit reduces financing to the private sector, which may lead to less investment and consumption by private agents, allowing the government to use the real economic resources that were denied to the private sector.

38 For those interested in the algebra, the decomposition comes from the definition of changes in real money demand:  $d(BM_0/P)$ . By the rules of differentiation,  $d(BM_0/P) = dBM_0/P - (BM_0/P) * (dP/P)$ . The financing of the government is  $dBM_0/P$ , so rearranging terms  $dBM_0/P = d(BM_0/P) + (BM_0/P) * (dP/P)$ . The increase in real money demand (seigniorage) is  $d(BM_0/P)$ , and  $(BM_0/P) * (dP/P)$  is the inflation tax collected, resulting from the inflation rate  $dP/P$  multiplied by the real monetary base  $BM_0/P$ .

39 The argument was presented in terms of the monetary base, but it can be extended to broader monetary aggregates, labeled  $BM_p$  before. From this broader perspective, the banking system, which creates  $BM_p$  as a multiple of the monetary base, also collects some amount of seigniorage and inflationary tax.

For crowding out to occur, however, the private sector must not have a surplus of savings (that is,  $S_p - (P_q * I_p) \leq 0$ ), in which case the government's desire to expand its activities would effectively displace other private-sector activities. On the other hand, if the private sector has a surplus in savings ( $S_p - (P_q * I_p) > 0$ ), crowding out of private consumption and investment would not take place. Usually, the case for expansionary fiscal policies with strong support from central banks is based on the assumption that the private sector has a large surplus ( $S_p - (P_q * I_p) > 0$ ) with respect to the size of the economy. In that case, a deficit from the public sector financed by the surplus in the private sector implies that the government is sustaining aggregate demand to compensate for the fact that the private sector is not consuming or investing enough to sustain economic growth.

Instead of borrowing from the central bank, another option for the government is to issue domestic debt (dB) directly, denominated in domestic currency. This option, however, may put upward pressure on the internal real interest rate, which could bring in capital flows and appreciate the exchange rate, affecting traded goods and services, including agriculture.

The impacts of deficit financing through issuing domestic debt depend on the size of private-sector savings, the potential alternative uses for those savings, the expectations of inflation, and the possibility of repayment of the accumulated public debt. In a deep recession, a government could issue significant amounts of debt without affecting the interest rates if the private sector has a large surplus of savings, if there are no other clear alternatives where those savings can be invested, if inflationary expectations are low, and if the level of public debt accumulated does not threaten future default. Some argue that those have been, at least initially, the prevalent conditions in industrialized countries resulting from the world financial crisis that started in 2007–2008.

However, in developing countries, even during recessions, many of these conditions do not necessarily apply: for instance, the public may have alternative options to invest its savings, usually through buying dollars (currency substitution) and sending them abroad (capital flight). Similarly, there may be concerns about the public sector defaulting on its debt, or there may be high inflationary expectations. Therefore, even in recessions there are limits to the possibility of developing countries' issuing domestic debt to finance a fiscal deficit.

Finally, another way to finance a public-sector deficit is to issue external debt (dFCg). This option also presents dilemmas, particularly in developing countries. The accumulation of external debt may increase the country risk

premium that the public sector must pay in world markets,<sup>40</sup> which affects the whole economy and not only the debt of the public sector. For instance, private-sector firms seeking funds in world markets will most likely find that the country risk premium is added to the cost of their borrowing, or an external investor deciding to invest in a country will use an interest rate (or discount factor) that includes the country risk premium to evaluate the potential investment in that country. Therefore, a high country risk premium not only makes public debt more expensive but also may discourage private-sector investment. These are other ways in which the expansion of public expenditures can crowd out the private sector's activities when a government runs deficits that go beyond what can be financed sustainably.

A separate effect of using external flows to finance external public sector debt, which applies to external borrowing from the private sector as well, is on the exchange rate. Those external flows tend to appreciate the exchange rate in the short run while capital is flowing in (affecting tradables), but they could also later force a depreciation to generate the trade surplus needed to service the debt that was accumulated. These ins and outs of capital flows can generate volatility in the exchange rate (with negative effects on investments and trade) and, eventually, generate a balance-of-payment crisis, particularly if the sentiment of foreign investors changes suddenly, leading to what has been called sudden stops (the abrupt end and eventual reversal of capital inflows, which force a strong devaluation and adjustment in the domestic economy) (Calvo 1998).

In summary, monetizing the deficit ( $dCDg$ ) or issuing domestic debt ( $dB$ ) are options for absorbing savings from a country's private sector ( $S_p$ ), while issuing external debt ( $dFCg$ ) is an option for receiving savings from the rest of the world ( $S_{rw}$ ). However, the government cannot absorb a greater level of savings (from the domestic private sector or from the rest of the world) than what economic agents are willing to allocate to buying that country's public debt. Attempts to channel toward buying public-sector debt more private savings (external or internal) than are available have led in several countries to fast increases of inflation, very high real interest rates, and capital flight (which is a form of placing savings outside government's control). If the deficit of the projected public sector is greater than the sum of the internal private savings

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40 The country risk premium is the additional percentage points that a country must pay above a benchmark interest rate for a similar maturity, which is supposed to represent the lowest country risk (also called sovereign risk) at the global level. The benchmark is usually US public debt instruments. For instance, if a country pays an annual interest rate of 9 percent on its 10-year bonds denominated in dollars and the interest rate that the US government pays on its 10-year bonds is 4 percent, then the country is facing a risk premium of 5 percent. The risk premium is usually quoted in basis points: 500 basis points in this case.

and the external savings available, a better balancing of the fiscal accounts is required, including, in cases of extremely indebted countries, debt relief (in the form of debt forgiveness or at least debt rescheduling to stretch payments over a longer period of time).

### Adjusting Fiscal Accounts

If a government becomes concerned about inflationary pressures and a potential debt crisis, then instead of financing the deficit, the government may try to reduce it by working on  $[Sg' - (Pq * Ig)]$ .

Fiscal consolidation to better align expenditures and revenues can be achieved in several ways, with different effects in the components of the equation  $[Sg' - (Pq * Ig)]$ . But those changes can also affect the components of  $[Sp' - (Pq * Ip)]$  and  $Sw$  in ways that may reinforce or dampen the initial fiscal adjustment.

For example, public-sector deficits can be reduced by increasing taxes ( $Tind + Tm + TYp + TYb$ ), decreasing public consumption ( $Pq * G$ ) and transfers ( $ST$ ), reducing public investment ( $Pq * Ig$ ), or reducing the payment of net interests on public debts  $[(INTR * B) + (INTR * DCg) + (R * FCg)]$  through, for example, a rescheduling or reduction of the external debt. However, each one of these approaches can affect other components of the equation, potentially forcing further changes in policies to reduce the government deficit.

Tax increases affect GDP, private consumption, and private investment. The results may be such that the initial improvement in the net public position could be, at least in part, negatively compensated by a fall in private net saving ( $Sp'$ ).

On the other hand, if public expenditures are cut, the short-term impact will depend on, among other things, the nature of the goods for which aggregate demand has decreased as a result of the fiscal contraction. For instance, it makes a difference whether the cuts fall on government's consumption, transfers, or investments. Transfers to the poor and vulnerable, as well as investments in human or physical capital, should be spared from such cuts. Another difference is that if the affected goods and services are traded ones, the smaller internal demand (resulting from the fiscal restriction) can lead to greater exports (if there are no restrictions in international demand) or fewer imports, which would lead to an improvement of the external accounts. If the decrease in public expenditures falls on goods and services that are not exported or imported (that is, nontraded), the impact in the short term can be reflected in the unemployment of the productive factors dedicated to those activities and

in a fall of the GDP, which in turn may affect net private savings, again forcing other adjustments in the full equation.<sup>41</sup> In any case, both raising taxes and cutting public expenditures can have recessive effects, at least in the short run, which must be considered. However, if the fiscal adjustment reduces the economy's overall interest rate, it could end up having an expansionary impact through the expansion of consumption and investment by the private sector.

This debate is part of the discussion of fiscal multipliers, which are defined as the ratio of a change in GDP in real terms ( $dGDP_r$ ) in relation to an exogenous change (mostly a policy decision) in the fiscal deficit (expressed as real expenditures minus taxes:  $dG - dT_{real}$ ):<sup>42</sup>

$$\text{Fiscal multiplier: } dGDP_r / (dG - dT_{real}).$$

If there is an increase in real expenditures ( $+dG$ ) or a reduction in real taxes ( $-dT_{real}$ ), then the expression  $(dG - dT_{real})$  increases in value. The question is how much additional real GDP is obtained from that fiscal expansion (or what would be the decrease in  $GDP_r$  from a fiscal contraction). If the ratio is 1 or more, this means that an increase of the deficit is translated into a similar increase, or more, of real GDP (conversely, a cut in fiscal deficit will reduce  $GDP_r$  by the same amount or more). If the empirical estimates of the fiscal multipliers suggest numbers equal to or greater than 1, then in an economic slump it would seem adequate to expand the fiscal deficit, while trying to cut the deficit (for instance, to stabilize the ratio of debt to GDP) would be counterproductive because it would lead to additional drops in  $GDP_r$ , which may increase rather than decrease the ratio of debt to GDP.

The empirical estimates of fiscal multipliers vary significantly. One problem is the definition, which may include the immediate impact, the delayed impact, or the cumulative impact over several quarters (this latter indicator is the more adequate). Another issue is the size of the leakages: that is, what percentage of the fiscal stimulus is saved by the private sector (which negates the expansion of domestic aggregate demand) and/or is directed to buying imports (which expands domestic aggregate demand but ends up helping the rest of the world, not the country using the fiscal stimulus). Monetary

41 To compensate for the decrease in the demand for nontradable goods and services and to maintain overall economic activity, the real exchange rate needs to adjust to favor the production of tradable goods and services, and factor markets must be sufficiently flexible to ensure the channeling of labor and capital toward those activities. These adjustments will be discussed in Chapter 7.

42 Remember that  $G$  was defined earlier as real government expenditures (combined with the deflator  $P_g$ , it resulted in nominal government expenditures); therefore, taxes have to be defined in real terms as well.

conditions are also important: if the interest rate increases as a result of the fiscal expansion (because the monetary authority is tightening the policy stance in response to the fiscal stimulus or because markets react negatively to the increase in public debt), then the expansion of the real deficit ( $G - T_{real}$ ) may be more than compensated by drops in private consumption ( $C$ ) and investment ( $I_p$ ). Finally, another factor affecting the multiplier is whether the government's fiscal position after the stimulus is sustainable (see Chapter 7; Spilimbergo, Symansky, and Schindler 2009).

In addition to the considerations of short-term adjustments mentioned so far, there are also dynamic and intertemporal aspects of the program of fiscal adjustment that must be taken into account. An obvious trade-off, already mentioned, is the impact of the decline of public investment dedicated to the formation of human capital, productive infrastructure, and the support of science and technology: although these cuts may contribute in the short term to attaining a balance of the public accounts compatible with the availability of internal and external net savings, they can also decrease the future growth rate of the GDP and thus worsen future fiscal balances.

Another dynamic element is the evolution of various financial assets and liabilities as a result of the level of the public deficit and its financing. Each of the three methods of financing (monetization, issuing domestic debt, and issuing external debt) implies modifications in the stock of a specific financial asset that, when interacting with their demand, can produce changes in key macroeconomic variables (as mentioned before and discussed later). These issues are discussed in the section on adjustments in assets in the next chapter.





## MACRO BALANCES IN PRODUCT, FACTOR, AND ASSET MARKETS

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This chapter starts by introducing some key relative prices and presenting different definitions of the exchange rate. Then it moves to the discussion of the adjustment in production and utilization, factor markets, and asset markets (blocks 2, 3, and 4, respectively in Figure 5.1). It ends with a brief consideration of what have been called closure rules (mainly which variables are assumed to be exogenous and which ones are endogenous in a model) and of some empirical issues.

### Relative Prices

In Chapter 6, the adjustments happened mostly to variables in quantity levels (block 1 in Figure 5.1), with little reference to either the variety of prices that appear in the Social Accounting Matrix (SAM) or to the potential changes in their relative values. The SAM, even though it is a simplified framework, includes several prices:  $P_d$ , the price of the domestically produced and consumed goods (D);  $P_{ex}$ , the price of exports (EX) in domestic currency (and  $P_{ex\$}$  in foreign currency terms); and  $P_{im}$ , the domestic currency price of imports (IM) ( $P_{im\$}$ , in foreign currency terms). The aggregate good produced by the country (Z, a combination of D and EX) has also its price  $P_z$ ; this aggregate good is different from the good utilized in that country (Q, a combination of D and IM), with price  $P_q$ . Furthermore, there are salaries ( $w$ ) paid to labor (L) and the payment ( $\pi * P_q$ ) of the productive services per unit of physical capital (K), as well as the exchange rate (ER), and interest rates (INTR and R).

From this variety of prices in levels, several crucial relative prices can be defined, such as  $P_d$  divided by  $P_{ex}$  ( $P_d/P_{ex}$ ), which would indicate the incentives to *produce* for the domestic or the foreign market;  $P_d$  divided by the price of imports,  $P_{im}$  ( $P_d/P_{im}$ ), which would show the relative incentives to

*utilize* the domestic or the foreign good;<sup>1</sup> and  $P_{ex}/P_{im}$  (or  $P_{ex\$}/P_{im\$}$ ), which defines the terms of trade for that country.

As mentioned earlier,  $P_z$  and  $P_q$  can play important roles as deflators for other variables. For instance, wages deflated by  $P_z$  (that is,  $w/P_z$ ) will indicate the real wage from the point of view of producers and will be part of a labor demand function, while wages deflated by  $P_q$  (that is,  $w/P_q$ ) will define the real wage from the perspective of workers and will be part of a labor supply function. More generally,  $P_q$  and  $P_z$  can be utilized, along with the price deflator of the GDP ( $P_{gdp}$ ), to calculate in constant prices other variables (although the real variables will have different interpretations depending on the deflator utilized).

The relative price of labor and capital [ $w/(\pi * P_q)$ ] would affect the relative use of productive factors (the capital/labor ratios) and technological alternatives, all of which helps define medium- to long-term aggregate supply trends. Finally, as noted before, the exchange rate (ER) and interest rates (INTR and R), nominal and real (that is, price deflated), are crucial variables for short-run macroeconomic balances and long-term growth.

Therefore, there is a range of relative prices that may change along with the adjustments in quantity levels of the macroeconomic variables discussed before. These modifications in relative prices will influence the different ways in which the structure of the economy may adjust behind, so to speak, the mechanical balancing of the main macroeconomic accounts discussed in Chapter 6.

In this analysis, there are several questions to be considered (Dornbusch 1980). First, what are the relative prices of interest for the analysis at hand among the several examples mentioned above? Second, how are relative prices changed? Some of the ways in which these changes happen (but not all) are related to government interventions, such as exchange rate policies, trade policies (import tariffs, export subsidies, quotas, and similar instruments), fiscal policies (through taxes, subsidies, and expenditures that can affect wages and the rate of return to capital, among other variables), and monetary policies (that influence interest rates). Other changes may reflect exogenous shifts in supply and demand conditions in some relevant markets.

Third, what are the channels through which those changes in relative prices affect supply and demand movements in the relevant markets? Those

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1 Both  $P_{ex}$  and  $P_{im}$  must be defined to reflect the relevant price received by the producers (for instance, if there are export subsidies that must be counted in  $P_{ex}$ ) or paid by users (the case of import tariffs, for example, to be considered in  $P_{im}$ ).

changes would eventually lead to the accounting balancing of the macro accounts, and some type of (temporary) equilibrium in those markets (including production, demand, and employment; monetary and financial markets; the fiscal position; and the balance of payments).

Fourth, what is the direction and intensity with which the variable of interest reacts to changes in relative prices (or other related variable that may influence the former one)? Such direction and intensity is captured by the concept of elasticity: as used in economics, it is a number that indicates the percentage change in a variable of interest (say, quantity demanded of wheat, labor, or money) when a contextual variable that influences the former (such as the price of wheat) changes by 1 percent.<sup>2</sup>

In many economic adjustment processes to changes in relative prices, it is important to consider income and substitution effects (Dornbusch 1980): for instance, if a country benefits from an improvement in its terms of trade measured in foreign currency ( $P_{ex}\$/P_{im}\$$ ), say because the world price of that country's exports ( $P_{ex}\$$ ) went up, besides the substitution in production (now the country would produce more EX, presumably improving the trade balance), there is an income effect because the country is richer (measured in world prices) that may lead to increased demand for domestic goods (D) and imports (IM). There can be configurations of income and price elasticities that may lead to instability problems in the process to adjust to the new context (Dornbusch 1980).<sup>3</sup>

## Exchange Rates

The exchange rate is one of the most important macro prices. The relevance of the real exchange rate and exchange rate policies for the performance of the economy and the agricultural sector, in both developed and developing countries, has been long recognized (a classic general treatment can be found in

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2 Elasticity is a pure number (that is, it does not have units). For instance, if someone says that the income elasticity of wheat is +0.2, it means that the demand for wheat *increases* 0.2 percent when income increases 1 percent; if the price elasticity of *demand* for wheat quantity is -0.4, it means that the quantity demanded of wheat *decreases* 0.4 percent when the price of wheat goes up 1 percent; if the price elasticity of *supply* of wheat is +0.5, it means that the quantity of wheat produced *increases* 0.5 percent when the price goes up 1 percent. When the value of the elasticity is less than 1 in absolute value, the demand or the supply of the product (or factor of production or financial instrument) involved is called inelastic (if it is more than 1, it is called elastic). Elasticities may be calculated for the short term (say up to one year) or for longer time periods (say more than five years); usually short-term elasticities are smaller in absolute value than longer-term ones, reflecting the fact that adjustments in supply and demand take time.

3 A well-known result in international economics is the Marshall-Lerner condition, which indicates that a currency devaluation will have a positive effect on the trade balance only if the sum of price elasticity of exports and imports (in absolute value) is greater than 1.

Krueger 1983; Corden 1990; for agricultural issues see Schuh 1974; Orden 1986; Balassa 1988).

The level and changes (both actual and expected) of the exchange rate have wide influence throughout the economy, affecting and being affected by the demand and supply of traded and nontraded products, the demand and supply of money and monetary assets denominated in local currency in comparison with assets denominated in other currencies, inflows or outflows of capitals, and the public budget, among other things. To analyze exchange rate policies, it is necessary to first consider some definitions.

### Nominal Rates

Nominal exchange rates (ER) are usually defined in units of domestic currency per unit of foreign currency (for instance, 20 pesos per US dollar).<sup>4</sup> With that definition, appreciation (depreciation) of a currency means that the amount of that currency paid for one unit of foreign currency decreases (increases). A strong (weak) currency is one that has appreciated (depreciated) vis-à-vis others. Note that when the domestic currency has appreciated, the nominal value of the ER so defined goes down (for instance, if the ER moves from 20 pesos per dollar to 15 pesos per dollar, the domestic currency has appreciated; the domestic currency has strengthened and therefore fewer units of domestic currency must be paid per unit of foreign currency). Conversely, when a currency depreciates, the nominal value of ER goes up (for example, moving from 20 to 25 pesos per dollar; because the domestic currency has depreciated, a larger number of pesos is needed per unit of foreign currency).

The concept of effective nominal exchange rate highlights the fact that a country has different exchange rates with different currencies, such as  $x$  pesos per dollar,  $y$  pesos per euro,  $z$  pesos per yen, and so on. The effective exchange rate (EER) in this context is an index that represents an average of all those exchange rates weighted by the percentage of international trade of a country with each one of those currency areas.<sup>5</sup> It is usually calculated as follows:

$$EER = \prod_j (ER_j)^{\alpha_j} \quad \text{where } \sum \alpha_j = 1, \text{ and } j = 1 \dots n,$$

where  $\prod_j$  is the symbol of multiplication;  $ER_j$  are the bilateral nominal exchange rates of the country considered with each one of that country's

<sup>4</sup> There are some exceptions, such as the British sterling pound, which is usually quoted as dollars per pound.

<sup>5</sup> Sometimes the notion of effective nominal exchange rate is utilized for a *product* (EERp): it is the nominal rate corrected by taxes or subsidies that may correspond to that product:

$$EERp = ER * (1 + \text{subsidy rate}); \text{ or } EERp = ER * (1 - \text{tax rate}).$$

partners (country “j” for a total of “n” countries; that is,  $j = 1 \dots n$ ); and  $\alpha_j$  is an appropriate country weight (usually based on the percentage of trade participation for each country j), which must add up to one for all “j” countries.<sup>6</sup>

### Real Exchange Rates

Another important concept is the real exchange rate (RER), which is also used in two main conceptual ways. The first one, in the case of a single partner country, is the bilateral nominal exchange rate of the home country with the foreign country corrected by an index of domestic prices and another index of prices in that partner country:

$$\text{RER1} = (\text{ER} * \text{Pint})/\text{Pdom},$$

where Pint is the general price index of the partner country and Pdom is the local price index.<sup>7</sup> It can be generalized, as it was in the case of the nominal effective exchange rate (EER), by calculating a geometrical average of the bilateral real exchange rates, weighted as before. In this case, the real effective exchange rate (REER1) is equal to

$$\text{REER1} = \prod_j (\text{RER1}_j)^{\alpha_j} \quad \text{where } \sum \alpha_j = 1, \text{ and } j = 1 \dots n.$$

Another definition of the real exchange rate is the price of traded goods and services (Ptr) in a country divided by the price of nontraded ones (Pntr) in that same country:

$$\text{RER2} = \text{Ptr}/\text{Pntr}.$$

As discussed elsewhere in this book, the price in domestic currency of traded goods and services (Ptr) may depend on some reference world price in foreign currency for those items (Ptr\$) and the exchange rate ER. In the case of homogeneous goods in world and domestic markets, the relation is  $\text{Ptr} = \text{ER} * \text{Ptr\$}$ . Therefore, in both definitions of the real exchange rate, a devaluation of the nominal exchange rate (ER) (which implies that the nominal amount of local currency paid per foreign currency unit increases), the ratio also increases, at least initially,<sup>8</sup> and it is usually said that the RER has

6 See Chinn (2005) for a discussion of the complexities in defining appropriate weights.

7 The domestic price index utilized here (Pdom) is different from the price of the domestic nontraded good D, which we called Pd. See Chinn (2005) for the various price indexes that can be utilized (such as Consumer Price Index, Wholesale Price Index, Producer Price Index, GDP deflators, and so on) and their advantages and disadvantages.

8 The final effects depend on the second-round reaction of Pdom and Pntr to the devaluation.

depreciated (conversely, with the appreciation of the ER, both RER1 and RER2 decline).

Note that, as with the nominal definitions, the ratios move opposite to the normal meaning of the words involved, which may generate some confusion: the RERs increase when they depreciate and decrease when appreciating. That is why analysts sometimes use definitions in which the ratios are inverted, such as  $P_{dom}/(ER * P_{int})$  and  $P_{ntr}/P_{tr}$ ; in this case, those ratios increase (decrease) when the RER appreciates (depreciates), aligning the normal meaning of the word (appreciation/depreciation) with the direction in which the ratios move (up/down). These alternative definitions are a source of confusion in the literature, and it is always important to clarify what definition is being used. In the rest of the book, we will mainly use definitions RER1 and RER2; but at times we may refer to their inverse representation, in which case it will be explained in the text.

In many empirical applications, the theoretical sections discuss RER2, but when moving to the empirical sections, RER1 is utilized. However, these are not equivalent, although they are related. The relationship between RER1 and RER2 can be seen by taking logarithms on both sides of the first equation<sup>9</sup> (see Edwards 1989; Chinn 2005):

$$\log(\text{RER1}) = \log[(ER * P_{int})/P_{dom}]$$

or

$$\log(\text{RER1}) = \log(ER) + \log(P_{int}) - \log(P_{dom})$$

or

$$\text{rer1} = \text{er} + \text{pint} - \text{pdom},$$

where a variable in logarithms is represented in lowercase letters. We define, also in logarithms, the price indexes for both the home country ( $P_{dom}$ ) and the partner country ( $P_{int}$ ) as a function of the prices of their own traded (indicated by “tr”) and nontraded goods and services (“ntr”):

$$\text{pdom} = \delta * \text{pdom}(\text{ntr}) + (1 - \delta) * \text{pdom}(\text{tr})$$

$$\text{pint} = \beta * \text{pint}(\text{ntr}) + (1 - \beta) * \text{pint}(\text{tr}),$$

where  $\text{pdom}$  is the logarithm of the domestic price index ( $\text{pdom} = \log(P_{dom})$ ), which represents a combination with weights  $\delta$  and  $(1 - \delta)$  of the

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<sup>9</sup> Taking logarithms on both sides does not change the equality but transforms multiplications and divisions into sums and subtractions respectively.

log of the domestic price of nontraded goods and services ( $p_{\text{dom}}(\text{ntr}) = \log(P_{\text{dom}}(\text{ntr}))$ ) and the log of the domestic price of traded goods and services ( $p_{\text{dom}}(\text{tr}) = \log(P_{\text{dom}}(\text{tr}))$ ). The same applies for the price index of the trading partner ( $p_{\text{int}} = \log(P_{\text{int}})$ ), which is a combination with weights  $\beta$  and  $(1 - \beta)$  of price index for nontraded goods and services ( $p_{\text{int}}(\text{ntr}) = \log(P_{\text{int}}(\text{ntr}))$ ) and traded ones ( $p_{\text{int}}(\text{tr}) = \log(P_{\text{int}}(\text{tr}))$ ).

The final equation can be rearranged as

$$\text{rer1} = [\text{er} + p_{\text{int}}(\text{tr}) - p_{\text{dom}}(\text{tr})] - \delta * [p_{\text{dom}}(\text{ntr}) - p_{\text{dom}}(\text{tr})] + \beta * [p_{\text{int}}(\text{ntr}) - p_{\text{int}}(\text{tr})].$$

Then the first version of the real exchange rate (RER1) can be expressed as the sum of three components (Chinn 2005):

1. The relative price of traded goods and services for both countries expressed in the domestic currency of the home country ( $\text{er} + p_{\text{int}}(\text{tr}) - p_{\text{tr}} = \log(\text{ER} * P_{\text{int}}(\text{tr})/P_{\text{dom}}(\text{tr}))$ ); this is a form of the terms of trade (TOT) faced by a country expressed in domestic currency
2. The inverse of RER2 for the home country ( $p_{\text{dom}}(\text{ntr}) - p_{\text{dom}}(\text{tr}) = \log(P_{\text{dom}}(\text{ntr})/P_{\text{dom}}(\text{tr}))$ ), weighted by the share of nontraded goods and services in the domestic price index ( $\delta$ )
3. The inverse of the RER2 for the foreign country ( $p_{\text{int}}(\text{ntr}) - p_{\text{int}}(\text{tr}) = \log(P_{\text{int}}(\text{ntr})/P_{\text{int}}(\text{tr}))$ ), weighted by the share of nontraded goods and services in the price index of the partner country ( $\beta$ )

If the “law of one price” for traded goods and services applies (which implies that  $\text{ER} * P_{\text{int}}(\text{tr}) = P_{\text{dom}}(\text{tr})$ ),<sup>10</sup> then the first group is zero. But if, for different reasons, the equality postulated by the law does not hold (for example, due to the fact that the traded goods and services produced by the home country and the foreign country are not perfectly substitutable), then the first group is not zero; in this case, the expression  $[\text{er} + p_{\text{int}}(\text{tr}) - p_{\text{dom}}(\text{tr})]$  also affects RER1. Therefore, the relation between RER1 and RER2 for a given country involves the impact of the terms of trade and the RER2 in the trading partner as well.

10 The “law of one price” refers to the idea that goods, services, and assets that are comparable should show similar prices in different markets, if these markets are efficient, once adjustments are made for issues such as transportation costs. If the prices were not the same, then economic agents could buy in the low-price market and sell in the high-price market until prices converge. In real markets, this law does not necessarily hold because of many imperfections and constraints in the operation of markets.



A final point to be noted is that in the SAM, we have two traded goods, exports (EX) and imports (IM), while so far we have been talking about traded goods in general. For some analyses (as discussed later in this chapter), EX and IM can be aggregated into a traded good, which requires among other things that their relative price ( $P_{ex}/P_{im}$ ) be kept fixed. But in general it is better to analyze EX and IM separately. In that case, there are two different real exchange rates of the type RER2: one for exports,  $P_{ex}/P_d$ , and another for imports,  $P_{im}/P_d$  (now using the price of the domestic nontraded good D). In the next section, we work first with a generic traded good, while in the subsequent analyses exports and imports will be kept separate.

### **Adjustment in Production and Consumption**

The next sections discuss adjustments first in the price of traded and nontraded goods and then in the terms of trade (prices of exports divided by the prices of imports).

#### **Relative Prices: Traded and Nontraded Goods**

As suggested in the previous discussion, an important relative price to understand macro balances in the economy is the one highlighted by Salter (1959) and Swan (1960), who identified two sectors in the economy: tradables (including both imports and exports) and nontradables. The Salter-Swan model is more realistic than the standard neoclassical trade model, also known as the Heckscher-Ohlin-Samuelson (HOS) model, in which all goods are tradable and domestic and external goods are perfect substitutes. In the HOS model, domestic prices are set in world markets and transmitted directly to the national economy. In the empirical applications, those assumptions yield unrealistic changes in domestic prices and specialization in production as a result of changes in trade policies or world prices.

At the same time, in reality there are no (or very few) purely nontradable goods—that is, goods that at the usual level of disaggregation of national statistics show neither exports nor imports. Therefore, in the SAM we identified the domestic good (D) as nontraded (which has more of a temporary connotation) rather than nontradable (which sounds like a definite attribute) (Dervis, de Melo, and Robinson 1989; Devarajan et al. 1997). In this characterization, the domestic good D is an imperfect substitute in demand for the imported good IM (with some elasticity of substitution in the overall commodity Q), and also for the exported good EX on the production side (with some elasticity of transformation as part of the aggregate good Z).

This conceptualization leads to the distinction between traded (EX and IM, in the SAM) and nontraded goods (D) and highlights the importance of considering the balance of supply and demand in the markets for each type of good. There is an external equilibrium regarding the supply and demand of traded goods, which is reflected in the trade component of the balance of payments, and the internal equilibrium requires that the demand and supply of the domestic good (D) are also in balance.

When the Salter-Swan model was conceived, international capital mobility was very limited. Therefore, the model would look at the adjustment process only on the trade side of the BOP and its interactions with the nontraded sector. The model also assumes that the international prices in dollars are exogenously determined by world markets (the assumption that the country is small in the relevant world markets): therefore, the ratio  $P_{ex}\$/P_{im}\$$  is fixed, assuming as well that either there are no trade policies affecting that relative price or that if there are trade policies, such as import tariffs, they are kept fixed in the analysis.

Therefore, the equations to consider are as follows:

$$(P_{ex}\$ * ER * EX) - (P_{im}\$ * ER * IM) + \text{Other Items} = \text{Change in Net Wealth} = 0.$$

This is the BOP equation, in which all other items in that equation have been aggregated and are kept fixed. Also, to reflect some notion of long-term external equilibrium, the country must not be borrowing from or lending to the rest of the world (therefore the change in net wealth must be zero).

For internal equilibrium regarding the domestic good D the equation to consider is

$$D(\text{supply}) = D(\text{demand}).$$

Using the equations for activities and commodities from the SAM, we can write (assuming there are no import tariffs; that is,  $t_m = 0$ )

$$(P_q * IO) + YL + YK + T_{ind} + DEPR_p + DEPR_g = (P_d * D) + (P_{ex} * EX)$$

$$(P_q * IO) + (P_q * C) + (P_q * G) + (P_q * I_p) + (P_q * I_g) = (P_d * D) + (P_{im} * IM).$$

Recalling that

$$YL + YK + T_{ind} + DEPR_p + DEPR_g = GDP = P_{gdp} * GDP_r,$$

then the activities and commodities equations can be written (separating the domestic good  $D$  into the supply and demand component)

$$(P_q * IO) + (P_{gdp} * GDP_r) = (P_d * D(\text{supply})) + (P_{ex} * ER * EX)$$

$$(P_q * IO) + P_q * (C + G + I_p + I_g) = (P_d * D(\text{demand})) \\ + (P_{im} * ER * IM).$$

Subtracting the second from the first equation, we have

$$(P_{gdp} * GDP_r) - P_q * (C + G + I_p + I_g) = [P_d * D(\text{supply}) - P_d * \\ D(\text{demand})] + [(P_{ex} * ER * EX) - (P_{im} * ER * IM)].$$

From before, we recall that  $P_q * (C + G + I_p + I_g)$  was called absorption ( $A$ ), then

$$P_{gdp} * GDP_r - A = [P_d * D(\text{supply}) - P_d * D(\text{demand})] + [(P_{ex} * ER * \\ EX) - (P_{im} * ER * IM)].$$

If there is internal equilibrium, then the first group is zero [ $(P_d * D(\text{supply}) - P_d * D(\text{demand})) = 0$ ]; and if there is external equilibrium, the second group (considering that the rest of the BOP is kept fixed) also must be zero [ $(P_{ex} * ER * EX) - (P_{im} * ER * IM) = 0$ ]; then,  $(P_{gdp} * GDP_r) - A = 0$  (that is, the country is in internal and external equilibrium in goods and services).

Suppose that starting from that internal and external equilibrium, absorption ( $A$ ) increases. This may happen perhaps because the government decides to increase  $G$  and/or  $I_g$ ; or because the government promotes private consumption or investment through credit expansion or a reduction in interest rates; or private  $C$  and  $I_p$  may simply increase because of changes in tastes or expectations. That increase in  $A$  may lead to more demand of  $D$  and/or  $IM$ , which disrupts the internal and external balances.

To restore the internal equilibrium, there must be more supply of  $D$ ; and because the aggregate good produced in the country ( $Z$ ) combines  $D$  and  $EX$ , in order for the production of  $D$  to increase,  $P_d$ , the price of  $D$ , must go up compared to  $P_{ex}$ , the price of exports  $EX$  (that is, the relative price  $P_d/P_{ex}$  must increase).

But to restore the external equilibrium, there must be more exports (to compensate for the increase in imports), and therefore relative prices should favor  $EX$ : the relative price of  $P_d/P_{ex}$  must go down. Alternatively, the price of imports  $P_{im}$  must go up with respect to the domestic good  $D$ , to dissuade people from buying  $IM$ :  $P_d/P_{im}$  must go down. In other words, external equilibrium requires that the relative price of the domestic good  $D$  goes down with respect to the price of the traded goods ( $EX$  and  $IM$ ).

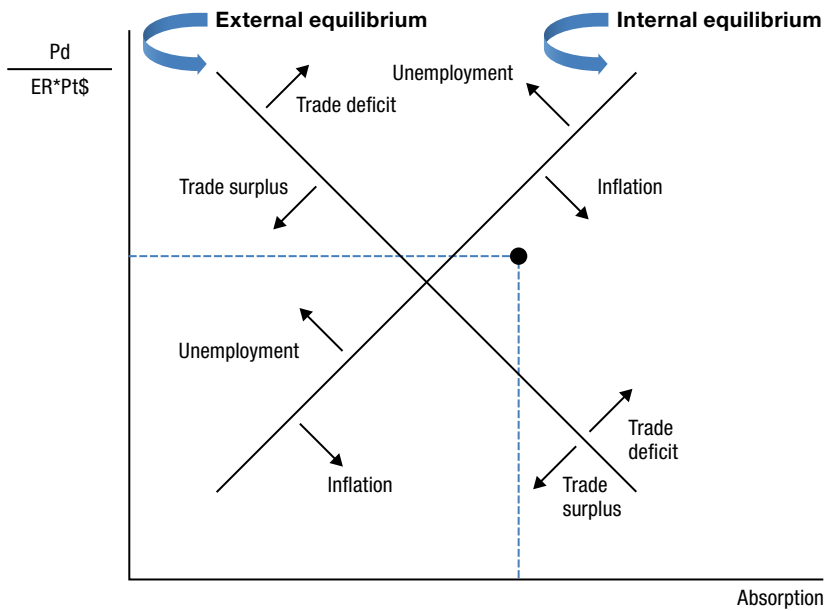
Because the country is small in global markets, it cannot influence world prices,  $P_{ex\$}$  and  $P_{im\$}$ , which then remain fixed. Recalling that  $P_{ex} = P_{ex\$} * ER$  and  $P_{im} = P_{im\$} * ER$ , the relative prices to consider can be written

$$P_d/P_{ex} = P_d/(P_{ex\$} * ER) \text{ and } P_d/P_{im} = P_d/(P_{im\$} * ER).$$

Therefore, the adjustment process presents a dilemma: internal equilibrium requires that  $P_d$  go up with respect to  $P_{ex}$  (or  $P_{ex\$} * ER$ ), while external equilibrium requires that  $P_d$  go down in relation to  $P_{im}$  ( $P_{im\$} * ER$ ).

Figure 7.1 shows the inverse movements in relative prices needed to attain internal and external equilibrium (where  $P_{t\$}$  stands for the dollar price of the traded good that combines EX and IM).

**FIGURE 7.1** The Salter-Swan diagram



Source: Author based on Salter (1959) and Swan (1960).

Regarding external equilibrium, the downward sloping line simply indicates that if there is more absorption, additional internal demand will absorb some of the exports that would have gone to world markets and will bring some additional imports as well, generating an external imbalance. Therefore, to compensate for the pressure that an increase in absorption  $A$  places on the trade balance, the relative price of the nontraded good must go down with

respect to the traded goods and services (leading to more exports and fewer imports). Points to the right and above the line indicate a trade deficit, and points to the left and below indicate a trade surplus. External equilibrium can be attained by devaluing the local currency (that is, ER increases in value, meaning that more local currency is needed to buy 1 dollar), which forces down the relative prices  $P_d/P_{ex}$  and  $P_d/P_{im}$ .

The internal equilibrium, on the other hand, requires a larger supply of the domestic good D when absorption A increases, which implies that  $P_d/ER * P_t\$$  must go up: therefore, the line for internal equilibrium is upward sloping. Points to the right and below indicate inflationary pressures and points to the left and above indicate unemployment. Again, the ER can be used to decrease  $P_d/ER * P_t\$$ , through a revaluation of the local currency (that is, ER decreases in value, meaning that less local currency is needed to buy 1 dollar). But this would go against the adjustment in ER needed for external equilibrium.

The Salter-Swan cross defines four different zones, and each one requires different policies to move to internal and external equilibrium. For instance, point W, which is in the quadrant with inflation and trade deficit, may require a reduction in absorption A (which is called expenditure reduction) to move horizontally and to the left to go to the internal equilibrium line and then a devaluation to move down to the external equilibrium line (which is called expenditure switching) until both equilibrium conditions are satisfied.

Each one of the other quadrants will need different combinations of expenditure adjustment (through policies such as a cut in some government expenditures that affect the level of absorption) and expenditure switching (through policies such as devaluation of ER that affect the composition of production and absorption) to attain internal and external equilibrium simultaneously. This is another manifestation of the Tinbergen Rule mentioned in Chapter 1: because there are two objectives (internal and external balances), then usually at least two policy instruments are needed (such as changes in ER and adjustments in some of the components of absorption).

### Export and Import Prices

In the previous section, we discussed changes in relative prices of traded and nontraded goods but without modifying  $P_{ex}/P_{im}$ , the relative price of exports and imports. The reasons for the lack of change in that relative price can be seen from the equations used so far for  $P_{ex}$  and  $P_{im}$ :

$$P_{ex} = P_{ex\$} * ER \text{ and } P_{im} = P_{im\$} * ER.$$

Therefore,

$$P_{ex}/P_{im} = (P_{ex\$} * ER)/(P_{im\$} * ER) = P_{ex\$}/P_{im\$}.$$

The exchange rate (ER) can be eliminated as it equally affects  $P_{ex}$  and  $P_{im}$ , and it was assumed that the terms of trade ( $P_{ex\$}/P_{im\$}$ ) are exogenously defined in world markets. Also, we have ignored trade policies that may affect in different ways the domestic values of  $P_{ex}$  and  $P_{im}$ .

Now in this section, we introduce trade policies to consider changes in the relative price  $P_{ex}/P_{im}$ . These policies may change the domestic price of imports, as is the case of import taxes or tariffs, quotas, nontrade barriers (such as sanitary and phytosanitary measures), and so on. Others may change the domestic price of exports, such as export subsidies, exports taxes, export quotas, and the like.

To simplify the discussion, we consider a simple import tariff charged on the value of imports in domestic currency (which is called an ad valorem tariff) and a simple export subsidy.<sup>11</sup> Maintaining the small-country assumption (and, therefore, the dollar prices of exports and imports,  $P_{ex\$}$  and  $P_{im\$}$ , remain fixed), the equations for  $P_{ex}$  and  $P_{im}$  in domestic currency (as seen from the point of view of the economic agents that produce EX and those who utilize IM) and can be written

$$P_{im} = (1 + t_m) * ER * P_{im\$}$$

$$P_{ex} = (1 + t_x) * ER * P_{ex\$}.$$
<sup>12</sup>

For instance, if the price of the imported good IM (say corn) is 100 dollars per ton, the exchange rate is 1 peso equal to 1 dollar, and the import tariff ( $t_m$ ) is 20 percent, then

$$P_{im} = (1 + 0.2) * 1 * 100 = 120 \text{ pesos.}$$

Assuming now that the country is an exporter of corn and that it is also applying an export subsidy ( $t_x$ ) of 20 percent for that product, and using the same ER and world price, then

$$P_{ex} = (1 + 0.2) * 1 * 100 = 120 \text{ pesos.}$$

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11 The other measures, such as quotas, which operate on quantities rather than on prices, may be converted into "price equivalent" measures under certain assumptions. Those complications will not be considered here.

12 If it is an export tax, then the sign of  $t_x$  is changed to minus ( $1 - t_x$ ); also, in the (less likely) case of import subsidies,  $t_m$  would be negative ( $1 - t_m$ ).

A point to be noticed is that imposing ad valorem import tariffs and export subsidies of the same percentage is equivalent to a similar devaluation of the ER, when looking only at  $P_{ex}$  and  $P_{im}$ ;<sup>13</sup> therefore, it is possible to simulate the direct price effect of a devaluation through trade policies.

But to change the relative price  $P_{ex}/P_{im}$ , we need differential trade policies affecting exports and imports.

For the analysis of trade policies, we can go back to the equation we used in the previous section and replace  $P_{ex}$  and  $P_{im}$  by

$$P_{im} = (1 + t_m) * ER * P_{im\$}$$

$$P_{ex} = (1 + t_x) * ER * P_{ex\$}.$$

To simplify the example further, we assume that the only trade intervention is the import tariff (there is no export subsidy;  $t_x = 0$ ). Then we have

$$(P_{gdp} * GDP_r) - P_q * (C + G + I_p + I_g) = (P_{gdp} * GDP_r) - A = [(P_d * D(\text{supply})) - (P_d * D(\text{demand}))] + [(ER * P_{ex\$} * EX) - ((1 + t_m) * ER * P_{im\$} * IM)].^{14}$$

The sum  $P_q * (C + G + I_p + I_g)$  is absorption  $A$ , the total expenditure by residents of a country. And if we consider that the supply and demand of  $D$  must be equal within the period analyzed, then the equation reduces to

$$(P_{gdp} * GDP_r) - A = (ER * P_{ex\$} * EX) - (1 + t_m) * ER * P_{im\$} * IM).$$

As noted before, if a country uses (absorbs) more goods and services than it produces ( $A > P_{gdp} * GDP$ ), which makes  $(P_{gdp} * GDP - A)$  a negative number, then the expression  $[(ER * P_{ex\$} * EX) - [(1 + t_m) * ER * P_{im\$} * IM]]$  must also be negative. Let's consider the situation of a government that may be concerned about the negative trade balance in dollar terms  $[(P_{ex\$} * EX) - (P_{im\$} * IM)]$ , but because it does not want to devalue the ER, it decides to use trade policies to reduce the use of imports (IM). Or perhaps, the government wants to expand the industrial sector by protecting it from competing imports (what has been called the import substitution industrialization strategy). Then, there are several potential trade interventions, such as quotas that impose a maximum of IM (IMmax) or import tariffs that make imports more

13 There are other differential impacts, such as, among others, the fiscal implications of taxes and subsidies and the influence of the exchange rate on assets, which would negate the simple equivalence from the point of view of  $P_{ex}$  and  $P_{im}$  alone.

14 Note that by defining the domestic price of imports inclusive of import tariffs, the prices  $P_{gdp}$  and  $P_q$  have to be adjusted accordingly.

expensive compared to the domestic good  $D$ . In the latter case, the relative price  $P_d/P_{im}$  or  $P_d/[(1 + t_m) * ER * P_{im} * IM]$  goes down when  $t_m$  goes up, and then imports become more expensive than the domestic good, and domestic demand shifts toward the domestic good.

The first impact of such restrictive trade policies would be to diminish imports ( $IM$ ), which is the intended effect. But this trade measure will be successful only if there are also changes in the balance between  $P_{gdp} * GDP_r$  and domestic absorption  $A$ , which would most likely require additional policies. If the country has unutilized domestic resources and factors of production that can be mobilized through adequate policies to produce the previously imported goods that are not entering the domestic market now,  $GDP_r$  would expand. Still, those goods now produced domestically would probably be more expensive than the ones previously imported (otherwise they may have been produced before);<sup>15</sup> so the society needs to consider the benefits of the policy (more employment of domestic factors) as well as the potential costs (more expensive products),<sup>16</sup> which in turn may negatively affect production and employment in other sectors. Still, the effects on net employment and  $GDP_r$  may be positive in a scenario of significantly unused resources, provided that they can be adequately mobilized for the production of traded goods (which may not necessarily be the case).

On the other extreme, if there are no unemployed domestic factors (or some other structural constraints impede the expansion of  $GDP_r$ , say nonsubstitutable energy imports), and at the same time if policies affecting absorption  $A$  do not change, then the balance  $[(P_{gdp} * GDP_r) - A]$  will not change. If  $IM$  goes down because of trade measures, the macro balance  $[(P_{gdp} * GDP_r) - A]$  has not been adjusted, and  $ER$  and world prices do not change, then  $EX$  must decrease to reestablish the balance in the equation.

The economic mechanisms that equilibrate the accounting identity usually function as follows: with increases in protection for import-producing sectors, domestic prices would go up and resources (that in this case are fully

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15 Of course, it can be argued, as in the notion of infant industries, that such production does not exist because it has not had the opportunity to start, get established, and achieve the needed economies of scale and specialization to make the domestic product competitive with imports. This is the well-known argument for protection of certain activities that have the potential to develop and get established. It may be a valid argument in some cases, but it may also be used to support unsustainable activities that misallocate scarce resources from better uses. In any case, in the context of the analysis of the text, those activities will be, at least initially, more expensive than those produced abroad. So the argument in the text still holds.

16 This would be the case if the protected sector does not use the start-up push afforded by protection to become truly competitive.



employed) move from their previous activities oriented to exports and/or the domestic market to the production of goods (or services) previously imported. The movement of productive resources toward the domestic good D to substitute imports decreases the supply of exports. If the exportable products come principally from the agricultural sector, this would be the sector that most suffers the impact of the policy of substitution of industrial imports. This is the argument (presented here in a more general equilibrium framework) of the literature related to the bias against agriculture of industrial protection (which is normally presented in a partial equilibrium setting).

Actual conditions in developing countries fall between both extremes of unemployed and readily available factors of production and resources on the one hand and fully employed domestic production capabilities on the other. Still, in these intermediate cases some activities must decrease to allow the expansion of the domestic supply of import substitutes. Therefore, although import substitution activities may grow, this expansion may happen without necessarily expanding total employment and GDP and probably forcing a decline in at least some exports.

The main point here is that any attempt to correct the balance between EX and IM by means of a reduction of IM without adjusting the balance between the GDP and A is going to leave the balance between EX and IM unchanged but at lower levels of international trade (that is, the country will become more closed). Conversely, if the goal is to improve the balance of external payments, the way to do this is through better-designed policies aimed at increasing internal production (through capital accumulation and the utilization of idle factors of production). Otherwise, a reduction of domestic absorption would be necessary (it may also be a combination of both increases in production and reduction of demand).

The accounting equation also serves to consider other policy measures, such as lowering taxes on agricultural exports (or increasing subsidies) as a way to increase production and exports. If there are not enough idle domestic resources that can be mobilized to produce those additional exports, then the production of the domestic good D will be reduced. This implies that if the balance between GDP and A has not been adjusted, then imports IM must go up to satisfy the previous demand that is now unsatisfied because of the decline in the production of D.

So far, there has been some symmetry in the effects considered: if the government wants to reduce imports IM or increase exports EX but the balance between GDP and A is not changed, then the external accounts will return to the previous imbalance. However, the import tariff (revenue for the

government) and the export subsidy (a public expenditure) have different fiscal impacts, and the final impact on the economy will also depend on how the budget gap (which may be positive or negative) is managed, as discussed in the “Government Balances” section in Chapter 6.

## **Adjustments in Factor Markets**

### **Adjustments When All Products Are Traded**

Much of the economic analysis on adjustments in factor markets due to trade and other international influences starts with the standard Heckscher-Ohlin-Samuelson (HOS) model (see, for instance, Bhagwati, Panagariya, and Srinivasan 1998). It includes two countries, two goods, and two factors and uses some strong simplifying assumptions, such as free trade and no transportation costs; factors are mobile within each country but not across countries; the countries differ in their endowments of factors (that is, one is more capital abundant and the other more labor abundant); there is perfect competition, and all factors are fully employed; both countries have the same technologies in each product, represented by production functions that exhibit constant returns to scale (meaning that if all inputs increase by certain percentage, the output increases by the same percentage); however, technologies may be different in the two productive sectors.

The HOS model yields four strong theoretical results:

1. A capital-abundant (labor-abundant) country will export goods from capital-intensive (labor-intensive) industries; conversely, the country will import goods produced with the scarce factor (the Heckscher-Ohlin theorem).
2. If the relative prices of the two goods do not change and the quantity of one factor of production expands, then the production of the good that uses that factor intensively increases proportionally more than the expansion in the factor of production, and there is a decline in the output of the other good (Rybczynski theorem), but there are no changes in relative factor returns.
3. If the price of capital-intensive (labor-intensive) goods increases, the return to capital (the wage to labor) will increase and wages (the return to capital) will fall (Stolper-Samuelson theorem). In the HOS model, factor returns are defined by commodity prices, which in turn are determined on world markets.

4. Free international trade by equalizing the prices of goods across countries will also equalize the prices/returns to the factors of production, irrespective of whether there are different factor endowments across countries (Samuelson's Factor Price Equalization theorem).

The results indicate that the implications of the HOS model tend to be dominated by commodity prices and trade rather than adjustments in factor endowments or technological change that may favor a sector (product) or a factor of production.

There have been different empirical studies trying to determine whether the implications of the HOS model are present in real life, mostly with mixed results (Bowen, Leamer, and Sveikauskas 1987; Wood 1998; Baldwin and Cain 2000).

### Adjustments with Traded and Nontraded Goods

Other approaches have tried to improve the theoretical underpinnings and the empirical implications of the HOS model by modifying some of the assumptions. A line of analysis is to include nontraded goods, such as in the 1-2-2-3 model (Robinson and Thierfelder 1996).<sup>17</sup> This is an extension of the 1-2-3 model (one country, two production activities, and three commodities). This model was discussed earlier, but now includes two additional factors. The structure of the model differentiates the imported good IM and the domestic good D on the consumption side, which, unlike the HOS model, are not considered to be perfect substitutes: there is an elasticity of substitution in utilization that is far less than infinity (the HOS model, by assuming perfect substitutability, makes that elasticity infinite).

Therefore the good utilized in the economy  $Q$  is a combination of  $M$  and  $D$  with some elasticity of utilization (called here  $\sigma$ ) across the two goods, which in general equation form can be written

$$Q = q(M, D; \sigma).^{18}$$

17 It is based on Jones (1974), who examines the role of nontradable goods in the HOS model; in the 1-2-2-3 model, the domestic good  $D$  is nontraded, as argued before, but not rigidly nontradable, being an imperfect substitute for imports in consumption and for exports in production.

18 This is a qualitative representation that indicates that some variable, say  $X$ , depends on other variables as specified in  $q(\dots)$ . The semicolon (;) separates the variables (in this case  $M$  and  $D$ ) from the parameter  $\sigma$ , which is exogenously fixed. In quantitative applications, the functions need to have a numerical representation. For instance,  $X = 2 + 3 * Y1 + 5 * Y2$  is a numerical representation of the qualitative formula  $X = f(Y1, Y2)$ . The more common numerical functional forms are Cobb-Douglas and the Constant Elasticity Substitution (CES); but there are several others, such as Translog, Generalized Leontief, Normalized Quadratic, and Non-separable Nested Constant-Elasticity-of-Substitution functional forms, among others. For a discussion of those functional forms, see Perroni and Rutherford (1996).

The model also has two goods on the production side, exports  $E$  and domestic good  $D$ , which are not perfect substitutes and which combine into the general product  $Z$ . There is also a positive elasticity of transformation  $\Omega$ , which reflects the level of difficulty to move from the production of the domestic good to exports and vice versa. The elasticity of transformation  $\Omega$  depends on endowments of factors of production (here only labor  $L$  and capital  $K$ ) and technology that defines, among other things, the requirements of  $L$  and  $K$  per unit of product  $D$  or  $E$  at a point in time and the possibility of substitution between those factors of production if their relative prices change. In general equation form,

$$Z = z(E, D; \Omega).$$

Robinson and Thierfelder (1996) assume that the production factors are homogeneous (that is, each unit of  $L$  or  $K$  is the same in the production of any good, although they may be employed in different combinations in different goods) and that they can move freely across activities and are fully employed. Even with these strong assumptions, several of the results from the HOS are modified. In the HOS, the chain of causation goes from prices defined in world markets ( $P_{im}$  and  $P_{ex}$ ) to the structure of production (which in the HOS is only an exportable and an importable) and then to the returns to factors and production ( $L$  and  $K$ ). Also, according to the Rybczynski theorem, changes in relative factor supplies and changes in technology that may have the same effect also affect production and trade but not relative factor prices (Robinson and Thierfelder 1996).

In the 1-2-2-3 model, however, relative factor prices are affected not only by relative prices of goods in world markets but also by relative factor supplies and by the trade balance and how open or closed is the economy. Depending on the combination of values for the elasticity of substitution in utilization ( $\sigma$ ) and the elasticity of transformation in production  $\Omega$ , the link between world prices and structure of production and relative factor returns weakens (modifying the Stolper-Samuelson theorem). In particular, if  $\sigma < 1$  (that is, if  $IM$  and  $D$  are poor substitutes), then an increase in the world price of  $IM$  would lead to a decrease in the price of  $D$  relative to  $EX$ : because imports have become more expensive and they cannot be easily substituted by the domestic good  $D$  (that is,  $\sigma < 1$ ), then the country needs to shift resources to the production of exports  $EX$  to generate the export earnings needed to pay for the more expensive imports that cannot be replaced by the domestic good  $D$  (Robinson and Thierfelder 1996). Depending on whether goods are labor or capital intensive, the change in world prices may have the opposite effect on

factor returns than what would be predicted by the HOS model (Robinson and Thierfelder 1996).

They also show that, while trade shares do not matter in the standard HOS model for changes in the endowments to affect factor returns, in the 1-2-2-3 model those factor returns are very sensitive to the trade share (it is important not only whether a good is traded or not but also how much is traded). Finally, the larger the transformation elasticity ( $\Omega$ ) (when it is easy to move from producing D to producing EX and vice versa), then the less impact there is of changes in endowments, in world prices, and in the trade balance on factor returns.

Considering that in the 1-2-2-3 model (as in most economic models) the results vary with different values of elasticities and other parameters, more definite results about how factors of production fare under different policies would need a full quantitative model with specific values for those elasticities and parameters.

### **Further Assumptions about Factors, Markets, and Technology**

In the previous two sections, it has been assumed, among other things, that factors of production are homogeneous and that they are fully employed in competitive markets.<sup>19</sup> All these assumptions may have to be adjusted in applied policy decisions.

#### **SPECIFIC FACTORS**

Regarding homogeneity of factors of production (the first assumption), the production structure affected by policy decisions is certainly more disaggregated (there is more than one Z), and a relevant assumption is whether L and K that are employed in a specific production activity can move to other activities or whether they can operate only in one sector. In the latter case, in the language of trade theory, they would be specific factors (see, for instance, Bhagwati, Panagariya, and Srinivasan 1998). A case relevant for agriculture is land as a factor of production: it may have some alternative uses within agricultural activities but would not have significant uses outside of agriculture. Certainly, there are several alternatives between the two extremes of all factors being mobile and all of them being specific: for instance, some factors

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<sup>19</sup> The models discussed include also several assumptions about the basic technology and the existence and nature of technical change that, if altered, would modify the results significantly (see, for instance, Aghion and Howitt 1998). In particular, some policy decisions may lead to different types of non-neutral technological change (for example, those technologies may favor the substitution of one factor for another). Those issues are beyond the scope of this book.

may move (say skilled workers, but other types of labor cannot); or factors may move, but at different speeds, in which case the transition to the new economic configuration may be different depending on the assumptions about the potential mobility. In general, in the short term most factors are specific, and only with the passage of time (which may be more or less protracted) will those factors be able to move across activities. Slow or no mobility in labor, capital, and land implies that any reallocation of factors and resources will take time and would include potentially significant transition costs.<sup>20</sup> In particular, small and vulnerable producers (and consumers) may not be able to adjust to drastic changes in the policy environment and may suffer negative impacts on their livelihoods from which they may not easily recover.

These are all crucial assumptions that affect the results of the policies analyzed and highlight the need for carefully modulated policies for poor producers and consumers.

#### OPERATION OF LABOR MARKETS

The second assumption relates to full employment and the operation of labor markets. Even if the factors of production considered can move and be potentially employed or utilized in different activities, there may be different scenarios ranging from full employment to diverse levels of unemployment (in the case of capital,  $K$ , this would be reflected in a low level of utilization of the installed capacity, a statistical indicator that is usually calculated in developed countries but less so in developing countries).

Models with full employment usually follow what has been called the neoclassical approach: a production function is assumed to exist where the production of  $Z$  depends on the use of labor and capital, such as

$$Z = f(L, K).$$

From that production function it can be postulated that there exists a marginal product of each factor (that is, by how much  $Z$  increases when a unit of one factor is added, while holding the other factor fixed)<sup>21</sup> and that each factor is paid the value of that marginal product.<sup>22</sup>

The equation of labor demand ( $L_d$ ) is derived from the production function and usually takes the following form:

20 See, for instance, Fernandez de Cordoba et al. (2006) for a general discussion of adjustment and transition costs in trade liberalization episodes.

21 In mathematical terms, if the function can take derivatives, then the marginal return of one factor would be the derivative of that function with respect to that factor alone.

22 Under certain assumptions about the mathematical properties of the function, the value of each marginal product exhausts the value of the product.

$$L_d = L_1(w/P_z; K_{\text{fixed}}, Z).$$

This equation indicates that the demand for labor depends on the real wage ( $w/P_z$ )—that is, the nominal wage ( $w$ ) deflated by the price ( $P_z$ ) of the product produced. It also depends on the level of capital  $K$  utilized at that point in time and some indicator of the overall scale of production (in this case  $Z$ ).

Labor supply ( $L_s$ ) can be specified as a function of the real wage ( $w/P_q$ ),<sup>23</sup> or it can simply be assumed that all people want and need to work and, therefore, there is a fixed amount of labor available to be hired (within the period considered, but it may grow from period to period). To simplify, we take

$$L_s = L_{\text{fixed}}.$$

If we assume equilibrium in the labor market, we can write

$$L_d = L_1(w/P_z; K_{\text{fixed}}, Z) = L_s = L_{\text{fixed}}.$$

This implies that everyone is employed and that wages adjust to equilibrate the market. This is what has been called the classical closure of the labor market, as opposed to a Keynesian closure. In a Keynesian closure, it is assumed that for different reasons related to the institutional aspects of the labor market, either the nominal wage or the real wage is fixed, at least for a relevant range of values. In that case, the equation above is dropped and can be replaced by another equation that may fix the nominal wage ( $w$ ) or the real wage ( $w/P_q$ ; here we use the price of the good  $Q$  utilized in the economy). The fixity of the nominal or the real wage may reflect different assumptions about how labor contracts are negotiated and renewed and about the relative bargaining power of labor and capital. Then, the fixed nominal or real wage is substituted in the demand function for labor ( $L_d$ ), which now determines the level of employment  $L$ , with the possibility that there may be unemployment (that is the demand of labor  $L_d$  may be lower than the supply  $L_s$ ).

Other theories of income distribution may define the price of a product as resulting from a certain percentage markup ( $mk$ ) over costs (say 10 percent) defined by firms, such as

$$P_z = (1 + mk) * (\text{production costs}).$$

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<sup>23</sup> The deflator utilized in the labor supply function is the consumption price ( $P_q$ ) rather than the production price ( $P_z$ ), which is utilized as deflator in the labor demand function.

If production costs are basically labor and the price of the product is defined by demand and supply, then there may be an inverse relationship between the profit of the firms (resulting from the markup,  $mk$ ) and the wage paid to workers. The theory based on the markup can be rationalized by the presence of monopoly power by the firms or by other theories, such as how firms generate cash flows for their operations. This markup can also vary with the business cycle, with changes in the degree of monopoly power, or other circumstances (Taylor 2004). Part of this type of model will highlight power relations between workers and owners of capital as the crucial determinants of wages and profits, rather than market or technical conditions (as in the neo-classical framework). Also, in this specification the level of aggregate demand matters to achieve full employment.

In summary, labor markets may not lead to full employment for different reasons that, depending on different theories, range from microeconomic failures and institutional restrictions to lack of aggregate demand.

### **Implications for Adjustments in Agricultural and Food Production**

This book simply notes different theories or opinions. The previous paragraphs discussed different changes in assumptions to make the HOS model more realistic: the introduction of nontraded goods with different elasticities of utilization and transformation; the possibility that some factors of production are specific to certain activities or sectors; and whether wages and profits are defined by neoclassical or non-neoclassical theories leading to unemployment of labor (and low capacity utilization of capital). Once the simpler world of the HOS model is transcended, the task of identifying the impact of policies on factor allocation and factor returns becomes an empirical issue beyond simple generalizations. Those are very relevant policy issues, but they require numerical models and econometric techniques beyond what can be discussed in these guidelines. Furthermore, those empirical applications will still utilize some of the different assumptions mentioned, with potentially very different macroeconomic outcomes when analyzing specific policies.

For instance, Diao et al. (2005) argued that in economywide models that assume full employment in developing countries (as most of the large-scale simulations of trade policy do), agricultural production can expand only by taking labor from nonagricultural activities; therefore, positive multiplier effects on the rest of the economy from an expanded agricultural sector are assumed away. They analyze different changes in global agricultural policies in developed and developing countries in a model in which, following a long tradition in development analysis (such as Lewis 1954, 1955), there is unemployment in labor



markets. In that specification, expanded agricultural incomes lead to increased demand for nonagricultural products and to more employment and production in nonagricultural activities, with further rounds of expansionary effects for the economy as a whole. The overall economic expansion is clearly larger than with a full employment specification, even if the simulations are run with fixed land and capital, which limits the multiplier effects.

Another issue, as mentioned before, is how mobile factors are. Previously the issue of specific factors was exemplified with land, which has limited possibilities of being transferred to other productions, even within the agricultural sector. But also farm labor (family or hired) may not be very mobile across different activities, at least during the short to medium term. Therefore external shocks or policy changes that affect small farmers and rural workers may not be simply accommodated by labor moving to other activities, as it is assumed in many trade models, and there may be substantial transition costs for those involved. Very negative shocks may even compromise their livelihood strategies on a permanent basis if, for example, small farmers have to sell livestock or other productive assets or take children out of school.

The analysis of adjustments in factor markets related to agricultural and food production needs to be based on a realistic consideration of the levels of unemployment and the important limitations in labor mobility across activities in many developing countries.

### **Investment, Savings, and Asset Markets**

It was already discussed in Chapter 5 that the short- to medium-term financial and macroeconomic programming for developing economies is done using flow accounting identities, trying to ensure *intratemporal* consistency—that is, the accounting identities hold for the time period considered (say one year). This is the accounting framework for what Hicks (1939) called temporary general equilibrium: every period (in this example, one year), economic agents make their production, employment, consumption, savings, investment, and related decisions (probably looking at the past and present information and forming expectations of the future; Grandmont 2006).

Besides the balancing requirements imposed by the flow equilibrium, there are also balance-sheet accounting constraints that apply to the period considered, imposing what has been called adding up constraints on the different components of individual, sectoral, and national wealth (money, loans, deposits, bonds, and equity shares on productive capital) (Brainard and Tobin 1968; Tobin 1969; and Bourguignon, Branson, and de Melo 1989). But the balance-sheet accounts are also the link to intertemporal issues (that is, they take place over several

years) such as growth and investment (how capital is accumulated) and solvency of the public and private sector (related to how other assets and liabilities evolve). The variables in the balance sheet define the time evolution of the economy: variables at the end of period “ $t$ ” are the starting point for the next temporary equilibrium at “ $t + 1$ ,” when macroeconomic variables will have to satisfy again the accounting constraints on flow and stocks and so on. Thus the economy evolves through a sequence of temporary equilibriums (Hicks 1939 and Grandmont 2006).

The proximate causes for economic growth are factor accumulation (basically capital, depending on savings and investment, and labor, depending on demographics and human capital accumulation) and productivity (a combination of available technologies and the efficient use of them). Therefore, some theory is needed for how physical capital, population and human capital, and technology evolve. What follows concentrates on physical capital and financial assets.<sup>24</sup>

### Savings and Investment

In short-term macroeconomic analysis, the stock of capital is considered fixed at time “ $t$ ” (although it can change in  $t_1$ ,  $t_2$ , and so on). Therefore, in the short term,  $K$  is exogenously fixed at the level of the end of the previous period  $K(t - 1)$ .

However, over time the accumulation of capital evolves as

$$K_t = I_p + I_g + K(t - 1),$$

where  $I_p$  and  $I_g$  represent, as before, gross<sup>25</sup> total investment in real terms from the private and public sectors.<sup>26</sup>

Chapter 6 showed how to calculate the Savings and Investment Equation 2:

$$[S_p' - (P_q * I_p)] + [(S_g' - (P_q * I_g))] = -S_{rw}.$$

It shows the balance of savings and investment for the private sector  $[(S_p' - (P_q * I_p))]$ , for the public sector  $[(S_g' - (P_q * I_g))]$ , and the presence of savings from the rest of the world  $(-S_{rw})$ . This equation was the result of combining the equation of national product and income (Equation A), the

24 See Aghion and Howitt (1998) for endogenous technological change. Regarding population issues, several theories exist about fertility and accumulation of human capital (see, for instance, Razin and Sadka 1995).

25 It is gross because it includes the amount of investment needed to replace the capital lost through depreciation.

26 To simplify, we assume that both types of investments accumulate into a single type of capital,  $K$ .

balance-of-payment account (Equation D), and the government account (Equation B). The equation can be also written as

$$Sp' + Sg' + Srw = (Pq * Ip) + (Pq * Ig).$$

This indicates that we need domestic savings from the private sector ( $Sp'$ ) and the public sector ( $Sg'$ ), as well as savings from the rest of the world ( $-Srw$ ),<sup>27</sup> to finance public and private investments  $[(Pq * Ig) + (Pq * Ip)]$ .

If we assume that  $Ig$  and  $Sg'$  are policy variables, then we need to understand the saving and consumption and investment decisions of the private sector. We leave for later the analysis of the transactions with the rest of the world.

### SAVING AND CONSUMPTION

Macroeconomic models usually include an equation that determines consumption ( $C$ ). The simplest specification is the Keynesian one, in which consumption depends on the total disposable income of the private sector after taxes ( $Ydisp$ ). In Chapter 6, we used the following expression to define  $Sp'$  when deriving the Savings and Investment Equation 2:

$$\{[(GDP + NTrwp + (INTR * B) + (INTR * DCg) + ST) - (Tind + Tm + TYp + TYb) - (R * FCp)] - (Pq * C)\} - (Pq * Ip),$$

where, as before,  $(GDP + NTrwp + (INTR * B) + (INTR * DCg) + ST)$  is total private income (including the monetary/banking sector), while  $(Tind + Tm + TYp + TYb)$  represents all taxes paid and  $(R * FCp)$  is the payment of the external debt by the private sector. Let's call disposable income after taxes ( $Ydisp$ ) to the following expression:

$$Ydisp = [(GDP + NTrwp + (INTR * B) + (INTR * DCg) + ST) - (Tind + Tm + TYp + TYb) - (R * FCp)].$$

Previously in Chapter 6, the whole expression  $\{[(GDP + NTrwp + (INTR * B) + (INTR * DCg) + ST) - (Tind + Tm + TYp + TYb) - (R * FCp)] - (Pq * C)\}$  was called  $Sp'$ . Therefore,

$$Ydisp - (Pq * C) = Sp'$$

or

$$Ydisp = (Pq * C) + Sp'$$

<sup>27</sup> If the country is a net lender instead of a net borrower, it would be contributing savings to the rest of the world.

In real terms, deflated by  $P_q$ , we have

$$Y_{\text{disp}}/P_q = C + (S_p'/P_q)$$

or

$$Y_{\text{disp}}(r) = C + S_p'(r).$$

The disposable private income after taxes in real terms ( $Y_{\text{disp}}(r)$ ) can be allocated to real consumption ( $C$ ) or real savings ( $S_p'(r)$ ).

In its simple form, we can postulate a constant marginal propensity to consume (call it  $c$ , which here will be considered an exogenous parameter with values between 0 and 1). Therefore,

$$C = c * Y_{\text{disp}}(r)$$

and

$$S_p(r) = (1 - c) * Y_{\text{disp}}(r).$$

More sophisticated consumption functions consider not only current disposable income but also expectations of future labor income (the permanent income model of Friedman 1957), financial wealth and interest rates (the life-cycle model of Modigliani and Brumberg 1954 and Ando and Modigliani 1963), volatility in income and wealth, and credit or liquidity constraints (Carroll 2001). A general but theoretically not very precise way to express consumption ( $C$ ) as a function (represented by  $F[\dots]$ ) of different variables is as follows:

$$C = F[Y_{\text{disp}}(r); \text{expected } Y_{\text{disp}}(r); \text{real financial wealth; the interest rate (INTR}^{28} \text{ in the previous equation); some indicator of uncertainty or volatility; and some indicator of liquidity or credit constraints}].$$

An increase in any of the first three variables is expected to lead to more consumption; increases in INTR and uncertainty reduce consumption; and liquidity/credit constraints mean that expected/future variables would have little influence on current consumption, which would then depend basically on current  $Y_{\text{disp}}(r)$  and wealth. Some specifications also differentiate consumption/savings depending on the type of income (whether it comes from salaries or from profits) or social classes (workers and capitalists) (Taylor 2004). In empirical applications, consumption functions that assume that a

28 We assume that the interest rates on domestic debt (INTR) and on external debt ( $R$ ) are related through the arbitrage conditions discussed later, and therefore we do not need to consider both in the equation.

percentage of the consumers are credit constrained (which may also be interpreted as workers living from their salaries and unable to borrow to smooth consumption between the periods considered) reflect better the effective evolution of that variable.

If more complex consumption functions are considered, then additional equations and definitions will be needed for the added variables, including the treatment of expectations. The discussion of these topics would take us beyond the scope of this book.

### INVESTMENT

It has already been mentioned that  $I_g$  is assumed here to be a policy variable defined by the government. Then what is left to be considered is  $I_p$ .

As in the case of consumption, there are different theories, some more related to current variables and others involving expectations of future ones. A representation with a generic functional form ( $F[\dots]$  as before) that lumps together several investment theories (not all valid at the same time) is as follows:

$$I_p = F[\text{GDP growth; INTR; } K(t-1) \text{ and the marginal product of capital, MPK;}^{29} \text{ the market price of a unit of capital (P}_k\text{) with respect to the price of product (P}_z\text{); depreciation rate (depr); the rate of taxes/subsidies (t/s); adjustment costs; uncertainty/volatility; credit/liquidity constraints; "animal spirits"}].$$

Explaining  $I_p$  in terms of GDP growth alone is called the accelerator theory of investment. The terms INTR,  $K(t-1)$ , MPK,  $P_k$ ,  $P_z$ , depr, and  $t/s$  appear in more complex theories of investment.

The optimizing conditions for a firm in competitive markets within a single period require that the value generated by an additional unit of capital must be equal to the cost of that unit of capital. The value generated by an additional unit of capital is ( $P_z * \text{MPK}$ )—that is, the price of the product ( $P_z$ ) multiplied by the quantity of product generated by an additional unit of capital (MPK). The cost of that unit of capital includes the market price of a unit of capital ( $P_k$ ) plus the financial costs (INTR), the depreciation rate plus taxes or minus subsidies, and minus the appreciation of the capital used (if there are capital gains, these should be discounted from the financial costs):

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<sup>29</sup> This is assuming that MPK can be calculated from the production function discussed above.

$$P_z * MPK = P_k * [1 + (\text{INTR} + \text{depr} + \tau/s - \text{appreciation of K})].^{30}$$

At the optimal level of  $K$ , the equality holds. But if the LHS is greater than the RHS, then the level of  $K$  is lower than optimal and the firm will want to increase its  $K$  by investing until such optimal level is reached. However, the increase from the current level of  $K$  to the optimal one ( $K_{opt}$ ) cannot usually happen in just one period because of adjustment costs. In that case, the investment equation is usually written as follows, where the coefficient labeled “Adjustment factor” regulates the speed of adjustment from current to optimal  $K$ :

$$I_p = \text{Adjustment factor} * (K_{opt} - K).$$

If instead of considering one period (year), the returns to capital in future years are also considered, then the equation takes the form of what has been called the Tobin- $q$  investment theory (Brainard and Tobin 1968; Tobin 1969): the present value of the current and expected future flows of net capital returns per unit of capital is compared to the cost of installing an additional unit of capital stock.<sup>31</sup> Again, if the former is larger than the latter, the firm will invest.

As in the consumption function, uncertainty and volatility in returns and costs (which may result from volatile economic policies related to variables such as, for example, exchange rates and taxes) reduce the desire to invest. Liquidity and credit constraints would also limit investment to the annual free cash flow of the firm.

Finally, Keynes coined the phrase “animal spirits” to refer to exogenous changes in confidence and mood by economic agents that may lead them to modify their investment demand even when the real interest rate, other crucial determinants of investment, or more generally the current state of the economy have not changed. In other words, the Keynesian appeal to “animal spirits” would largely separate investment demand ( $I_p$ ) from most of the fundamental causes discussed in the generic equation, even becoming an exogenous variable.

30 This expression assumes that the variables have been expressed in the proper units: for instance, if the interest rate is 3 percent, INT has been expressed as 0.03; the same applies to the other variables. Therefore, the cost of a unit of capital is its price,  $P_k$ , multiplied by a markup with the costs (or benefits, in the case of capital appreciation) associated with that unit of capital.

31 The concept of present value addresses the issue that the value for an economic agent of 1 dollar now is not the same as 1 dollar in the future. These future values have to be adjusted by some coefficient to make them equivalent to 1 dollar now. In the case of the equation discussed, the future flows of revenues and costs from the investment must be adjusted to the present value so they can be compared in equivalent monetary units.

## Adjustments in Asset Markets

### General Considerations

Another dynamic element is the evolution of various financial assets and liabilities, as indicated by the equations of the government sector (Equation B), of the monetary sector (Equation C), and the balance of payments (Equation D). The equations are repeated here:

$$\begin{aligned} \text{Equation B: } & [(P_q * G) + (P_q * I_g) + (INTR * B) + (INTR * DC_g) \\ & + (R * FC_g) + ST] - (T_{ind} + T_m + T_{Yp} + T_{Yb} + NTr_{wg} + DEPR_g) \\ & = dB + (dDC_g - dBM_g) + dFC_g. \end{aligned}$$

$$\begin{aligned} \text{Equation C: } & dONRA + dNFA_b + dDC_p + dDC_g = dBM_p + dBM_g \\ & + S_b. \end{aligned}$$

$$\begin{aligned} \text{Equation D: } & (P_x * EX) - (P_{im} * IM) - (R * FC_p) - (R * FC_g) + \\ & NTr_{wp} + NTr_{wg} + (dFC_p - dNFA_b) + dFC_g = dONRA. \end{aligned}$$

Recalling that the symbol “d” means change from  $t - 1$  to  $t$ , the equations define how different assets and liabilities evolve. The government equation defines how the public sector, in its desire to finance the fiscal deficit (or allocate the fiscal surplus), affects the evolution of the supply of government bonds  $B(t) - B(t - 1)$ , the demand of banking credit by the government  $DC_g(t) - DC_g(t - 1)$ , the demand of broad money by the government  $BM_g(t) - BM_g(t - 1)$ , and the demand of external credit  $FC_g(t) - FC_g(t - 1)$ .

The monetary equation shows the evolution of the demand of foreign assets by the Central Bank  $ONRA(t) - ONRA(t - 1)$  and by other banks  $NFA_b(t) - NFA_b(t - 1)$ , the supply of credit from the banking sector to the private sector  $DC_p(t) - DC_p(t - 1)$  and to the public sector  $DC_g(t) - DC_g(t - 1)$ , and the evolution of the supply of broad money held by the private sector  $BM_p(t) - BM_p(t - 1)$  and by the government  $BM_g(t) - BM_g(t - 1)$ .

Finally, the balance-of-payment equation shows the evolution of the supply of foreign credit to the private sector  $FC_p(t) - FC_p(t - 1)$  and to the government  $FC_g(t) - FC_g(t - 1)$ , and of foreign assets to the central bank  $ONRA(t) - ONRA(t - 1)$  and other banks  $NFA_b(t) - NFA_b(t - 1)$ .

These equations link the flows to the stocks of financial assets. In a properly specified general equilibrium model, there must be supply and demand equations for the different components of national wealth (money, loans, deposits, bonds, and equity shares on productive capital), which must fulfill an adding-up constraint that simply says that, for individuals, sectors, and for the country as a whole, the sum of all components of their respective wealth must be equal to the total wealth at the level considered, from individuals to

the nation (Brainard and Tobin 1968; Tobin 1969; Bourguignon, Branson, and de Melo 1989).

Each of the three equations implies modifications in the stock of a specific financial asset that, when interacting with their demand, can produce changes in key macroeconomic variables. But these effects are, in several cases, only the first round of macroeconomic adjustments that can lead to additional modifications in the levels of production, saving, and investment through their impact on the current account of the balance of payments.

Some of these effects may occur not only because the supply and demand of financial assets should be balanced in a moment in time but also because there are intertemporal balances that must be maintained. For instance, economic agents, who not only look at the present but also try to anticipate the future, may forecast solvency problems in coming years, which may happen at the fiscal level (that is, the violation of what has been called the intertemporal budget constraint of the government), at the level of the sustainability of the external debt for the country as a whole, or on both accounts.

In those cases, agents would react by reducing or even stopping their acquisition of public debt (both domestic and external) if the problem is one of fiscal solvency; and/or acquisition of external debt (both public and private) if there is a problem of external solvency. In both cases, the reaction of economic agents will have negative repercussions for current interest rates, capital flight, and inflationary expectations (the latter because, in the case of fiscal problems, economic agents may anticipate that the government will resort to printing money to cover the borrowing needs).

### **Fiscal Sustainability**

A useful approach in fiscal analysis is to consider the level of the primary deficit<sup>32</sup> that stabilizes total debt as percentage of the GDP. Of course, it is not the same to stabilize the debt/GDP at 40 percent as at 90 percent or higher (Reinhart and Rogoff 2010, who suggest a sharp decrease in growth above a debt/GDP of 90 percent or more, and the debate with Herndon, Ash, and Pollin 2013, who find errors in those calculations). Although it is debated whether there is an exact number at which the stronger negative impact of debt emerges, even the critics of the existence of a clear threshold find that average annual growth is higher with lower levels of debt to GDP. For instance, Herndon, Ash, and Pollin (2013) estimate that average growth

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32 Primary fiscal deficit refers to the public sector deficit excluding the payment of interests on the debt (recall the previous discussion on data definitions in Chapter 4).



is 4.2 percent in countries where debt/GDP is below 30 percent but drops to 2.4 percent with the ratio between 90 and 120 percent and 1.6 percent when the ratio goes above 120 percent.

Acknowledging that the level at which a debt/GDP ratio stabilizes also matters, the mere fact that such a ratio stops growing in a country, particularly in forward projections, means that the probability of debt crises in that country is not increasing (other things being equal). A simple formula calculates the level of primary surplus needed to stabilize public debt as a percentage of the GDP. Simplifying the government public account, we have

$$G1 + (\text{INTR1} * \text{Debt}) - \text{TT} = \text{dDebt},$$

where  $G1$  is all government expenditures,<sup>33</sup>  $\text{TT}$  is all taxes and revenues, and  $\text{INTR1}$  is the interest rate on Debt (both domestic and external). If we divide both sides of the equation by Debt (which does not change the equality), we have

$$[(G1 - \text{TT})/\text{Debt}] + \text{INTR1} = \text{dDebt}/\text{Debt},$$

where  $(G1 - \text{TT})$  is the primary deficit or surplus. If we further subtract the rate of growth of real GDP (call it “ $g$ ”) from both sides, we have

$$[(G1 - \text{TT})/\text{Debt}] + \text{INTR1} - g = (\text{dDebt}/\text{Debt}) - g,$$

where  $\text{dDebt}/\text{Debt}$  is the rate of growth of debt. To stabilize nominal Debt as a fraction of the nominal GDP, both variables must be growing at the same rate: that is,  $\text{dDebt}/\text{Debt} = g$ , which implies that

$$(\text{dDebt}/\text{Debt}) - g = 0,$$

and therefore

$$[(G1 - \text{TT})/\text{Debt}] + \text{INTR1} - g = 0.$$

Moving  $[(G1 - \text{TT})/\text{Debt}]$  to the right-hand side (which changes the sign of the variables) and multiplying both sides by Debt/GDP, we have

$$(\text{Debt}/\text{GDP}) * (\text{INTR1} - g) = (\text{TT} - G1)/\text{GDP}.^{34}$$

This equation can be utilized to calculate the primary surplus needed to stabilize the ratio Debt/GDP. For example, if the current level of Debt/GDP

33  $G1$  is total public expenditures in nominal terms:  $Pq * (G + Ig)$ .

34 A similar equation can be derived to define the sustainability of the external accounts: that is, what would be the needed level of the current account of the BOP (without interest) to stabilize external debt as a percentage of GDP.

is 60 percent, the interest rate is 5 percent, and the economy is growing at 3 percent per year in nominal terms, then the primary surplus needed to stabilize the Debt/GDP ratio is 1.2 percent (note that the numbers in the calculation are presented as ratios and not in percentages; they must be multiplied by 100 to get the percentages):

$$0.6 * (0.05 - 0.03) = 0.012.$$

If the country in this example is running a primary surplus that is less (more) than 1.2 percent, the debt will be growing (decreasing) as a percentage of the GDP.

The primary surplus needed is affected not only by the starting value of the debt/GDP ratio (the larger the ratio, the larger the primary surplus needed) but also by the interest rate (the larger the rate, the larger the surplus required) and by the growth rate (the faster the growth, the lower the primary surplus).<sup>35</sup> In fact, if a country is growing faster than the interest rate (when the expression  $\text{INTR1} - g$  is negative), then the country can run a primary deficit and still maintain or reduce the debt/GDP ratio.

This is a static equation; the relevant question about the sustainability of a fiscal position must consider future expected developments. There are different approaches to determining the odds of a country experiencing a fiscal crisis and even defaulting on the debt.

For instance, work by the IMF on the topic of fiscal vulnerability and fiscal stress (IMF 2012a; Baldacci, McHugh, and Petrova 2011) starts from a framework that identifies three groups of issues (Cottarelli 2011): (1) current level and baseline projections of key fiscal variables; (2) shocks around this baseline (that may arise because of macroeconomic or fiscal policy changes or the materialization of contingent liabilities); and (3) other factors, including country-specific nonfiscal variables (such as significant current account imbalances and high private debt levels) and/or changes in global market sentiment that could trigger a crisis even though they do not affect fiscal aggregates directly (Baldacci, McHugh, and Petrova 2011).

The fiscal issues relate to the variables mentioned in point 1. Baldacci, McHugh, and Petrova (2011) suggest that the focus should be on the variables shown in Table 7.1, which would “provide early warning signals about rollover difficulties, thereby giving policymakers the opportunity to adjust policies

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35 If the deflator to calculate the real interest rate and real GDP growth is the same, then the argument in the text applies as well to these real variables. If the deflators differ, some additional (but not necessarily very large) adjustments are needed when using the equations in real terms.

before the accumulation of fiscal vulnerabilities leads to extreme fiscal stress events.” The analysis can be based on the historical evolution of those variables, but Baldacci, McHugh, and Petrova also estimate thresholds for these indicators beyond which they consider a fiscal crisis to be more likely.

The first block of variables allows for the calculation of the primary surplus that stabilizes debt as a percentage of GDP. The primary surplus is cyclically adjusted when the primary balance is modified by considering the effect of temporary factors, such as the phase of the cycle in the economy and one-off factors. For instance, if the economy is growing faster than the historical trend, a small primary deficit in that context may reflect only the unusual growth behavior and not a better underlying fiscal position. The cyclically adjusted balance takes this into account. The second dimension includes factors that affect long-term fiscal trends such as demographics and retirement and healthcare spending. The third block of fiscal factors refers to issues that may affect asset and liability management of public debt and that may lead to fiscal crises even when the variables in the other blocks are not posing problems. These include issues such as the sheer size of the financing needs and whether much of the debt is short term, denominated in foreign currencies, or held by nonresidents. It also includes the weighted average maturity of general government debt, expressed in years, and the volume of total (public and private) short-term external debt (which shows the overall need for foreign currency to pay the rest of the world).

### **Adjustments in Exchange Rates**

As mentioned several times, the exchange rate (ER) is one of the key macro prices (if not the key macro price) in the economy, particularly in developing countries. It plays a dual role in the nominal and real aspects of the economy. That dual role of the exchange rate is reflected in the two approaches to exchange rate policy that have been utilized in developing countries. The real exchange rate approach emphasizes the influence of the exchange rate on production and trade (Balassa 1977a, 1977b, and 1985). The nominal anchor approach highlights the role of the exchange rate in the inflationary process and its relationship with interest rates, portfolio balances, capital flows, and

**TABLE 7.1** Indicators of fiscal sustainability

Indicator	What the indicator measures
<b>Basic fiscal variables</b>	
$r - g$ (ten-year average)	Indicates the effect on fiscal solvency of the interest rate ( $r$ ) minus the growth rate ( $g$ ) (also called the interest rate growth differential)
General government gross/net debt	Debt burden
Cyclically adjusted primary balance	Corrects overall balance for cyclical and one-off factors
<b>Long-term fiscal trends</b>	
Total fertility rate	Indicates the population aging momentum
Old-age dependency ratio projections	Measures future burden of population aging
Long-term projections of the change in public pension expenditures	Measures projected budget pressures from pension expenditures
Long-term projections of the change in public health expenditures	Measures projected budget pressures from health
<b>Asset and liability management</b>	
Current gross financing need	Measures the government's rollover and new borrowing requirement
Share of short-term debt as a ratio of total debt	Indicates vulnerability to rollover risk
Debt denominated in foreign currencies	Indicates exposure to foreign exchange risk; applies only to emerging market economies; expressed in percent of total debt
Debt held by nonresidents as a proportion of total debt	An indicator of global market risk
Weighted average maturity of general government debt	Predicts the vulnerability changes in market sentiment; expressed as years
Short-term external debt	Provides information on the likely claim on foreign currency resources available to meet short-term foreign debt servicing

**Source:** Baldacci, McHugh, and Petrova (2011).

**Note:** In the table, " $r$ " is the real interest rate and " $g$ " is the growth rate of real GDP.

asset accumulation.<sup>36</sup> As noted earlier, the exchange rate's dual role has been at the core of many countries' inconsistent economic programs (Corden 1990).<sup>37</sup>

For instance, pursuing a competitive real exchange rate approach without a separate monetary anchor could lead to higher inflation and create macroeconomic problems for the expected production, trade, and employment objectives. On the other hand, using the ER as a nominal anchor to control domestic prices without complementary fiscal and monetary policies could lead to the appreciation of the real ER and create unsustainable trade and current account positions, forcing a devaluation that would then feed into higher inflation and defeat the purpose of using the ER to control inflation. Many of the economic crises experienced by developing countries over the years resulted from failed economic programs that pursued the dual objectives of competitiveness and inflation control with a single policy variable in inconsistent economic programs. In this regard, as previously discussed, it is always important to remember the Tinbergen Rule (Tinbergen 1952), which states that policymakers need to have one instrument for each goal and that, therefore, it would be very difficult for a government to attain two objectives (external competitiveness, as in the real exchange approach, and low inflation, as in the nominal anchor approach) with just one instrument (the ER). A combination of policies is needed to maintain an adequate level in the real ER.

To understand how the exchange rate is determined and, thereby, the ways in which exchange rate policies may operate, we need to look at the supply and demand of foreign currency in flow terms and in stock terms and the potential entry points for related policies.

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36 Dornbusch (1980, 276) closes his classic book on open-economy macroeconomics by noting, "The role of the exchange rate varies in the models we have studied. With given wages and prices, the exchange rate determines relative prices, demand and output. In models with sluggish wages the exchange rate determines the real wage, employment and supply. [In other models] the exchange rate sets the levels of prices, real balances, and real wealth. [In yet other models] the exchange rate affects relative asset yields and absorption, and therefore the intertemporal choices of savings and investment, rather than the allocation of expenditure between domestic and foreign goods. There is no reason to prefer one model to another."

37 This dual role has implications for the political economy of exchange rate adjustments as well. For example, producers of traded goods and services generally prefer a devalued exchange rate (depending on the import content of their products), whereas producers of nontraded ones may benefit from a strong currency. However, the expansion of assets and liabilities in dollars adds, both technically and in terms of political economy, a new complexity to the decision to devalue the domestic currency. Debtors in the domestic currency can be helped by devaluations that increase inflation and reduce the real cost of servicing their debt, but the situation is reversed in dollarized countries, where debtors could have their liabilities denominated in foreign currency (see, for instance, Frieden and Stein 2001).

Starting with flows, the exchange rate plays a role in both the current account (mostly but not only on the trade balance) and the capital account<sup>38</sup> of the balance of payment. This requires considering the whole BOP equation, where there are variables that represent the supply of foreign currency and others that represent the demand of foreign currency. We repeat here the BOP equation but expressed in dollars (dividing the domestic currency version by the exchange rate ER; as before, all variables expressed in dollars have the sign \$ at the end):

$$(Pex\$ * EX) - (Pim\$ * IM) - (R * FCp\$) - (R * FCg\$) + NTrwp\$ + NTrwg\$ + dFCp\$ + dFCg\$ = dONRA\$ + dNFAB\$.$$

The equation shows the supply of dollars into the domestic economy, which includes exports ( $Pex\$ * EX$ ), net transfers ( $NTrwp\$$ ,  $NTrwg\$$ ), and capital inflows ( $dFCp\$$ ,  $dFCg\$$ ) (if net transfers and capital flows are positive).<sup>39</sup> On the other hand, the demand of dollars includes imports ( $Pim\$ * IM$ ), interest payments, and other current account transactions ( $R * FCp\$$ ,  $R * FCg\$$ ) (if net transfers were negative and there were capital outflows, then those transactions would be part of the demand for dollars). If the central bank increases the official net foreign assets ( $+dONRA\$$ ) or the rest of the banking system expands its net foreign assets ( $+dNFAB\$$ ), this means that both are buying dollars in the domestic market (demand); if they decrease those reserves ( $-dONRA\$$ ) and net foreign assets ( $-dNFAB\$$ ), they are selling foreign currency (supply).

### The Real Exchange and Trade

In the real exchange rate approach, the focus is on the trade balance ( $Pex\$ * EX) - (Pim\$ * IM)$ , and the rest of the variables may be considered exogenous ( $NTrwp\$$ ,  $NTrwg\$$ ),<sup>40</sup> inoperative (such as  $dFCp\$$  and  $dNFAB$ , because of capital controls), or a policy variable (for example,  $ONRA\$$  may be defined by a policy rule such as that the central bank must have “x” months of yearly imports or “y” times annual debt payments).

38 Remember that the new international methodologies for national accounts call this the financial account, reserving capital account for a specific type of external transactions. We keep the old names here, which continue to be more widely utilized than the new ones.

39 If the private sector is dumping the domestic currency and demanding dollars, this may be represented as an outflow of capital (that is, a negative  $dFCp\$$ ).

40  $NTrwp\$$  depend on variables such as remittances (which are affected by migration to and employment in the rest of the world), and  $NTrwg\$$  are related to foreign aid grants (which depend on the political decisions of foreign governments) and other variables.

Under this scheme, considering the equations for exports and imports represented as generic functions  $F1[...]$  and  $F2[...]$ ,

$$EX = F1[(ER * Pex\$)/Pd; \text{real world GDP or another similar variable}]$$

$$IM = F2[(ER * Pim\$)/Pd; \text{real domestic absorption}(A(r)), \text{ or some other similar variable}].$$

$ER * Pex\$$  is the domestic price of exports, compared to the domestic price of the goods and services ( $Pd$ );  $ER * Pim\$$  is the domestic price of imports (if no other trade measures are imposed) compared to  $Pd$ . We also have real world GDP, or another indicator that shows the level of economic activity in the rest of the world, and similarly real domestic absorption  $A(r)$  or income for the level of economic demand in the country. This equation in a more complete model will define the exchange rate that is compatible with the level of the other variables considered exogenous or policy determined. We turn to the implications on other macroeconomic balances.

### **Exchange Rate and Monetary Aspects: Without and with Dollarization**

As discussed in the “Monetary Balances” section in Chapter 6, the BOP equation has implications for the money supply and demand. If  $dONRA\$$  and  $dNFAb\$$  are expanding, that means that the central bank and the other banks are buying foreign currency and selling domestic currency (that is, expanding money supply). At the same time, a devaluation ( $+dER$ ) will affect other components of the balance in the monetary market:

$$BM_{supply} = BM_{demand} = (1/v) * P_{gdp} * GDP_r.$$

A devaluation ( $+dER$ ) could affect not only the money supply but also money demand. The final impact of the devaluation on the equilibrium of the monetary market will depend as well on its effects on the general economic activity in the country (indicated by real GDP), domestic prices including the price deflator ( $P_{gdp}$ ), and the desire to hold domestic currency as summarized by the variable “ $v$ ” (which we earlier called velocity of circulation of money; if people do not want to keep the currency, they try to get rid of it and velocity increases).

In a simple scenario, if people do not change their desire to hold domestic currency and the devaluation does not affect real GDP, while at the same time  $P_{gdp}$  (which is a combination of  $Pd$ ,  $Pex$ , and  $Pim$ ) increases, then there will be an increase in money demand. A counterpart of the increase in money

demand by the private sector will be a reduction of absorption,<sup>41</sup> which will reinforce the effect of the devaluation on the trade balance: in the equation

$$IM = F2[(ER * Pim\$)/Pd; \text{real domestic absorption}(A(r)), \text{ or some other similar variable}],$$

imports will be reduced because of the price effect (now they are more expensive) and the decline in absorption ( $A$ ).

However, the devaluation may also have expansionary or contractionary effects on GDP<sub>r</sub>, and those effects may differ in the short and long run (we will return to these issues in Chapter 10 on exchange rates). Furthermore, while with the capital account of the BOP closed and with restrictions in using foreign currency for domestic transactions, a devaluation may affect “ $v$ ” only through inflationary expectations, with open capital accounts and a dollarized economy, the reaction may be faster, with economic agents moving toward the foreign currency considered to be a better store of value. If the demand for domestic money falls because of a decline GDP<sub>r</sub> and/or because people are shifting toward dollars, then the economy may suffer from inflation and further drops in economic activity.

Simply by introducing domestic money, the scenarios for devaluations that were relatively straightforward when only considering the trade balance become more complex. Furthermore, if in the monetary system we consider the fact that foreign currency may be allowed to be deposited in banks and these institutions in turn make domestic loans also in foreign currency, then we need to consider the impact on the banking system of adjustments in the ER (as discussed in Chapters 6, 9, and 10).

Recall that with dollarization, the equation for the monetary/banking system (Equation C) has to distinguish deposits and loans in foreign currency (which assumes that only the private sector utilizes foreign currency for deposits and loans), and it can be written as follows:

$$(ER * ONRA\$) + (ER * NFAb\$) + DCg + DCp(\text{dom}) + (ER * DCp\$) \\ = BMg + BMp(\text{dom}) + (ER * BMp\$) + NWb,$$

where, as before, the symbol \$ indicates a variable in dollars and (dom) is for domestic currency.

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41 Remember that, simplifying, the disposable income after taxes of the private sector ( $Y_{disp}$ ) goes to consumption and investment (both part of absorption) and to holding monetary balances:  $Y_{disp} = Pq * (C + Ip) + BMp$ . For a given  $Y_{disp}$ , if demand for  $BMp$  goes up, then demand for  $Pq * (C + Ip)$  goes down.



Now a devaluation (and the expectation of a devaluation) would directly affect loans in dollars ( $ER * DCp\$$ ) and deposits in dollars ( $ER * BMp\$$ ) with the possibility that firms can go bankrupt, and depositors may want to withdraw their dollar deposits, asking for physical dollars (perhaps to transfer them abroad or to hide them under the mattress). This would require that banks (1) use their own reserves ( $ER * NFAB\$$ ); (2) ask for support from the central bank, which, using its own reserves ( $ER * ONRA\$$ ), might lend foreign currency to the banks to cover the withdrawals (but the central bank may not have enough reserves to counter that run on dollar deposits); or (3) borrow abroad (but in an actual or expected crisis, there will be no willing foreign lenders to the banks).<sup>42</sup> The result would be a banking/financial crisis and a deep economic recession, given the central role of the banks in the payment system (Chapters 6, 9, and 10).

### ER and Asset Markets

Considering other capital flows in the BOP ( $dFCp\$$ ,  $dFCg\$$ , and  $dNFAB\$$ ) further complicates the analysis, including the fact that they also interact with domestic assets/liabilities through the links between internal and external interest rates.

This can be seen with the following (simplified) arbitrage condition for capital flows under perfect mobility of capital when there are no restrictions in the capital account and when domestic and foreign assets are comparable:

$$INTR = R_w + E(dER/ER) + CR.^{43}$$

This equation indicates that INTR, the domestic interest rate for the time period considered in domestic currency financial instruments, is equal to the sum of three terms:  $R_w$  (the world interest rate in financial instruments in foreign currency); the expected (indicated by “E”) devaluation:  $E(dER/ER) = \{Et[ER(t + 1) - ERt]/ERt\}$  (the devaluation, in percentage terms, which at time  $t$  is expected ( $Et$ ) to take place at time  $t + 1$ ); and the country risk,  $CR$  (also expressed in percentage terms).

42 The banking and financial crises in several developing countries in the last decades also showed that international banks from advanced economies would not necessarily supply dollars in support of their subsidiaries operating in developing countries in the middle of such crises.

43 This equation is an approximation. To be an exact arbitrage condition, it would need to include another term showing the interaction between the world interest rate and the expected rate of devaluation. For instance, if the world interest rate for period  $t$  to  $t + 1$  is 10 percent and the expected devaluation in the same period is 20 percent, then the domestic interest rate that makes an investor indifferent (abstracting from country risk) between investing in that country or in world markets is  $0.1 + 0.2 + (0.1 \text{ multiplied by } 0.2) = 0.32$ , or 32 percent.

If  $INTR$  is greater than the expression  $[Rw + E(dER/ER) + CR]$ , then capital will flow into the country (because the return more than compensates for the expected devaluation of the  $ER$  and the country risk); conversely, if  $INTR$  is smaller than  $Rw + E(dER/ER) + CR$ , capital will flow out of that country. In the absence of capital controls and for relatively homogeneous financial instruments, these capital flows will tend to ensure that the equation holds.

Without controls on the access and use of dollars (that is, no controls in current and capital accounts of the BOP), then we have the impossible trinity that was mentioned before in the monetary section, linking monetary aspects, capital flows, and the exchange rate. This impossibility principle implies that if a government has decided to eliminate restrictions in current and capital account transactions (first policy choice), it can have only one independent policy decision between the level of the exchange rate (second policy choice) and a separate monetary policy (third policy choice) at the same time.

The following argument shows why this is the case. If we assume the country is a small player in financial markets, it cannot influence  $Rw$ , which is then exogenous;  $ER_t$  is predetermined (it is already known at  $t$ ) and  $CR$  is also exogenously given at  $t$ .<sup>44</sup> Therefore, with free capital flows, economic authorities cannot define  $INTR$  (monetary policy) independently from (the expectations of the)  $ER(t + 1)$  (exchange rate policy). Capital will flow in or out (depending on whether  $INTR$  is greater or smaller than the right side of the equation), expanding or contracting the money supply and forcing adjustments in the domestic interest rate ( $INTR$ ) and/or in the exchange rate ( $ER$ ).

If, on the other hand, a country establishes controls on capital flows and, more generally, on selling and buying dollars for financial reasons, then the equation linking  $INTR$  to  $(Rw + E(dER/Er) + CR)$  does not hold, and the economic authorities would have more freedom to define the level (or pace of devaluation) of the nominal  $ER$  with greater independence from monetary policy. But this freedom is not absolute (given the other factors affecting the supply and demand of dollars), and it comes at a cost related to the potential inefficiencies, rent seeking, and corruption problems that may be generated by such controls. However, in crises and special circumstances, those controls may be needed to reestablish more normal conditions in financial markets.

Without capital controls, banks and the private sector may borrow or lend abroad. As noted in Chapter 6, banks can offer dollar loans ( $ER * DCp\$$ ) by borrowing abroad (changes in their net foreign assets,  $ER * NFAb\$$ ). Then

<sup>44</sup> The country could affect the country risk in the future through policy changes now. At time  $t$ , however, it can be considered as predetermined.

they may be hit by devaluations, as happened in the case of several Asian countries during the 1997–1998 crisis. Also the nonbanking private sector may be borrowing in foreign currency directly (without going through the banking system), as indicated by  $dFCp\$$  (private-sector debt), which may pose its own risks for the economy (even if not intermediated by the banking system).

Going back to the equation  $INTR = R_w + E(dER/Er) + CR$ , capital flows may be driven by factors that may be considered mostly related to internal conditions in developing countries (the domestic interest rate  $INTR$  and expectations of devaluation,  $E(dER/Er)$ ), but they can also be driven by external factors (such as the world interest rate,  $R_w$ ), and by country risk ( $CR$ , which may be a combination of domestic policies and external perceptions). These capital flows dwarf trade flows in size and speed of change. Therefore, the determination of the  $ER$ , in countries with few or no capital controls, would be related to those financial flows rather than trade flows.

The impact of changes in capital flows on the economy depends on various factors. One is the size of the change, which does not require that the flow is reversed but only that changes in level occur. For instance, if an economy is receiving capital flows that are equivalent to 5 percent of the GDP and they stop coming so that they are 0 percent (these have been called “sudden stops” by Calvo, Izquierdo, and Mejía 2004 and 2008), then the economy has to adjust for an equivalent value of 5 percent of the GDP.

A second factor to consider is the change in the real exchange rate needed to adjust to the new situation. Recalling the BOP equation,

$$(Pex\$ * EX) - (Pim\$ * IM) - (R * FCp\$) - (R * FCg\$) + NTrwp\$ + NTrwg\$ + dFCp\$ + dFCg\$ = dONRA\$ + dNFAb\$.$$

we concentrate on the trade balance  $(Pex\$ * EX) - (Pim\$ * IM)$  and private capital flows  $(dFCp\$)$  and take all the rest as zero. If  $dFCp\$$  was 5 percent of the GDP and then went to 0 percent, then the trade balance  $(Pex\$ * EX) - (Pim\$ * IM)$  was negative in 5 percent of the GDP and it has to move to 0 percent (if the other variables are kept at zero, which implies among other things that the government does not want to use reserves to smooth the shock). The adjustment in the  $ER$  needed to expand  $EX$  and reduce  $IM$  so as to move the trade balance to zero will depend on the amount of tradable goods in the economy that are ready to be exported or to substitute imports. The impact on the economy through the banking system will depend on the level of domestic loans (and deposits) in dollars. The larger the proportion of dollarization of the assets and liabilities of the banking system, the larger will be the impact on the banks. Finally, the general impact on the economy will

also depend on the level of private and government external debt ( $FCp\$$  and  $FCg\$$ ) not intermediated by the banking system.

Therefore, sudden stops will be more damaging (1) the larger the original imbalance that is closed (that is, the size of the change in capital flows); (2) the smaller the part of the economy dedicated to tradable goods (which increases the needed adjustment of the ER); (3) the larger the proportion of dollar loans and deposits in the banks (which makes the banking and financial system more likely to suffer a crisis, impairing the functioning of the whole economy); and (4) the larger the rest of dollar-denominated debts, public and private, in the economy (which increases the risk of bankruptcy by firms and defaults by governments) (see Calvo, Izquierdo, and Mejía 2008, who focus on the first three aspects).

In summary, the ER is a variable that affects the way that all four macroeconomic identities adjust in their real and nominal aspects, including the balance of savings and investments and the full set of demand and supply equations for the different assets/liabilities (such as domestic private credit,  $DCp$ ; foreign private credit,  $FCp$ ; domestic government borrowing,  $B$  and  $DCg$ ; foreign government credit,  $FCg$ ; and net foreign assets by banks,  $NFAb$ ) (for a combined macro and CGE model with a detailed determination of the financial side, see Bourguignon, Branson, and de Melo 1989). Even with strict controls on capital and current accounts, which could allow the government to use the ER as a policy instrument, the value determined by the economic authorities may generate imbalances in one or several of the macro accounts. Therefore, the ER defined as a policy instrument could be different from the equilibrium exchange rate, which is the one that balances the real and nominal aspects of the economy, consistent with its medium-term fundamentals and macroeconomic stability.

### **Equilibrium Exchange Rates**

The equilibrium real exchange rate (ERER) has been defined as one that attains both internal equilibrium (meaning that nontradable markets clear in the current period and are expected to do so in the future with a reasonable price stability) and external equilibrium (when current account balances, now and in the future, are compatible with long-run sustainable capital inflows and balance-sheet equilibrium; [Edwards 1989; Isard 2007]). However, as implied by the Tinbergen Rule, that ERER will depend on the rest of the relevant policy interventions (particularly monetary, fiscal, and trade ones). A consequence of this combination of factors is that empirical estimations of ERER vary significantly.

Isard (2007) identifies six different approaches that have been utilized to calculate the ERER: purchasing power parity, purchasing power parity adjusted for productivity effects (the Balassa-Samuelson effect),<sup>45</sup> sustainability of the current account, assessments of the competitiveness of the tradable goods sector, estimates based on a single equation econometrically estimating the equilibrium exchange rate, and assessments based on general equilibrium models. Of the six approaches identified by Isard, the two most utilized are variants of the sustainability of the current account approach and the single equation estimations approach.

The external sustainability approach to the determination of exchange rates (IMF 2006; Isard 2007) considers all the factors that affect the net foreign position of the country as a creditor or a debtor (that is, the country's external assets minus external liabilities). In its simplest form, this approach looks at the total net foreign liabilities (NFL)<sup>46</sup> as a percentage of the GDP and calculates the current account balance that would stabilize the NFL/GDP ratio at a level considered appropriate, using the formula

$$(CA/GDP) = \{(R' - \text{Growth rate}) / (1 + \text{Growth rate})\} * (NFL/GDP),$$

where CA/GDP is the current account as ratio to the GDP and R' is the interest applicable to the net foreign liabilities NFL. This formula includes the expected medium-term growth rate of the economy and the desired ratio of NFL to GDP.<sup>47</sup>

Given some projected values for the interest rate and growth and a desired value for NFL/GDP, the level of CA/GDP needed to stabilize NFL/GDP at the benchmark value can be determined. The estimated value of the CA can then be compared with the current value of the CA, and the devaluation/revaluation of the domestic currency required to move from the current value to the sustainable CA can be approximately calculated. It should be noted that the ER also appears in the valuation of CA and GDP, and therefore the calculation of the equilibrium ER must consider these valuation effects as well.

45 Balassa (1964) and Samuelson (1964) note that if a country increases its productivity in the production of traded goods and services relative to nontraded ones that are larger than those of its trade partners, and if those increases are reflected in domestic prices, then the real exchange rate of that country will appreciate relative to its trade partners. In terms of the SAM, Pd/Pex and Pd/Pim will go up.

46 That is, both public and private net foreign liabilities.

47 As the reader may have noticed, the formula has the same conceptual structure as the one utilized to calculate the primary fiscal balance needed to stabilize public debt as percentage of the GDP.

**TABLE 7.2** ERER determinants for developing countries

*The external terms of trade*, defined as the ratio of the price of a country's exports over the price of its imports. Most African countries mainly export primary commodities, such as oil, lumber, metals, and diamonds, and/or agricultural products, such as coffee and cocoa. The price for these primary commodities is determined in world commodity markets and is subject to significant volatility affecting the terms of trade. An improvement in the terms of trade will positively affect the trade balance and thus cause the ERER to appreciate.

*Productivity relative to foreign trading partners*, proxied by total factor productivity, where available, or relative per capita real GDP. Developments in relative productivity capture Balassa-Samuelson effects. Countries with higher productivity growth in the tradables sector (where such growth tends to concentrate) can sustain an ERER appreciation without losing competitiveness.

*Government consumption as a share of GDP* relative to that of foreign trading partners. An increase in government consumption biased toward nontradables creates higher demand for that type of goods and services (relative to the tradable sector). This greater demand boosts the relative prices of nontradable goods, causing the equilibrium real exchange rate to appreciate. However, if the increase in overall government consumption is biased toward the tradable sector, an increase in spending will cause the ERER to depreciate.

*The severity of trade restrictions*, which may be proxied by variables such as the sum of exports plus imports as a ratio or percentage of GDP. Protection of domestically produced goods via restrictions on cross-border trade (for example, import tariffs and nontariff barriers) leads to higher domestic prices and thus ERER appreciation. Consequently, lifting existing trade restrictions should cause the ERER to depreciate.

*The ratio of investments to GDP* relative to that of foreign trading partners. Investments in low- and middle-income countries have usually high import content and thus a direct negative impact on the trade balance. Because this variable may capture technological progress, its overall impact on the ERER is ambiguous.

*Debt service as a share of exports*. An increase in debt service payments leads the external balance to deteriorate; thus subsequent price adjustments should restore equilibrium. Higher debt service payments should therefore cause the ERER to depreciate.

*Net foreign assets as a share of GDP*, a proxy for the country's net external position. An increase in capital inflows from abroad implies higher demand for domestic currency, thus causing the ERER to appreciate.

*Aid flows as a share of exports*. Aid flows may represent a significant fraction of GDP in low-income countries. An increase in aid flows causes the ERER to appreciate.

*Controls over capital flows*. Similar to tightening restrictions on the movement of goods across borders, easing controls on capital flows could impact the ERER. The direction of this impact depends on (1) how much the real interest rate in the domestic economy differs with those of its foreign trading partners and (2) the country's risk profile.

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**Source:** Chudik and Mongardini (2007).

A related analysis is called the macroeconomic balance approach (IMF 2006), which calculates the difference between the current account balance projected over the medium term at existing exchange rates and an econometrically estimated equilibrium current account balance. As before, the exchange rate adjustment that would move the existing CA to the equilibrium CA over the medium term can be estimated from econometrically estimated responses of the trade balance to the real exchange rate.

The other approach widely used in developing countries is the econometric estimation of a single equation, in which both fundamentals and policy variables may be considered. Table 7.2 from Chudik and Mongardini (2007), who analyze equilibrium exchange rates in SSA, shows some of the main determinants in those estimations.

There are different options for this estimation depending on how the policy variables are treated for the projection of the equilibrium exchange rate and on how the dynamic adjustments generating transitory and long-term effects are modeled (see, for instance, Di Bella, Lewis, and Martin 2007). Presumably, once the EREER has been estimated, it can then be compared with the actual real exchange rate to determine whether there are important deviations (such as significant under- or overvaluation) that requires correction.

## **Other Assumptions and Empirical Issues**

### **Closure Rules**

We have already mentioned that macroeconomics can be thought of as “accounting identities plus opinions.” Some of the opinions relate to how to classify the variables that are part of a model assumed to represent the economy. They can be separated into four main categories:

1. Endogenous variables, which are determined by the interaction of the different equations considered
2. Policy variables, which are defined by the government (including the central bank)
3. Mixed variables, which may be endogenous or policy variables, depending on how the rest of the model is defined
4. Exogenous variables and parameters, which do not fall within the three previous categories

As mentioned in Chapter 6, an important issue in macroeconomic modeling comprises the closure rules: the assumptions about which variables are exogenous and which ones are endogenous, clearly assigning the mixed variables to one or another category.<sup>48</sup>

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<sup>48</sup> It must be remembered that a properly specified macroeconomic model must have the same number of independent equations as endogenous variables and must respect the basic accounting identities (Christ 1991).

In the context of the Savings and Investment Equation 2,

$$[Sp' - (Pq * Ip)] + [(Sg' - Pq) * Ig] = -Srw.$$

This means (1) considering whether there are capital controls or not (and if there are capital controls for the private sector, then at least part of the borrowing/lending implicit in  $-Srw$  will not take place); (2) deciding whether the government deficit/surplus ( $Sg' - Pq * Ig$ ) is a policy target or will adjust endogenously; and (3) whether the investment and savings functions variables respond to fundamentals (such as GDP level and growth, real interest rates, and so on) and they adjust to each other or whether investment is exogenously defined by “animal spirits.” In the latter case, investment is the autonomous variable to which savings adjust; this assumption has been called the Keynesian closure, while considering that savings and investment adjust to each other has been called the neoclassical closure (Robinson 2006).

Other closure rules, some of which have already been mentioned, include the following (Robinson 2006):

- The selection of the “numeraire” that anchors the nominal values (in CGE models it is usually an important price for the economy, such as the GDP deflator; in models with money, then some definition of money supply may act as anchor of nominal values)
- For labor markets, whether wages equilibrate supply and demand at full employment or whether there are some rigidities that lead to unemployment
- For the external accounts, whether the ER is fixed and then external savings ( $Srw$ ) adjust; other alternative closures include the reverse ( $Srw$  fixed and ER adjust) or some combination of both assumptions
- For public-sector accounts, whether real or nominal government expenditures are fixed and taxes adjust; or some combination of adjustments in expenditures and taxes

In dynamic models, rather than the closure rules mentioned, there are certain conditions to which the economy is assumed to converge in what is called the steady state. These are more complex rules, which include assumptions (or targets) about several ratios of assets and liabilities measured as a percentage of the GDP or population, as well as about the rate of technological change and population growth.



### **Empirical Functions, Calibration, and Estimation**

In applied policy analysis, it is necessary to present the consumption, investment, money demand, and other functions in quantitative terms in order to derive the potential impacts on the variables of interest in different settings of the policy instruments and of external events. The specification of those functions in macroeconomic models usually applies econometric techniques, while in multi-sectoral, economywide models (such as the computable general equilibrium approach) calibration techniques are used, where different parameters and elasticities are borrowed from different sources and then applied in the model so as to fulfill all the equations in the base period. Usually, there are not enough time series of data to econometrically estimate CGE-like models, which makes the results sensitive to the parameters and elasticities postulated. Sensitivity analyses will be needed for a policymaker to have some sense of the range of results resulting from different assumptions about key parameters and elasticities.

On the other hand, econometric estimates must be careful about the point made by Lucas (1976), at least regarding policy evaluation with simple macroeconomic equations estimated by econometric methods. He uses the examples of a consumption function, an investment function, and the relation between unemployment and inflation (usually called the Phillips curve; see Chapter 9) to show that the coefficients of the decision rule by economic agents depend, among other things, on the policy rule followed by the government. Therefore, if there is a change in the policy setting, the coefficient should change and the equation cannot be utilized to do policy evaluation under the assumption that the coefficients and elasticities are constant. An implication is that using simple equations that aggregate supply and demand factors (reduced form equations) may not be a valid way of doing policy evaluation. It is necessary to estimate separate equations for demand and supply curves, trying to identify deeper parameters linked to more invariant characteristics, such as perhaps tastes and technology, and separate them from those elements that change with policy announcements. Another approach is to test the stability of the parameters to determine the empirical validity of the Lucas critique. The question is whether the general structure that generates the observable values of the variables changes or not because of changes in the policy regime (or for other reasons). This can be tested (Hendry 1988). If the economy has been operating under some constant policy regime related to key variables and later that regime is modified, then such change would almost certainly show up in the instability of the coefficients (and equations with unstable parameters would then be dismissed). But if there have been changes and still the relevant parameters seem reasonably stable, then, as an empirical matter, the Lucas critique may not apply (Hendry 1989).

## **PART 3**

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# **Macroeconomic Policies**



## FISCAL POLICIES

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This chapter starts with a consideration of fiscal instruments and general fiscal conditions in developing countries. Then it discusses agricultural expenditures and agricultural taxes in two separate sections. Considering their fiscal implications, the chapter closes with four sections dedicated, respectively, to commodity prices and fiscal outcomes, food stabilization stocks, food subsidies, and input subsidies.

### Introduction

Chapter 4 discussed the main data definitions related to macroeconomic variables, including fiscal variables, such as general public expenditures ( $G$ ) and public investments ( $I_g$ ), taxes, and different ways of financing potential deficits, such as borrowing from the nonbanking private sector ( $B$ ), from the banking sector ( $DCg$ ), which leads to money creation, and from the rest of the world ( $FCg$ ).

Fiscal policies encompass a diversity of instruments, as the examples in Table 8.1 show.

Chapters 5, 6, and 7 placed government accounts within the context of the main national balances, which showed that fiscal policies have a variety of macroeconomic effects. They affect aggregate demand, particularly through public expenditures,  $G$  and  $I_g$ , and taxes/subsidies. It has been argued that high levels of government expenditures and overall taxes, as well as persistent deficits, affect growth negatively (Barro and Sala-i-Martin 1995).<sup>1</sup>

Fiscal policies also influence aggregate supply through the additional impact of public investments,  $I_g$ , as an accumulation of public capital, and of other expenditures usually counted in  $G$ , such as those related to human capital or science and technology. Therefore, in addition to the consideration of

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1 But the relation may not be linear: Adam and Bevan (2003) have estimated that there is a threshold effect: growth increases in the medium term if deficits are reduced from higher levels (in absolute value) to about  $-1.5$  percent, but the effect is not clear and may even work in the opposite direction, if a contractionary fiscal policy tries to reduce the deficit further.

the level of fiscal outlays, it is crucial to consider their composition: the structure of expenditures may have different growth effects depending on the percentage of consumption expenditures versus investments in infrastructure or human capital. There is a relatively extensive literature analyzing the impact of public investment (I<sub>g</sub>, as different from total public expenditures) on growth, cost reduction, and increases in productivity; a majority but certainly not all of these studies tend to find positive results (IMF 2004).

**TABLE 8.1** Different levels and instruments of fiscal policies

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1. Design and management of the revenue and tax system
    - 1.1. Tax reform (taxes on income, profits, and returns from property, on sales and consumption, on labor, and on international trade)
    - 1.2. Adjustment and reform of tariffs and utility charges in public services
    - 1.3. Programs to improve the tax administration (better records, computers, staff training)
  2. Programming and execution of general public expenditures
    - 2.1. Design, execution, and control of the budgetary operations
    - 2.2. Investment programming
    - 2.3. Reforms of social security systems, pension, unemployment, poverty safety nets
    - 2.4. Reforms to programs of subsidies and transfers
    - 2.5. Wage and related policies in the public sector
  3. Financing fiscal deficit
    - 3.1. Management of central bank credit
    - 3.2. Management of bank credit
    - 3.3. Management of internal public debt to the nonbank private sector
    - 3.4. Management of external public debt
  4. Reform, streamline, and/or privatization of public enterprises
    - 4.1. Reorganization of economic, financial, accounting, administrative, labor, and operational aspects of public enterprises
    - 4.2. Closure, privatization, and public-private programs for operations and activities of previous public enterprises and services
    - 4.3. Training, relocation, and unemployment insurance for employees of public companies
  5. Institutional reform of the public administration
    - 5.1. Programs to improve the capabilities to design, implement, and evaluate development, macro-economic, social, and other policies, and to maintain properly operating markets for products, factors, and assets
    - 5.2. Programs to improve regulations; deregulation, and debureaucratization programs
    - 5.3. Programs for strengthening/restructuring core activities (education, health, public investments, justice, public order, defense)
    - 5.4. Programs to decentralize public services; revenues and administrative and regulatory authority to the provinces and local governments
- 

**Source:** Author.

The evolution of macro prices (price level and inflation, interest rate, real exchange rate, and, sometimes, wage levels in the economy, in part related to the different ways of financing potential deficits) is affected by fiscal policies as well. For instance, considering that government expenditures tend to have a

larger component of nontraded goods, their expansion may increase the price of those goods, appreciating the real exchange rate and reducing the external competitiveness of the economy.<sup>2</sup>

There are also microeconomic effects of fiscal policies, linked to the specific structure of taxes, subsidies, expenditures, and borrowing. For instance, the same level of overall taxation may have different effects depending on the types of taxes utilized and variations in the treatment of sectors and sources of income for taxable purposes. The same can be argued about subsidies, other expenditures, and public borrowing.

While monetary decisions are basically concentrated in central banks or similar monetary authorities and have a range of quantitative models to guide decisions, fiscal policies tend to emerge from a more decentralized and political process, with a variety of ad-hoc decisions and a multiplicity of microeconomic effects. This tendency has led to the characterization of monetary policy as “science” and fiscal policy as “alchemy” (Leeper 2010). Still, macroeconomic analysis of fiscal policies has advanced enough since the 1930s, when some economists and public officials urged fiscal contraction in the middle of the recession, to merit a more positive portrayal. The next sections present a summary review of fiscal issues, with a focus on agriculture.

## **Fiscal Conditions in Developing Countries**

### **General View**

In general, fiscal conditions in developing countries differ from those in industrialized countries on several accounts, and there are also differences across developing regions and countries. First, the fiscal stance in developing countries tends to be pro-cyclical: in good times, government expenditures go up and taxes go down, and vice versa in bad times. This is different from both the neoclassical prescription (basically that fiscal policy should be acyclical) and the Keynesian one (which postulates the importance of counter-cyclical fiscal policies) (see, for instance, Talvi and Végh 2005; Jha 2007; and Végh and Vuletin 2012).

Second, the ratios of taxes to GDP and expenditures to GDP in developing countries are clearly lower than in industrialized countries. Table 8.2 (from

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2 Definitions of the real exchange rate were mainly discussed in Chapter 7. In all the potential definitions, an increase in the price of nontraded goods and services would reduce the supply of exports and increase the demand for imports, negatively affecting the trade balance.

IMF's Fiscal Monitor database) divides them into advanced countries, emerging economies, and low-income economies.<sup>3</sup>

**TABLE 8.2** Fiscal indicators (2006–2013) (% GDP)

Region		Overall balance	Expenditures	Revenues	Net debt
Advanced countries		-5.4	41.7	36.3	60.5
Emerging economies	TOTAL	-1.7	28.9	27.2	26.6
	Asia	-2.5	23.1	20.7	n/a
	Europe	-1.0	37.5	36.5	25.9
	Latin America	-2.3	32.9	30.6	32.7
	MENAP	-6.8	28.6	21.7	59.3
Low-income economies	TOTAL	-1.9	23.4	21.5	34.9
	Asia	-3.1	21.3	18.1	45.3
	Latin America	-0.8	29.2	28.5	n/a
	Africa south of the Sahara	-1.6	22.4	20.8	24.6
	Others	-0.6	27.6	27.0	37.3

**Source:** IMF Fiscal Monitor (2013d); MENAP: Middle East, North Africa, and Pakistan.

Comparing regions, the emerging countries of Europe, all Latin American countries, and MENAP have larger expenditures and revenues as a percentage of GDP (close to 30 percent or more), while countries in Asia and SSA show percentages in the lower 20 percent. In terms of the provision of public

3 The country groups are as follows. Advanced countries: Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong SAR, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom, and United States. Emerging economies: Argentina, Brazil, Bulgaria, Chile, China, Colombia, Egypt, Hungary, India, Indonesia, Jordan, Kazakhstan, Kenya, Lithuania, Malaysia, Mexico, Morocco, Nigeria, Pakistan, Peru, Philippines, Poland, Romania, Russia, Saudi Arabia, South Africa, Thailand, Turkey, and Ukraine. Low-income economies: Bangladesh, Bolivia, Burkina Faso, Cambodia, Cameroon, Chad, Congo (Democratic Republic of the), Congo (Republic of the), Côte d'Ivoire, Ethiopia, Ghana, Haiti, Honduras, Lao P.D.R., Madagascar, Mali, Moldova, Mozambique, Myanmar, Nepal, Nicaragua, Senegal, Sudan, Tajikistan, Tanzania, Uganda, Uzbekistan, Vietnam, Yemen, and Zambia.

services and investments, the first group of countries should focus primarily on improving the composition of public expenditures, while the second group of countries has room to increase the level of public services, investments, and transfers while improving the composition (more on this later).

Third, there is more volatility in public accounts, particularly taxes, when compared to developed countries (Jha 2007). This is in part related to the greater volatility in growth and political conditions in developing countries, as well as the structure of taxes (which is the next point).

Fourth, the structure of revenues in developing countries relies more on taxes on domestic consumption and trade and on the inflation tax and seigniorage (the result of money financing of government expenditures; see Chapter 6) and less on income taxes, when compared to developed countries (Gordon and Li 2005).

However, the structure of revenues has been changing in developing countries. For example, inflation has declined significantly from an average of more than 40 percent per year in the 1980s and 1990s to mid–single digits in the 2000s (Chapter 3), reducing the inflationary tax.

Another change has been the expansion of the value-added tax (VAT), which has reinforced the revenue-raising capacity in many developing countries.<sup>4</sup> While in the 1960s only a small number of developed countries and practically no developing countries were using that tax, by the early 2000s all developed countries plus close to 100 developing countries were using it (Ebrill et al. 2001).<sup>5</sup>

On the other hand, trade taxes as a percentage of GDP have declined in many developing countries since the 1990s. Table 8.3 shows trade taxes, both imports and exports, as percentages of the GDP (data are from the WB database World Development Indicators 2013).<sup>6</sup>

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4 The VAT applies to all sales of commodities at every stage of production. A broad-based VAT with limited exceptions has shown a greater potential to increase revenues in developing countries when compared to traditional commodity taxes because the way fiscal credits and debits for the VAT tax are integrated enforces greater compliance. It is also better in efficiency terms because it does not affect the prices that firms pay for inputs, it does not distort production decisions, and it eliminates the cumulative (cascading) effects of usual sales taxes when the latter are charged on inputs and output of the same process. It functions as a tax on final consumption (Ebrill et al. 2001).

5 According to Ebrill et al. (2001), 27 developing countries in SSA, 18 in Asia and Pacific, 25 in Central Europe and countries from the former Soviet Union, 6 countries in MENA, and 20 in LAC were using VAT by 2001.

6 The World Bank database has information for the two regional aggregates and the income aggregate shown in the table. For other regions, data are available only from some countries; in these cases, Table 8.3 shows the average for the countries that have information for the 1990s and 2000s (which are listed below the table).



**TABLE 8.3** Trade taxes (% GDP)

Aggregates	1990s	2000s
East Asia & Pacific	0.8	0.7
South Asia	2.8	1.8
Lower middle income	2.3	1.2
Selected countries		
LAC	1.6	1.2
SSA	4.9	5.0
MENA	2.8	1.4

**Source:** Author based on World Bank (2014).

**Notes:** LAC: Brazil, Guatemala, Mexico, Nicaragua, Panama, Paraguay, Peru, Trinidad-Tobago, Uruguay, Venezuela; SSA: Botswana, Congo (Democratic Republic of the), Congo (Republic of the), Ethiopia, Ghana, Kenya, Namibia, Sierra Leone, Swaziland, Uganda; MENA: Bahrain, Egypt, Iran, Kuwait, Oman, Tunisia.

SSA is the region where trade taxes contribute most to fiscal accounts. Although those percentages have remained stable at about 5 percent when comparing the 1990s and the 2000s, they show a decline when comparing with the 1980s. Table 8.4 looks in greater detail at different economic blocks within SSA (from Keen and Mansour 2009).<sup>7</sup>

Comparing 2003–2005 with the early 1980s in SSA, several facts can be noted: (1) total taxes as a percentage of GDP increased by several percentage points, except in WAEMU; (2) trade taxes declined as a percentage of GDP (mostly because of the decline in applied tariffs resulting from trade liberalization; Keen and Mansour 2009); and (3) indirect and income taxes increased their participation in total revenue.

Trends are similar in other developing countries: overall tax revenues in those countries have been relatively stable or slightly increasing (supported by the expansion of the VAT), even though trade taxes have been declining (Díaz-Bonilla and Robinson 2010).<sup>8</sup>

7 The abbreviations refer to the Economic Community of West African States (ECOWAS), the Southern African Development Community (SADC), the Central Economic and Monetary African Community (CEMAC), East African Community (EAC), and West African Economic and Monetary Union (WAEMU, usually known in its French abbreviation, UEMOA). The list of countries is in Keen and Mansour 2009.

8 The WB/WDR (2008) argues that middle-income countries have recovered about 45–60 percent of each dollar of lost revenue due to reductions in trade taxes, while for low-income countries the figure is 30 percent. However, data for SSA and other developing countries, although showing a decline in trade taxes, also show general increases in revenues. It still can be argued that without the reduction in trade taxes, revenues may have increased even further.

**TABLE 8.4** Structure of taxes in SSA trading blocks

1980–1982	Number of Countries	Total tax revenue	Trade tax revenue	Indirect tax revenues	Income tax revenue	Other revenue
COMESA	14	16.7	5.8	3.9	4.8	2.2
EAC	5	10.7	3.1	4.1	3.0	0.5
SADC	12	19.9	7.9	4.1	5.9	2.0
CEMAC	6	17.6	6.7	2.0	2.9	6.0
WAEMU	8	14.5	6.3	3.3	3.6	1.3
2003–2005						
COMESA	14	19.6	4.2	6.9	5.5	3.0
EAC	5	14.0	2.0	7.1	4.2	0.7
SADC	12	23.5	6.1	6.9	7.4	3.1
CEMAC	6	21.1	1.8	3.0	2.4	13.9
WAEMU	8	13.6	3.9	5.9	3.2	0.6

Source: Keen and Mansour (2009).

Finally, deficits as percentage of the GDP are currently smaller in developing countries than in developed ones, with the exception of emerging countries in MENAP, which has indicators similar to the advanced economies. Also, low-income Asia shows deficits above the average for developing countries and closer to the percentages of developed countries (Table 8.2).

Table 8.2 also shows that the incidence of public debt in net terms (that is, discounting government assets) as a percentage of GDP during 2005–2009 was smaller in developing countries (with the exception of MENAP and, to a smaller degree, low-income Asian countries) than in advanced economies. The global economic slowdown that began in 2007–2008 has had a more negative fiscal impact on industrialized countries, whose debt/GDP ratio has increased above 60 percent in net terms (and has exceeded 90 percent in gross terms on average, a level that, as discussed before, has been associated, albeit controversially, with slower economic growth; see Reinhart and Rogoff 2010 and the debate with Herndon, Ash, and Pollin 2013).

The current situation is an improvement over the more deteriorated overall fiscal position of many developing countries during the 1980s (fiscal problems in SSA occurred earlier in the 1970s): the average government fiscal deficit was 6 percent of GDP among developing countries in the first half of the 1980s. The health of public-sector accounts improved during the 1990s, with deficits declining to around 2 percent by the end of the 1990s (Tytell and Wei 2004). More recently, the net fiscal position in developing countries, although

with differences in individual countries and regions, appears to have improved further during the 2000s, at least until the 2009 world recession. These improvements were helped by the fiscal consolidation of previous decades, the resumption of economic growth during the 2000s after the crises of the 1980s and 1990s, the decline in world interest rates, and, in the case of low-income developing countries in SSA, LAC, and Asia, by several rounds of debt relief in the 1990s and 2000s (Chapter 3).

In summary, the data suggest that developing countries currently seem in better fiscal shape than during the 1980s and 1990s, when important fiscal adjustments were needed to stabilize public-debt ratios. However, there are many unknowns related to the evolution of the global economy, and therefore developing countries need to maintain a vigilant eye on public accounts.

### **Fiscal Policy: General Considerations**

While concerns about the need for overall fiscal consolidation in many but not all developing countries have diminished somewhat, other relevant fiscal issues relate to the consideration of the level, composition, and cyclicity of public expenditures and revenues, with implications for growth, efficiency, and equity of fiscal interventions.<sup>9</sup>

Regarding levels of revenues, developing countries may need additional domestic revenue mobilization to help alleviate poverty, improve infrastructure, and achieve the various Millennium Development Goals (IMF 2011). The estimates for necessary additional revenues are around 2–4 percentage points of the GDP (IMF 2011). The following list (quoting from IMF 2011) details possible actions needed to improve the tax and revenue system:

- Build systems of tax administration that limit incentives and opportunities for rent-seeking and corruption, including adequate approaches to risk management (assigning resources where the risks to revenues are more significant) and taxpayer segmentation (defining interventions and services to the specific challenges posed by different groups; this would include a “large taxpayer office or window”).

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<sup>9</sup> The economy and agriculture of developing countries will also be affected by fiscal developments in industrialized countries to the extent that they affect world growth and financial stability. Also, fiscal constraints in advanced countries may limit payments to their farmers (which would reduce subsidized competition to developing countries’ farmers) but also diminish contributions to foreign aid (which finances development programs in low-income countries).

- Approve and make accessible laws and regulations that are simple and clear and that protect compliant taxpayers from the misbehavior of tax officials.
- Eliminate exemptions that lead to significant declines in revenue and that lack a clear and useful purpose.
- Establish a broad-based VAT (that is, with very few exemptions) with a reasonably high threshold for the sales at which registration for the tax becomes mandatory.
- Implement a broad-based corporate income tax (CIT); the rates should consider international standards to avoid putting the country at a disadvantage in retaining and attracting investment capital.
- Extend the personal income tax (PIT) base and make sure that different forms of capital income are taxed in a coherent manner.
- Use excise taxes only for a few key items that (1) raise adequate revenues and (2) address recognized social concerns.
- Establish simpler and appropriate regimes for small businesses.
- Reinforce the system of real estate taxes, which may be crucial for the fiscal sustainability of local governments.
- Strengthen the capacity of tax authorities to perform fiscal policy analysis (IMF 2011).

Moving to the expenditure side, it is not only the level but also the structure that counts for the growth, efficiency, and equity objectives. For instance, public spending in areas such as infrastructure, education, and health has had positive results in developing countries, as shown in the case studies of the World Bank (2007a). In particular, the idea that public investment (as different from general expenditures) sustains growth appears to have been supported by the link between high public investment and high growth in best-performing developing countries: the Commission on Growth and Development (2008) noted that fast-growing countries have a high public investment of 7 percent of GDP or more.

A recent study (Arslanalp et al. 2010) focusing on a new dataset on public capital (a stock variable, instead of public investment, which is a flow variable) has also found positive impacts on growth, but with some nonlinearities: the relationship between public investment and growth could decline and even turn negative at higher levels of public capital. These nonlinear effects may be due to

the fact that at higher levels of capital, the potential investments with high benefit/cost ratios have already been implemented (that is, there are diminishing rates of return on the potential investments). Also, the need for higher taxes to maintain and/or expand the existing capital stock may imply that at some level of investments and taxes, the growth effects from higher public investment may be more than compensated by the potential disincentive of higher taxes, with a negative net effect on growth. Finally, higher public investments may lead to increases in interest rates, displacing private-sector investments with higher rates of return. Also, Arslanalp et al. (2010) argue that in developing countries the benefits of higher levels of public capital tend to appear over longer time periods than for developed countries. Given the relatively lower levels of public capital in developing countries, the potentially negative effects on growth of high levels of public capital may be less relevant there.

The effects of public investments in developing countries, although in general positive, need to be analyzed country by country and depend on a proper selection and implementation of projects (World Bank 2007a). It is important to have systems of budgeting and programming of investments that utilize adequate instruments to identify costs and benefits and that target the investments to the main growth and equity problems experienced by the specific countries, which tend to vary across them and also change over time. Countries at different stages of development confront different needs and constraints that must be taken into account in fiscal policies, with poorer countries facing particularly large disparities between their fiscal strength and their need of public expenditures and investments that support growth and equity (from physical infrastructure to health and education to safety nets for the poor) (World Bank 2007a). Also, adequate implementation is crucial to avoid waste and corruption (see different approaches to control misuse of public funds in Transparency International 2006).

Overall, given certain fiscal balances that can be sustained over time, fiscal policy needs to consider (1) the level and structure of the tax system to avoid disincentive effects; (2) whether the level of expenditure is inadequate or the efficiency of spending is too low to accomplish the growth and equity objectives; and (3) whether the composition of expenditures is biased against those that generate public goods that benefit growth and equity and instead include many low-productivity and wasteful expenditures or transfers or private goods without much of a growth, efficiency, or equity rationale.

In many countries, what is needed is to increase the efficiency of expenditures in areas such as health, education, and infrastructure, using cost-efficiency and effectiveness indicators. In other countries, there may be a need to change

the composition for a given level of expenditures. Countries should define the composition of expenditure so as to address the main constraints to growth and equity and then allocate resources to those activities with the highest economic or social returns. Finally, in other countries, particularly the poorest countries, there may be a need to increase the levels of public expenditures, which may require better mobilization of domestic resources, and in low-income countries, predictable and well-coordinated foreign aid. More generally, a certain appropriate level of expenditures is crucial to establish an appropriate tax system and an efficient and honest tax administration (World Bank 2007a).

In closing, it merits quoting in full the World Bank here:

Fiscal policy decisions reflect the societal preferences and political economy of a country. Public expenditure and taxation policies are fundamentally political choices which reflect the political economy and institutional arrangements in a country. While acknowledging this fact, the quality of fiscal policy decisions could be improved if: (a) they were informed by ex-ante policy analysis that clarified the likely growth and distributional consequences of alternative choices; and (b) planning and fiscal institutions enabled political actors to take a longer term perspective and supported a contestable process for determining policy decisions. The appropriate way to enhance the growth impact of fiscal policy varies with country characteristics (World Bank 2007a, ii).

## **Fiscal Issues and Agriculture: Expenditures**

### **Data Issues**

The first aspect to consider is what expenditures are related to agriculture; this question requires a definition of both the scope of agriculture and expenditures.<sup>10</sup> Regarding the first point, there is the obvious fact, highlighted in Figure 1.1 in Chapter 1, that agriculture includes but goes beyond farmers, encompassing three other levels of interventions: there are expenditures and investments related to rural areas and the regional geographical space, to food and agricultural value chains, and at the level of the whole economy that are crucial for agriculture but may not be captured by budgetary data.<sup>11</sup>

10 Fiscal policies also have had important effects on agriculture in developed countries. For instance, O'Mara et al. (1999) argue that fiscal policy in Australia had destabilizing effects on interest rates and the real exchange rate from the mid-1970s to the mid-1980s, but since then it has helped stabilize those variables, which was important in increasing agricultural supply.

11 A detailed discussion can be found in Mogues et al. (2012) on which this section draws extensively.

This leads to a distinction between public investments and expenditures in agriculture and for agriculture (FAO 2012, 10). The former are “specific to agriculture and aimed specifically at enhancing primary production in the crop, livestock, aquaculture and forest sectors as well as in upstream and downstream activities,” while the latter are government expenditures in other sectors that “can also have a positive impact on agricultural production and productivity and on farm incomes,” such as “transport and communications infrastructure, energy, general education, health and nutrition, ecosystem services, market institutions and broader legal and social institutions” that support agriculture (FAO 2012, 10). Figure 1.1 in Chapter 1 goes a step further and notes public policies and interventions that—even though they are not directly in and for food and agricultural production—remain nonetheless crucial for those activities.

Regarding the second point (the notion of expenditure), diverse concepts are used in very different ways, both in formal classifications and in economic analysis (Mogues et al. 2012). It is crucial to understand the diverse definitions that are utilized in different contexts.

According to economic classification, expenditures can be divided into two groups: expenditures that cover recurrent activities and others that are considered investments (IMF 2001a). Expenses, or current expenditures, are transactions that result in a decline of the government’s net worth (such as compensation of employees, subsidies and other transfers, consumption of goods and services, interest, and similar expenditures). The second group of public expenditures is investments, which contribute to public capital formation or the acquisition of other assets. These assets may include both non-financial and financial ones. Financial assets include cash, loans, and bonds, deposits, other financial instruments, monetary gold, and IMF-allocated Special Drawing Rights (SDRs). From the point of view of the impact on agriculture, it is more relevant to focus on nonfinancial assets, which include four categories: fixed assets (such as buildings and structures, machinery and equipment, and others including permanent crops and animals), inventories (for example, strategic reserves of grains or oil and other materials and supplies held as inventory), nonproduced assets (such as land, water, reserves of oil, natural gas, coal, metals, other mineral reserves, virgin forests and fisheries, the electromagnetic spectrum, and some intangibles such as patents, leases, and other contracts), and valuables (for example, precious stones and metals, jewelry, works of arts, etc.).

These classifications may not always coincide with the concept of investment in economic analysis: for instance, salaries and current expenditures

utilized for research and development (R&D) in public accounts are not treated as capital formation per se (Mogues et al. 2012).

The economic classification is different from the functional classification of public expenditures: the first describes the items on which resources are spent (such as salaries, goods and services, or capital formation), while the second presents the purposes of those expenditures (such as agricultural services, education, healthcare, schools, and so on). The items in the economic classification may serve different functions, and vice versa, a function may require several expenditures in the economic category.

Table 8.5 presents a summary of the functional classification of public expenditures according to the Classification of the Functions of Government (COFOG).<sup>12</sup> The table presents the ten main categories and includes a more detailed description only for the expenditures related to agriculture, which are further divisions of the category of Economic Affairs (Mogues et al. 2012). Unfortunately, data available from governments in developing countries are typically presented by ministries or government agencies and may not coincide with the functional classification of government expenditures.

A proper definition of these terms is important to evaluate the impact on agriculture of public expenditures or public investments, as a subset of public expenditures. Mogues et al. (2012, 46) note that the concept of public investment “has been defined, described, or proxied variously as public expenditures ‘providing various public goods, such as research and development (R&D), infrastructure, and education’ . . . or as ‘all kinds of public expenditures that generate future fiscal benefits.’ . . . The literature also includes discussions of ‘investment in research, extension, rural infrastructure, and irrigation.’”

A proper differentiation and classification of all those government expenditures and what should be considered investment may require detailed public expenditure reviews (PERs) (World Bank 2011; FAO 2012).<sup>13</sup> However, methodologies vary, as do the estimates of the percentage of investments: for instance, FAO (2012) shows estimates for 12 countries, in which the percentage of agricultural investments over total agricultural expenditures ranges from 9 percent in Tanzania to 84 percent in Mozambique. Differences also exist between budgeted and actual expenditures.

As noted before, the formal definition of the IMF’s *Government Finance Statistics Manual* (IMF 2001a) corresponds to accounting conventions and refers to the creation of specifically defined assets within the public sector. But

12 See <http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=4>.

13 The World Bank (2011) is a practical tool to conduct such public expenditure analyses.



**TABLE 8.5** Functional classifications of public expenditures

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<b>1. Education</b>
<b>2. Health</b>
<b>3. Economic affairs</b>
a) General economic affairs
b) Agriculture, forestry, fishing and hunting
(i) Agriculture
—Administration of agricultural affairs and services; conservation, reclamation, or expansion of arable land; agrarian reform and land settlement; supervision and regulation of the agricultural industry
—Construction or operation of flood control, irrigation, and drainage systems, including grants, loans, or subsidies for such works
—Operation or support of programs or schemes to stabilize or improve farm prices and farm incomes; operation or support of extension services or veterinary services to farmers, pest control services, crop inspection services, and crop grading services
—Production and dissemination of general information, technical documentation, and statistics on agricultural affairs and services
—Compensation, grants, loans, or subsidies to farmers in connection with agricultural activities, including payments for restricting or encouraging output of a particular crop or for allowing land to remain uncultivated
(ii) Forestry
—Administration of forestry affairs and services; conservation, extension, and rationalized exploitation of forest reserves; supervision and regulation of forest operations and issuance of tree-felling licenses
—Operation or support of reforestation work, pest and disease control, forest fire-fighting and fire-prevention services, and extension services to forest operators
—Production and dissemination of general information, technical documentation, and statistics on forestry affairs and services
—Grants, loans, or subsidies to support commercial forest activities
(iii) Fishing and hunting
—Administration of fishing and hunting affairs and services; protection, propagation, and rationalized exploitation of fish and wildlife stocks; supervision and regulation of freshwater fishing, coastal fishing, ocean fishing, fish farming, wildlife hunting, and issuance of fishing and hunting licenses
—Operation or support of fish hatcheries, extension services, stocking, or culling activities
—Production and dissemination of general information, technical documentation, and statistics on fishing and hunting affairs and services
—Grants, loans, or subsidies to support commercial fishing and hunting activities, including the construction or operation of fish hatcheries
c) Transport
d) Fuel and energy
e) Mining, manufacturing, and construction
f) Communication
g) R&D economic affairs
(i) R&D in agriculture, forestry, fishing, and hunting
—Administration and operation of government agencies engaged in applied research and experimental development related to agriculture, forestry, fishing, and hunting
—Grants, loans, or subsidies to support applied research and experimental development related to agriculture, forestry, fishing, and hunting undertaken by nongovernment bodies, such as research institutes and universities
—Excludes basic research, which is classified under “General Public Services”
(ii) R&D in transport
(iii) R&D in fuel and energy
(iv) R&D in mining, manufacturing, construction
(v) R&D in communication
(vi) R&D in other industries
h) Other industries
i) Other economic affairs
<b>4. Environmental protection</b>
<b>5. Social protection</b>
<b>6. Housing and community amenities</b>
<b>7. Recreation, culture, and religion</b>
<b>8. Defense</b>
<b>9. Public order and safety</b>
<b>10. General public services</b>

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**Source:** Moguez et al. (2012).

it is also possible to take a more general view of different types of capital (composed of both tangible and intangible assets) that yield returns over time, such as the following (FAO 2012):

- Physical capital, on-farm (such as animals, machinery, equipment) and off-farm infrastructure (rural roads, irrigation, telecommunications)
- Human capital resulting from health, education, training, and extension services
- Intellectual capital acquired through R&D in agricultural technologies and management practices
- Natural capital, such as land and other natural resources required for agricultural production
- Social capital, such as the legal and market institutions and social networks that help the process of production by, among other things, enforcing constructive behaviors and reducing risk
- Financial capital, which is usually a means for acquiring other types of capital

Some recurrent expenditures may help to build these types of capital and can therefore be considered investments (with the accumulation of capital taking place in the private sector and not within the government). In summary, determining what exactly an investment is within the different expenditures, public or private, poses conceptual and empirical challenges, including the fact that current expenditures are necessary to maintain the value of capital assets (FAO 2012).

Finally, another important distinction is between public goods and private goods (Chapter 1). In principle, governments should focus their expenditures on public goods; there is agreement that public expenditures and investments in areas such as R&D, education, and general infrastructure count as public goods with positive effects for the agricultural sector. But, as FAO (2012, 10) argues, “what constitutes a public good will depend to some extent on country characteristics and local context, and mixed public/private goods are common in agriculture.”

One of the well-known classifications of public expenditures is OECD’s calculation of the Producer Support Estimates (PSE) and General Services Support Estimates (GSSE), which have been developed to monitor and evaluate the level and composition of support provided to agriculture in the

member countries of that organization. In that sense, the classification and definitions focus on agricultural policies and interventions of more advanced countries (Table 8.6).

**TABLE 8.6 OECD's PSE and GSSE measures**

**PSE Categories**

**A. Support based on commodity output:**

A.1. Market price support (MPS): transfers from consumers and taxpayers to agricultural producers arising from policy measures that create a gap between domestic market prices and border prices of a specific agricultural commodity, measured at the farm gate level.

A.2. Payments based on output: transfers from taxpayers to agricultural producers from policy measures based on current output of a specific agricultural commodity.

**B. Payments based on input use: transfers from taxpayers to agricultural producers arising from policy measures based on on-farm use of inputs:**

B.1. Variable input use

B.2. Fixed capital formation

B.3. On-farm services

C. Payments based on current A/An/R/I, production required: transfers from taxpayers to agricultural producers arising from policy measures based on current area (A), animal numbers (An), receipts (R) or income (I), and requiring production.

D. Payments based on noncurrent A/An/R/I, production required: transfers from taxpayers to agricultural producers arising from policy measures based on non-current (i.e. historical or fixed) area, animal numbers, receipts or income, with current production of any commodity required.

E. Payments based on noncurrent A/An/R/I, production not required: transfers from taxpayers to agricultural producers arising from policy measures based on non-current (i.e. historical or fixed) area, animal numbers, receipts or income, with current production of any commodity not required but optional.

F. Payments based on non-commodity criteria: transfers from taxpayers to agricultural producers arising from policy measures based on:

F.1. Long-term resource retirement

F.2. A specific noncommodity output

F.3. Other noncommodity criteria

G. Miscellaneous payments: transfers from taxpayers to farmers for which there is insufficient information to allocate them among the appropriate categories.

**GSSE Categories**

H. Agricultural knowledge and innovation system: budgetary expenditure to support:

H.1. Agricultural knowledge generation

H.2. Agricultural knowledge transfer

J. Inspection and control: budgetary expenditure to support:

J.1. Agricultural product safety and inspection

J.2. Pest and disease inspection and control

J.3. Input control

K. Development and maintenance of infrastructure: budgetary expenditure to support:

K.1. Hydrological infrastructure

K.2. Storage, marketing and other physical infrastructure

K.3. Institutional infrastructure

K.4. Farm restructuring

L. Marketing and promotion: budgetary expenditure to support:

L.1. Collective schemes for processing and marketing

L.2. Promotion of agricultural products

M. Cost of public stockholding: budgetary expenditure covering the costs of storage, depreciation and disposal of public storage of agricultural products.

N. Miscellaneous: budgetary expenditure financing other general services that cannot be disaggregated and allocated to the above categories.

Another classification, centered on developing countries, is the OECD-FAO Monitoring African Food and Agricultural Policies (MAFAP) (<http://www.fao.org/mafap/home/en/>). The data highlight transfers to producers and budget expenditures and investments in general public agricultural services. MAFAP also expands the coverage of indicators to include investments in the rural economy and the functioning of agricultural value chains. This relates to the issue of the rural nonfarm sector as the link between supply and demand and the quality of rural infrastructure and services as the geographical locus where agricultural production takes place. Table 8.7 shows the classification of public expenditures suggested by MAFAP.

**TABLE 8.7 MAFAP proposed classification of public expenditures**

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1.1. Payments to the agents in the agrifood sector
A. Payments to producers
• Production subsidies and payments to farmers via development projects. Input subsidies: variable inputs (seeds, fertilizer, energy, credit, other); capital (machinery and equipment, on-farm irrigation, other basic on-farm infrastructure); on-farm services (pest and disease control/veterinary services, on-farm training, technical assistance, extension etc.)
• Income support
• Other
B. Payments to consumers (food aid, cash transfers, school feeding programs, other)
C. Payments to input suppliers
D. Payments to processors
E. Payments to traders
F. Payments to transporters
1.2. General sector support
A. Agricultural research
B. Technical assistance
C. Training
D. Extension/technology transfer
E. Inspection (veterinary/plant)
F. Infrastructure (roads, nonfarm irrigation infrastructure)
G. Storage/public stockholding
H. Marketing
I. Other
2. Agriculture supportive policies
A. Rural education
B. Rural health
C. Rural infrastructure (roads, water, other)

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**Source:** Adapted from Ghins, Ilic-Komorowska, and Mas Aparisi (2013).

## Trends in Agricultural Expenditures

Table 8.8 (based on IFPRI's SPEED and ASTI databases)<sup>14</sup> gives a sense of the evolution and order of magnitude of agricultural expenditures as a percentage of agricultural GDP (sometimes called agricultural expenditure intensity)<sup>15</sup> in different developing regions.

**TABLE 8.8** Agricultural expenditures as percentage of agricultural GDP

Region	Agricultural expenditures (% agricultural GDP)				Ag R&D expenditures (% agricultural GDP)	
	1980	1990	2000	Latest year	2000	Latest
East Asia	7.5	7.0	7.9	10.3	0.5	0.4
South Asia	7.0	5.0	4.8	9.9	0.4	0.3
MENA	15.0	10.7	14.0	10.2	1.2	0.9
LAC	6.7	3.7	4.9	6.4	1.0	0.9
SSA	10.6	6.0	5.8	8.7	0.8	0.8

**Source:** IFPRI's SPEED and ASTI databases; Global Food Policy Report (2012).

**Note:** Data are for single years 1980, 1990, and 2000, not for the decade. The latest available year usually goes from the end of the decade of the 2000s or the start of 2010s. The countries included in this table have been selected because there is information available for them for most years, and therefore it is possible to make aggregate comparisons across periods; the reference to regions such as LAC, MENA, and so on must be understood as referring only to some of the countries in that geographical area. The countries considered are as follows: East Asia: China, Indonesia, Malaysia, Myanmar, Philippines, Thailand, Vietnam; South Asia: Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka; MENA: Bahrain, Egypt, Iran (Islamic Republic of), Jordan, Morocco, Oman, Syrian Arab Republic, Tunisia, United Arab Emirates; LAC: Argentina, Brazil, Chile, Colombia, Costa Rica, El Salvador, Guatemala, Mexico, Panama, Uruguay; SSA: Burkina Faso, Côte d'Ivoire, Ethiopia, Ghana, Kenya, Madagascar, Malawi, Mauritius, Niger, Nigeria, Senegal, Togo, Uganda, United Republic of Tanzania, Zambia. Data for agricultural R&D are lacking for the following countries: Thailand (East Asia); Bhutan and Maldives (South Asia); Bahrain, Egypt, Oman, and United Arab Emirates (MENA).

MENA appears to be the region with the largest agricultural expenditures as a percentage of agricultural GDP and in agricultural R&D, in part because it includes some oil-producing countries with small agricultural sectors. LAC appears at the other extreme, with the lowest percentage in agricultural

14 The SPEED (Statistics of Public Expenditure for Economic Development) database covers expenditures in general. They are divided into agriculture, education, health, infrastructure, social protection, and defense and include an overall total (see <http://www.ifpri.org/publication/public-expenditure-database>). Table 8.5, with a functional classification of public expenditures, explains in greater detail the definition of expenditures included. The Agricultural Science and Technology Indicators (ASTI) initiative includes R&D expenditures only (<http://www.asti.cgiar.org/home>).

15 This should not be confused with a different indicator called agricultural *orientation* intensity, which is the percentage of agricultural expenditures over total expenditures, all divided by the share of agricultural GDP in total GDP. A number smaller (greater) than 1 indicates that the share of government spending on agriculture is less (more) than the share of agriculture in GDP, suggesting that there may be underspending (overspending) in the sector. Table 4 in FAO 2012 shows data for that indicator.

expenditures; however, this region spends more on agricultural R&D as a percentage of agricultural GDP (as MENA). It must be noted that given the size of the agricultural sector in countries such as China or India, the absolute value of public funding devoted to R&D is significant: in 2008 China and India represented 13 percent and 7 percent, respectively, of global public spending on agricultural R&D, compared to about 5 percent for all SSA. Also, the regional averages mask significant variations across countries (Beintema et al. 2012).

In terms of the evolution over time, the drop from the 1980s to the 1990s is clear. The decline in world agricultural prices in the mid-1980s and the fiscal and debt crises of those decades in many developing countries affected growth and agriculture. Deteriorating public-sector finances led to cuts in government expenditures in general and pressures to reduce support for agriculture in particular. Van Blarcom, Knudsen, and Nash (1993) found that in the late 1980s, agricultural expenditures declined as a share of total spending. Structural adjustment programs that—usually as a condition of loans from international financial organization—reduced support for agriculture in many developing countries during the 1980s and 1990s, as well as the US Farm Bills in the 1980s and 1990s and adjustments in the Common Agricultural Policy of the European Union in the 1990s, can all be seen as part of the same effort to confront deteriorated fiscal positions in the context of weak world commodity markets. Those negative impacts during the 1990s were more pronounced in LAC<sup>16</sup> and SSA, where the ratio of agricultural expenditures to agricultural GDP in the 1990s dropped to between 55–57 percent of the levels in the previous decade (in the other regions, there were also declines, but smaller).

Expenditures recovered after 2005. Faster growth and a stronger fiscal position in many low- and middle-income countries, along with higher agricultural prices, have led to increases in support and spending for the agricultural sector in recent years. For instance, for developing countries as a whole, the level of per capita agricultural expenditure (in constant international dollars) increased from 29 in the year 2000 to 44 in 2007; the rate of growth in agriculture expenditures accelerated between 2000 and 2007 to an annual rate of about 6 percent (Mogues et al. 2012). Other indicators, such as the Nominal Rate of Assistance (NRA) (as calculated by a World Bank project),

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16 For instance, at the beginning of the 1980s, several countries in South America, such as Brazil and Chile, embarked on accelerated programs to expand production of wheat (and other cereals) due to concerns about shortages and the high prices in the second half of the 1970s. When prices collapsed in the mid-1980s, these programs represented a high cost for the government, and support for those crops was substantially diminished (Díaz-Bonilla 1999).

the Producer Support Estimate (PSE) (computed by the OECD), and the categories of domestic support as defined in the Agreement of Agriculture that must be notified to the WTO, also show increases in agricultural support during recent years (Chapters 3 and 11 and Díaz-Bonilla 2014).<sup>17</sup>

However, even with the recent increase, developing countries, particularly in Africa, are still below the ratios seen in developed countries, which usually reach 20 percent or more of agricultural GDP (Mogues et al. 2012; see also Chapter 3). In the case of agricultural R&D, the difference is even larger, with developed countries seeing an intensity ratio of more than 3 percent of agricultural GDP (Beintema et al. 2012).

Besides the level, another important aspect is the composition. For instance, Allcott, Lederman, and López (2006) divided public agricultural expenditures in LAC into “non-social subsidies” or “private goods” (export subsidies, forestry subsidies, targeted rural production subsidies, and so on) and “public goods” (such as investment in R&D, plant and animal disease control, and environmental protection). They documented a decline in the share of expenditures devoted to nonsocial subsidies throughout the period, moving from 40 to 45 percent in the late 1980s to 30 percent in 2001, while average rural public expenditures per capita increased throughout the period.

The new conditions (including higher nominal commodity prices, climate change, and the recent growth in developing countries) present a different framework in which to consider the links between fiscal policies and agriculture. Although it is important to continue to monitor the general fiscal stance and balances, the fiscal policy issues to consider now in greater detail in developing countries may have shifted to more specific questions such as whether the level and composition of both expenditures and taxation related to the agricultural sector are adequate to attain the desired policy objectives. The next section discusses the differential impacts of several types of expenditures, followed by an analysis of tax issues.

### **Impacts of Agricultural Expenditures**

One key question is what type of expenditures and investments have stronger positive impacts on the agricultural sector and on other objectives such as poverty reduction, nutrition enhancement, and environmental sustainability. Mogues et al. (2012) provide a detailed review of studies trying to answer that question, and their conclusions are quoted extensively in the next paragraphs.

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17 As noted in Chapter 3, these measures differ among themselves, particularly when comparing the first two with the categories of domestic support in the WTO.

First, aggregate public spending on agriculture seems to have moderate to modest returns on rural welfare, agricultural growth, economic growth, or poverty reduction. This weak positive impact results from lumping together in the aggregate numbers both public expenditures that have important positive impacts and public expenditures that do not have positive impacts or that even lead to negative outcomes. The implication is that it is important to analyze different types of public expenditures in and for agriculture so that policymakers may be able to distinguish between high- and low-payoff activities in terms of agricultural growth, increased productivity, poverty reduction, or other desirable outcomes (Mogues et al. 2012).

Second, a consistent result across a large quantity of studies is that returns to agricultural R&D expenditures are positive and substantial for agricultural productivity and growth. A majority of estimates of internal rates of return to investments in agricultural research are greater than 20 percent, although returns vary by regions and products. Estimates for China during the 1990s show that 1 monetary unit spent on R&D yields more than 6.5 monetary units of agricultural GDP; in the case of India during the same period, the result is between 9 and 10 monetary units of agricultural GDP. Given these results, it appears that there is a substantial underinvestment in agricultural R&D, and therefore, more public resources should be shifted to the accumulation of knowledge and technology (Mogues et al. 2012).

Third, in several countries where those comparisons have been attempted, public spending on agricultural R&D outperforms other public expenditures in agriculture, such as irrigation, extension, and fertilizer subsidies, in terms of agricultural productivity. It also seems to outperform investments for agriculture, such as rural road infrastructure, education, electrification, health, and telecommunications, although several of the latter also have positive impacts on agricultural growth and productivity. Agricultural extension expenditures show relatively high returns, while irrigation appears to be a positive investment in some countries but not in others. The estimates cited by Mogues et al. (2012) for China indicate that 1 monetary unit spent on general education yields more than 2 monetary units of agricultural GDP; for roads and telephones, this is between 1.5 and 1.7; and for irrigation and electricity, less than 1.5. Fertilizer subsidies, at least as measured in India, rank last out of eight different types of agricultural and nonagricultural spending in terms of their contribution to agricultural productivity. For India, the cited studies indicate that expenditures of 1 monetary unit in roads result in 7–8 units of agricultural GDP, education between 5–6 units, irrigation 4–5 units, and credit



subsidies about 4 units, whereas a monetary unit expenditure on fertilizer and power subsidies led to just 1 unit or less of agricultural GDP.

In the case of LAC, Allcott, Lederman, and López (2006), as noted, divided public agricultural expenditures into “non-social subsidies” or “private goods” and “public goods” and analyzed the effects of the size and composition of rural expenditures on agricultural GDP in 15 Latin American countries during the period 1985–2001. Their general result showed a positive impact of public goods (such as investment in R&D, plant and animal disease control, and environmental protection) and a negative impact of nonsocial subsidies or private goods (export subsidies, forestry subsidies, targeted rural production subsidies, and so on): a standardized reduction in the latter (formally a standard deviation cut) led to a 5 percent increase in GDP per capita in the countries considered.

Fourth, public expenditures in agricultural R&D also rank high (although not always as the first option, as in the case of agricultural productivity) among the most effective interventions to reduce poverty. Estimates summarized in Mogues et al. (2012) calculate that 1 million monetary units in China led to 1,200 fewer poor people when invested in education, while R&D was a close second, leading to a reduction of 1,000 people in the poverty headcount. The same calculations for India, based on 1 million monetary units, were 120 fewer poor people due to spending on roads and 80 fewer due to R&D (the second largest impact). In Thailand, it was more than 250 fewer poor people for electricity and between 100 and 150 for R&D (also the second largest impact). Finally, in Uganda, this monetary level of R&D investment led to a reduction of almost 60 in the poverty headcount (the largest impact), while feeder roads ranked second with a reduction of about 30–40 persons in the poverty headcount.<sup>18</sup> Overall, these results suggest that the “trade-off between optimal policies to achieve income gains for the lower end of the economic distribution and policies to achieve aggregate growth in the sector is mostly absent when it comes to agricultural R&D” (Mogues et al. 2012, 42).

Fifth, some agricultural investments related to nutrition, such as biofortification, also have positive impacts on health and nutritional outcomes and seem highly cost-effective. Therefore, for some interventions, there may not be a trade-off between agricultural public investments and those oriented to health and nutrition (Mogues et al. 2012).

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18 It should be noted that 1 million monetary units may have different purchasing power in the countries mentioned; therefore, comparisons of the impact of expenditures on the amount of poverty reduction across countries are not valid (the appropriate comparison is between alternative expenditures within countries).

Sixth, returns to public investments in and for agriculture have been declining over time, with the exception of agricultural R&D. For instance, in the studies cited by Mogues et al. (2012), the use of fertilizer subsidies in India had a larger impact in previous decades than more recently: in the 1960s–1970s, 1 monetary unit spent on irrigation subsidies led to about 4–6 monetary units of agricultural GDP (lower than R&D, which yielded between 8 and 10 units), but in the 1980s and 1990s, the impact declined to 2–3 monetary units of agricultural GDP, and it appears to be even lower more recently (while the impact of expenditures on R&D stayed at 8 or more). These results suggest that there may be a “start-up” effect that declines over time. The consideration of the time dimension is important because the short- and long-term effects of public expenditures seem to be different (Mogues et al. 2012).

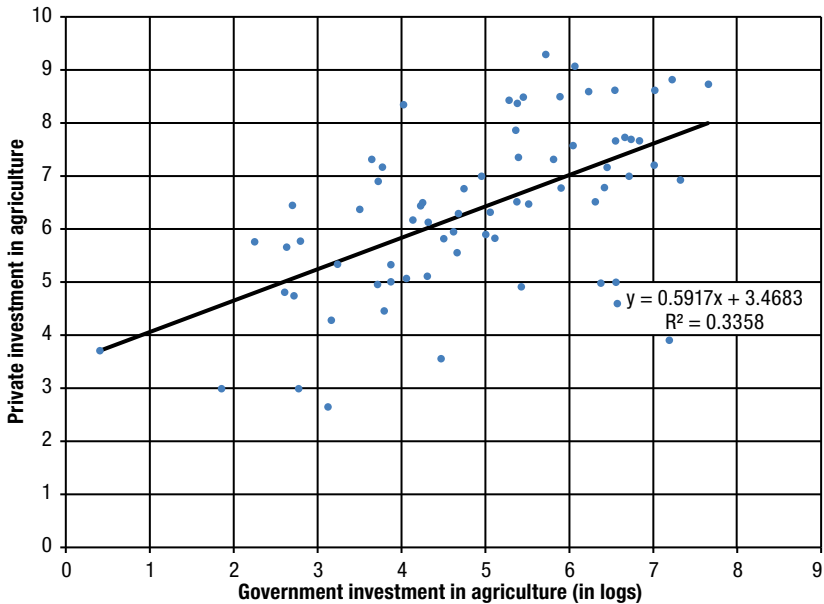
Seventh, besides the type of public expenditure, it may be important to consider the geographical dimension of the public expenditures. Mogues et al. (2012) offer the tentative conclusion that there may be greater returns per dollar of investment in less-favored areas than in high-potential areas, both in terms of poverty reduction and, more controversially, agricultural performance. However, they caution that further empirical analyses are needed regarding this conclusion. In any case, the effects of government expenditures on agricultural development are usually heterogeneous depending on the geographical area, which highlights the need for coordination between central and subnational governments to define what investments are needed, where they are needed, and whether the level and composition of all public resources applied in a region are adequate for the goals defined (Mogues et al. 2012).

Eighth, the evidence is mixed regarding whether aggregate public investments in agriculture generate incentives for private investments to expand (sometimes referred to as the public-sector expenditures “crowding-in” private investments) (Mogues et al. 2012). Figure 8.1, however, shows a positive correlation between public and private investment (from the country data in Lowder, Carisma, and Skoet 2012), but, of course, this simple correlation does not imply causation, and more studies are needed to evaluate the issue.

Table 8.9 presents investment in agriculture in selected low- and middle-income countries by source and region. Obviously, farmers are by far the largest investors in agriculture: more than three times as large as all other sources of investment combined (FAO 2012). In the case of governments, the second column shows the portion of public expenditures that can be considered investments, but excludes expenditures in agricultural R&D, which are

in the third column. It can be seen that non-R&D expenditures are about eight times larger than R&D expenditures for all developing countries.

**FIGURE 8.1** Correlation between public and private investment



**Source:** Author with data from Lowder, Carisma, and Skoet (2012).

Ninth, the findings from different studies should be interpreted as results “at the margin”—that is, the impact of an additional currency unit of expenditures (Mogues et al. 2012). Therefore, the results cannot be utilized to justify large changes in the structure of expenditures, such as completely halting funding for one activity or allocating all resources to another, which would dramatically change the impacts of those resources. Also, Mogues et al. caution about directly extrapolating the conclusions of these studies to other regions, time periods, or topics; the context and application of these results need to be carefully considered.

Tenth, public expenditures have opportunity costs, not only in terms of alternative uses for those funds but also fundamentally related to how those expenditures are financed, such as taxes, borrowing, and money creation. Therefore, it is important to be able to justify the need for using those funds in public expenditures focused on agriculture. The typical reasons for public

**TABLE 8.9** Investment in agriculture in selected low- and middle-income countries (by source and region, most recent year) in million dollars

Region	On-farm investment in agricultural capital (76)	Government investment (76)	Public spending on agricultural R&D (42)	Official development assistance (70)	Foreign direct investment (36)
East Asia and the Pacific	51,675	20,607	1,693	682	1,675
East Asia and the Pacific, excluding China	17,297	3,194	369	522	998
Europe and Central Asia	21,791	4,138		78	383
Latin America and the Caribbean	26,483	2,910	1,356	213	1,225
Middle East and North Africa	12,864	3,594	427	194	67
South Asia	36,726	4,715	703	912	10
Africa south of the Sahara	19,038	1,993	539	1,027	20
Low- and middle-income countries	168,577	37,957	4,718	3,106	3,380

**Source:** Lowder, Carisma, and Skoet (2012).

**Note:** The numbers in parentheses in the headings indicate how many countries are covered by the data in each column.

interventions are related to the presence of market failure or to distributional concerns, as discussed earlier (Chapter 1).

Eleventh, the studies show that agricultural expenditures can help with outcomes in other areas (such as health), while expenditures not directly aimed at agriculture, including energy, rural roads, education, and so on, have strong impacts on agricultural growth and productivity. Therefore, there is a need to coordinate across ministries and agencies, share information about the amount and characteristics of all public expenditures and their cross-sectoral effects, and improve the allocation of resources to achieve multiple development goals. Both the coordination imperative and the geographical dimension also call for a better understanding of the differential impacts of public expenditures at the national, provincial, and local levels, including the impact of decentralization in public-sector expenditures and interventions in and for agriculture (Mogues et al. 2012).

The final sections on price stabilization programs, food subsidies, and input subsidies include further considerations about some agricultural programs with large fiscal implications.

## **Fiscal Issues in Agriculture: Taxes and Revenue Mobilization**

Data on agricultural taxes, as was discussed before in the case of agricultural expenditures, also present serious problems. It is very difficult to determine the level of explicit direct and indirect taxes<sup>19</sup> paid by farmers in developing countries, among other things because national tax data are not classified by source or sector and the figures do not include taxes collected by state and local governments (Khan 2001). While important efforts have gone into collecting data on agricultural expenditures (such as the IFPRI's SPEED and ASTI databases), there has been less attention paid to the issue of taxation. This data vacuum may need to be filled to provide a complete view of fiscal issues in agriculture.

### **Types of Agricultural Taxes**

Table 8.10 presents a classification of taxes. These different types of taxes have dissimilar general equilibrium implications. Direct taxes are considered to generate revenues with fewer intersectoral or interpersonal resource transfers than indirect taxes, but this also depends on several factors, including whether sectors and income sources are treated equally for taxation purposes. The next paragraphs discuss agricultural taxation issues using a simplified classification from Sarris (1994), who divides taxes into land taxes, income taxes, taxes on output, and taxes on inputs (such as fertilizers, water, and so on).<sup>20</sup>

Land taxes have several advantages in terms of efficiency (they do not distort relative output prices within agriculture and do not reduce production incentives) and equity (the wealthier would pay more). On the other hand, they may increase producers' risk profiles, when compared to an income tax, if the land taxes apply irrespective of the realized production. But the fact that this type of tax is paid regardless of the level of production is also an incentive to increase production and productivity (see below for a discussion of this effect in Paraguay). Land taxes may also be relatively simple to administer if there is information regarding the area of the property, its location, its characteristics (such as the availability of water, fertility, and proximity to a market), and its owner. Even in communal properties, it would be possible to levy land

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19 Some studies have argued that *implicit* or *indirect* measures that may act as taxes (such as overvalued exchange rates, trade protection to other sectors, and procurement programs through monopoly marketing, all of which affect output prices) have been more important in defining the level of taxation for agriculture (see, for instance, Krueger, Schiff, and Valdés 1988). The issues raised by those interventions are discussed elsewhere in this book.

20 Where not otherwise attributed, the source of the this section is Sarris 1994.

taxes and let the community allocate payments. While in the past land taxes were important as a percentage of revenues, their significance has declined in recent decades (Sarris 1994;<sup>21</sup> Khan 2001). The main reasons for that decline seem to be political resistance by landowners and the option for governments to use less obvious and more indirect taxes (such as taxes on output).

**TABLE 8.10** Types of agricultural taxes

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**Direct taxes**

1. Income tax
  - on actual income
  - on presumed income (from land)
    - based on land area
    - on rental income (annual rental value or capital value)
    - value of gross or net income
2. Personal (or poll) tax
  - on individual or household
  - on livestock
3. Wealth and property tax (mostly land)
  - based on area with adjustments
  - based on capital (market) value
  - based on land improvements

**Indirect taxes**

1. Tax on domestic trade (VAT and turnover tax)
  2. Tax on foreign trade (import duty and export tax)
  3. Other indirect taxes (excise, cess, stamp duties) on specific marketed products
- 

**Source:** Khan (2001).

However, it seems important to renew the attention on land taxation. For instance, in Paraguay (where land concentration is a source of social conflict in rural areas), unequal land ownership—with a significant presence of large farms (*latifundios*) and low use of the land—reflects, in part, the very small land tax that is charged on rural properties (World Bank 2007b). An appropriately designed land tax applied over realistic fiscal valuations (current valuations are minimal compared to market values) would have a beneficial impact on the distribution of land ownership, agricultural productivity, poverty alleviation, and municipal finances (considering that the revenue potential for local governments was estimated at somewhat more than 1 percent of GDP) (World Bank 2007b).

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21 Sarris cites studies that show that in 1940, agricultural land taxation was 23 percent of central government revenues in Egypt, 19 percent in India, and 5 percent in Chile, while in the late 1980s in those same countries, land taxes did not account for more than 1 percent of central government revenues.

Income taxes on agriculture do not seem to be important contributors to fiscal revenues (Khan 2001). There are countries, such as Pakistan, in which constitutional amendments exclude farmers from income taxes and where only provincial governments are allowed to tax land, which they do very modestly (Khan and Khan 1998). In 2009–2010, agriculture contributed only 1 percent of all revenues, while the sector represented 22 percent of GDP and contributed 10 percent of total growth in that period (PILDAT 2011).

The bulk of agricultural tax revenue in many developing countries comes from taxes and duties on marketed agricultural products in domestic and foreign markets.<sup>22</sup> As noted before, the VAT has become an important revenue generator for many developing countries. However, food products are assessed reduced tax rates, and in many cases they are tax exempted.

On the other hand, taxes on exported and imported products have traditionally been a major source of government revenues in developing countries. This is an administratively simple way of collecting taxes, considering that foreign trade is concentrated in a few ports that can be more easily controlled. In some cases, public enterprises and marketing boards have acted as tax collectors. However, trade taxes show greater volatility in terms of revenues generated (Sarris 1994).

If the country has an important position in world markets for some export good, then export taxes may shift the terms of trade in favor of the exporting country; on the other hand, export taxes have been criticized (other things being equal) for reducing the domestic output and exports of the taxed products.<sup>23</sup>

The debates about the general equilibrium impact of trade taxes (both on the export and import side) and/or their revenue generation capabilities have become less relevant lately considering the decline in their use noted before. Agricultural export taxes in many developing countries have come down since the mid-1980s, linked to the steady decline in real agricultural prices, as well as the structural adjustment programs negotiated with the IMF and the

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22 In principle, there is a difference between taxes levied on gross output (including domestic consumption) and marketed surplus, with the first one being less distorting. In practice, it is very difficult to tax products for domestic consumption, and the only feasible option is to tax marketed products (Sarris 1994).

23 It has also been argued that export taxes reduce overall welfare in the country applying them, but this is less obvious and must be analyzed in a general equilibrium setting (see, for instance, Cicowiez, Díaz-Bonilla, and Díaz-Bonilla 2008).

World Bank.<sup>24</sup> Import taxes have also declined (but less than export taxes) due to different programs of multilateral, regional, and unilateral trade liberalization (see Chapter 11 on trade).

Another possible form of explicit taxation of agriculture is taxation of purchased inputs. In general, however, most public interventions related to inputs such as seeds, fertilizers, and machinery and equipment, including irrigation, are in the form of subsidies rather than taxes on those inputs (Sarris 1994; see discussion below).

### Levels of Agricultural Taxation

Considering all these taxes together, what is the explicit tax burden on farmers? Because of a lack of data, the answer to that question is not clear. Kahn (2001) argues that it has been lower for farmers than for other groups and that the explicit tax burden on agriculture has fallen in recent decades, due mostly to a reduction in indirect taxes (such as export taxes) and declines in direct taxes on income and land.

Recently, there have been studies of the tax burden for several SSA countries, in which agriculture is compared to other sectors using what those studies call the marginal effective tax rate (METR).<sup>25</sup> These studies provide a snapshot observation but do not show trends. The study on South Africa (FIAS 2006b), for instance, finds that the METR for agriculture is 5.7 percent; the study concludes that the sector currently pays very little in taxes, although it faces uncertainty over municipal taxation. The METR was estimated at 7 percent for Rwanda, where the agricultural sector was found to be largely informal and outside the tax coverage, except for coffee and tea farmers, and to benefit from significant tax concessions, although still paying some municipal levies (FIAS 2006a). In Tanzania, the calculations for the METR were between 6 and 23 percent, where, again, the agricultural sector is mostly informal and generally outside the tax net, except perhaps in the case of some local government sales taxes, while incorporated agricultural enterprises

24 Krueger, Schiff, and Valdés (1988) estimated that agricultural exportables in developing countries paid an export tax (measured as a negative direct nominal protection rate) of about 11 percent during the 1970s and 1980s, while agricultural importables were protected by an import tax (measured as a positive direct nominal protection rate) of about 20 percent during that period. Recent estimates by Anderson and Valenzuela (2008) indicate that the incidence of export taxes in most developing countries has fallen significantly since the mid-1980s, particularly in Latin America and Asia.

25 The METR measures how much the tax system reduces the real rate of return on investment, at the margin. The METR is defined as  $(RORbT - RORaT)/RORbT$ , where  $RORbT$  and  $RORaT$  are the real rates of return before and after tax, and  $ROR$  is the present discounted value of annual net earnings divided by capital expenditure.



benefit from immediate deductions of capital expenditures and are exempted from VAT on inputs and outputs (FIAS 2006c).

In general, it has been shown that the overall tax/GDP ratio is inversely related to the share of agricultural production in the economy, which would suggest that the sector is taxed less than other sectors (at least considering explicit taxes) (Ghura [1998] for the case of SSA). More recently, Gupta (2007) calculated, using cross-country regressions, that a 1 percent increase in the GDP share of the agricultural sector would reduce revenue collection by up to 0.4 percent of the GDP. This inverse correlation may be due to (1) the fact that in many developing countries, agricultural producers are poor and operate in the informal sector, (2) the difficulty and cost of collecting explicit taxes on a dispersed population, and/or (3) the sector's political ability to avoid taxation.

On the other hand, it has been argued that agriculture, which still accounts for a sizable percentage of the GDP (20 percent or more) in many low-income countries, should not be left aside as a "hard-to-tax" sector (Keen 2012). The tax collection effort could focus on land and large producers, while most small farmers will fall into income categories that, by the usual criteria, would be exempted from wealth, income, and value-added taxes. Landholdings are concentrated in many developing countries (much more so than income; see Table 3.3 in Chapter 3), which may add an equity rationale to the taxation on those assets. As Keen suggests, the low collection of taxes on agriculture may be the result of the political clout of large landowners rather than of specific technical problems that make agriculture a "hard to tax" sector. Whether those land taxes should be collected at the national or local levels would depend on the trade-offs between gains from improved local information and losses due to corruption and the potential local capture of tax offices. The use of presumptive taxes, as in the case of small enterprises in general, may help to increase tax collection. Similarly with any other productive sector, the main fiscal issue facing the taxation of agriculture is to ensure that the core tax base is adequately and fairly taxed (Keen 2012).

### **Special Fiscal Topics in Agriculture: Commodity Prices and Fiscal Outcomes**

In general, episodes of booms and busts in commodity prices appear to be associated with volatility in growth and other macroeconomic variables, including fiscal accounts. This is particularly the case in developing countries, many of which are producers and exporters of commodities (Chapter 1 and Chapter 3). Booms and busts in those products have been associated with pro-cyclical fiscal policies: revenues and expenditures increase in good times,

and fiscal adjustments takes place in bad times, exactly the opposite of what an adequate policy approach should be. For instance, high commodity prices in the 1970s appear to have led some countries to tax what was considered permanent windfall profits from primary products. Such increases in fiscal resources then led to expansionary fiscal policies that later proved unsustainable when commodity prices—and the tax revenues collected from those products—declined. Schuknecht (1999) argues that the experience of the mid-1990s coffee boom in Africa indicates that countries that left a large share of the windfall in the hands of the private sector and committed themselves to fiscal discipline have shown better results in terms of fiscal stability, private-sector responses, and economic growth than countries that did not.

The boom in commodity prices that started mainly after 2005 has reactivated the interest in the link between those price cycles and the performance of several economic variables. Different econometric analyses have looked at the relationship between commodity prices and economic growth and cycles on the one hand or between the economic cycle and fiscal aggregates on the other. Therefore, it is possible to establish a link from commodity prices to the economic cycle and from the latter to fiscal outcomes. More recent studies, however, have focused on the direct link between commodity prices<sup>26</sup> and fiscal outcomes (Medina 2010; Spatafora and Samake 2012; and Céspedes and Velasco 2011).

Medina (2010) finds that for LAC (as well as for some high-income countries included in the analysis), positive commodity price shocks have a positive effect on real revenues and GDP. On the expenditure side, however, the results show a larger dispersion: commodity-exporting high-income countries, and Chile in LAC, do not show changes in fiscal expenditures (in the case of countries such as Canada, the response is negative, suggesting a countercyclical fiscal policy), while for the rest of LAC, the median increase is about 4 percent (for a similarly standardized shock in commodity prices). There are also some countries with far higher responses, such as Ecuador (which shows an increase of 8 percent) and Venezuela (with an increase of 12 percent). A conclusion is that the presence of formal fiscal rules, adequately implemented within transparent frameworks, is the main reason for those differential results (Medina 2010). Chile, for instance, has established a fund to absorb the excess revenues above an estimated trend price for copper; this money can be later utilized when copper prices drop below trend. These policy rules help to avoid pro-cyclical policy responses and allow the country to use countercyclical fiscal policies.

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26 These are commodity prices in general, not only agricultural products.

Spatafora and Samake (2012) also show that commodity price shocks have a significant impact on fiscal outcome: commodity price volatility leads to increased budget uncertainty, may encourage a pro-cyclical fiscal policy, and could lead to problems of debt sustainability. These effects appear especially significant, both statistically and economically, in low-income countries, both when they are commodity exporters or importers, although, as noted immediately, the policy responses and impacts appear to be different in each case. For exporters, tax revenues and expenditures rise in response to commodity price increases. In many cases, the fiscal balance deteriorates because expenditures rise faster than revenues, related to the assumption made by governments in those countries that commodity price increases are permanent. For commodity importers, the impact is somewhat different: expenditures increase because of the need of more spending on social safety nets and food and fuel subsidies in response to commodity import price increases; and the fiscal balance deteriorates (Spatafora and Samake 2012).

Céspedes and Velasco (2011) analyzed 32 countries that have an important presence of commodities in production and exports (most of them developing countries that the authors call “commodity republics”) and looked at the impact of commodity booms on fiscal variables, including expenditures, revenues, and fiscal balances. They found a differential response, on average, between the commodity boom of the 1970s and the more recent one. Calculating the average fiscal deficit or surplus during a country’s boom episode as a share of GDP minus the average fiscal balance over the two years prior to the episode,<sup>27</sup> the 1970s boom led improved fiscal accounts by only 0.2 percent of GDP on average for the countries analyzed, while in the more recent episode they improved on average by 3.6 percent of GDP. The main reason does not seem to have been the behavior of revenues (which, using the same method of comparison as for deficits, increased by about 3.1–3.2 percent of the GDP in both episodes) but the more restrained expansion of expenditures: in the 1970s, the “commodity countries” analyzed spent an equivalent of the increase in real revenues (3.2 percent of GDP), while in the recent episode real spending did not increase as percentage of the GDP. Céspedes and Velasco (2011) note that the differential behavior of government expenditures

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27 For example, if in the two years previous to the boom the fiscal deficit was 2 percent of the GDP (that is, –2 percent), and during the boom it averaged a surplus of 3 percent (+3 percent), then the turnaround was 5 percent of the GDP (3 percent – (–2 percent) = 3 percent + 2 percent = 5 percent). If in the two previous years, expenditures (or revenues) were 15 percent of the GDP and during the boom period increased to 18 percent, then the fiscal change was 3 percent of the GDP (18 percent – 15 percent = 3 percent).

seems to also be reflected in the fact that the real exchange rate during the first episode experienced an appreciation of 9.3 percent, while in the current boom the real exchange rate appreciated far less (5.9 percent).<sup>28</sup> Of course, there is substantial heterogeneity across countries, with some of them showing deteriorating fiscal performances during both commodity price booms (although in most of those cases, such deterioration was smaller during the current episode).

The main policy question is how to manage these commodity booms to maximize the positive effects on the economy (growth, increased fiscal revenues) and minimize the negative ones (overspending and the potential appreciation of the real exchange rate). The traditional prescription (which applies mostly to metals and energy products that in many developing countries are under government control) is to invest the extra income in a public fund (sometimes called sovereign wealth fund [SWF]) and use only the interest or revenues from that capital to support future government expenditures, smoothing over time total consumption in that country. Agricultural products, which are based on private-sector activities, have not usually been discussed in the context of SWF, as has been the case of metals and energy products, but booms in agricultural commodities may also generate, through the normal structure of taxes (and particularly if there are export taxes), a fiscal surplus that can be invested in a countercyclical fund.

The policy dilemma is that given the pressing current needs in many developing countries (from investment in infrastructure and human capital to alleviation of poverty and food insecurity), there may be good economic and social reasons to utilize the windfall now, instead of trying to smooth the use over time. A more risky policy would be to borrow against the expectation that the windfall continues in the future and to use those loans to expand public expenditures even further: the experience during the commodity boom of the 1970s shows that such an approach tends to end in debt crises and fiscal adjustment, while simulations of possible policy responses during the current boom also indicate that it is a suboptimal policy response (see, for instance, Go et al. 2013).

The best policy approach using the additional revenues linked to higher commodity prices seems to be a balanced mix of countercyclical funds, high-quality investments linked to productive infrastructure, R&D, and

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28 This effect was briefly mentioned in the opening paragraphs of this chapter: because the government tends to buy more nontraded goods and services, an expansion of public expenditures increases the price of those goods and services ( $P_{nt}$ ) in relation to traded goods ( $P_t$ ), appreciating the real exchange rate ( $P_{nt}/P_t$ ) and negatively affecting exports and import-competing activities.

human capital, and targeted safety nets for the poor and vulnerable, rather than pursuing each one of these three options separately (Go et al. 2013). While using the windfall to finance transfers to reduce poverty in the short and medium term, investments in physical and human capital would help with medium- and long-term growth, and a countercyclical fund will maintain macroeconomic stability (Go et al. 2013). Transfers to households should try to target the poor and vulnerable instead of being universal (more on this later). It is also important to acknowledge that an accelerated program of public investments may find problems given the limited capacity to design and implement projects in many developing countries. Other problems might include the possibilities of misallocation of resources, waste, and outright graft that can result from poorly conceived and managed accelerated investment programs.

Other policy buffers to manage fiscal instability include floating exchange rates, increase in foreign reserves, and the use of hedging instruments to manage export prices. However, the first two policy levers would offer only a partial offset to the fiscal impact of commodity price shocks, while hedging, which could help stabilize export revenues, may be possible only for a small number of commodities and/or world prices used for hedging and may not coincide with country-specific commodity prices, which would remain subject to significant idiosyncratic fluctuations (Spatafora and Samake 2012).

### **Special Fiscal Topics in Agriculture: Price Stabilization and Public Stocks**

The new context of higher and more volatile nominal prices for food and agricultural products has led to renewed interest in price stabilization schemes. There are at least two structural aspects that may persist over time and influence price volatility (see Chapter 3). One is the expanded linkages between energy developments and food prices. In particular, biofuel mandates have been singled out as one of the reasons behind the price spikes affecting corn and oilseeds after 2005, and forward simulations suggest that biofuel policies, if maintained in their current state, will lead to higher and more volatile prices for food products in the coming decades (OECD/FAO Agricultural Outlook 2011, 2012, and 2013; Schnepf 2013; Laborde and Msangi 2012; Torero 2012; Rosegrant et al. 2013; Al-Riffai, Dimaranan, and Laborde 2010). More generally, developments in energy markets, including but going beyond the issue of biofuel mandates, may drive outcomes in agricultural markets, adding another source of volatility for food production, demand, and prices (Chapter 3).

The other aspect relates to climate change and the increase in the frequency of extreme weather events such as droughts and floods that appears to

have taken place lately (IPCC 2014; Hansen, Sato, and Ruedy 2012). A more frequent occurrence of extreme events would also increase the volatility of agricultural and food production and prices.

These developments have revived the issue of price stabilization in the current policy debate, and, in particular, the issue of food security stocks and domestic food aid. Here the focus will be on some fiscal and operational issues related to food security stocks.<sup>29</sup> Food consumption subsidies (or domestic food aid), also related to the perceived problems of high and volatile food prices, will be discussed in a subsequent section.

The starting point is to notice that prices (their level and volatility) are not the only variables that impact agricultural and food production and consumption. For production decisions, the crucial concept is farmers' net income (which depends on prices but also costs and taxes/subsidies; see Chapter 2); and poverty and food security are affected by multiple factors, of which food prices comprise only one (Chapter 1 and 3).<sup>30</sup>

Also, it is important to note there are many policy instruments that affect the level and volatility of prices and not just public stocks for price stabilization purposes. For instance, Galtier and Vindel (2013) identify a variety of policies within four broad strategies resulting from a 2-by-2 matrix, which combines markets and governments on the one hand with the goals of stabilizing prices or managing and coping with the consequences of price volatility on the other. Each one of the four quadrants defines a specific strategy that the authors call A (use of market-based policies to stabilize prices), B (use of market-based policies to cope with volatility), C (direct interventions by governments to stabilize prices), and D (direct interventions by governments to cope with volatility). They emphasize the C strategy (highlighting public agricultural and food stocks for stabilization purposes), which, in their view, is often missing in the advice given to developing countries.

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29 There is a long list of theoretical and empirical studies on food stocks that cannot be reviewed here. Different evaluations of the uneven experiences of food stocks for stabilization of prices in developing countries can be found in Islam and Thomas (1996); Hazell (1993); and Knudsen and Nash (1990). Recent analyses include Galtier and Vindel (2013), who are more supportive of the use of food stocks for price stabilization; less sanguine assessments can be found in World Bank (2005, 2012) and Gilbert (2011). Gouel (2013) provides a review of different approaches, including simulations with dynamic optimizing models. This book focuses on domestic food stocks; discussions about regional and international food stocks can be found in World Bank (2005, 2012); von Braun and Torero (2009); and Tangermann (2011).

30 See, for instance, Smith and Haddad (2000) on the crucial importance of health and sanitation and women's empowerment and education, all topics that are largely unrelated to price issues; and Sinha, Lipton, and Yaqub (2002), who argue that poverty is associated with different types of negative events on households and individuals that they call "damaging fluctuations," only some of which are related to food prices.

Table 8.11, taken directly from the report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security (HLPE 2011), expands the ABCD framework by defining a 3-by-3 matrix. The left-hand column identifies policies and interventions operating through markets and the private sector, directly implemented by the governments, or carried out

**TABLE 8.11** Different policies for price shocks

Policies and Programmes	Reduce the eventuality and size of price shocks	Ex-ante interventions relative to price shocks	Ex-post interventions relative to price shocks
Programmes	Reduce price volatility	Manage price volatility	Cope with price volatility
Interventions through markets and with the private sector	<p>A. Make markets work better in time and space</p> <ul style="list-style-type: none"> <li>• Information systems</li> <li>• Transport and communication infrastructure</li> <li>• Increase competition in domestic market and trade</li> <li>• Private sector storage development through improved access to financing</li> <li>• Grades and standards</li> </ul>	<p>B1. Financial products</p> <ul style="list-style-type: none"> <li>• Crop/livestock insurance (index-based)</li> <li>• Credit and savings associations</li> </ul>	<p>B2. Emergency loan programmes</p> <ul style="list-style-type: none"> <li>• Access of importers to trade loans</li> <li>• Loans to producers and consumers</li> </ul>
		<p>B1. Investment in agriculture</p> <ul style="list-style-type: none"> <li>• Increase domestic food production</li> <li>• Diversification and resilience of food systems</li> <li>• Growing local crops</li> <li>• Food storage systems at all levels including community storage</li> </ul>	
Direct state interventions	<p>C. Intervene in markets</p> <ul style="list-style-type: none"> <li>• Public stocks</li> <li>• Price bands schemes</li> <li>• Price stabilization</li> </ul>	<p>D1. Enhance productivity in small-holder farming</p> <ul style="list-style-type: none"> <li>• Resilience of farming systems</li> <li>• Targeted input subsidies (seeds, fertilizer)</li> <li>• Production for home consumption</li> </ul>	<p>D2. Social protection for vulnerable households</p> <ul style="list-style-type: none"> <li>• Cash and food transfers</li> <li>• School feeding programmes</li> <li>• Taking into account human life-cycle</li> </ul>
		<p>D1. Employment in the rural non-farm economy</p> <ul style="list-style-type: none"> <li>• Decentralization</li> <li>• Small and medium rural enterprise programmes</li> </ul>	
Interventions through and with civil society		<p>E1. Negotiated ex ante social protection</p> <ul style="list-style-type: none"> <li>• Minimum wage, right to food</li> </ul>	<p>E2. Community-driven productive social protection</p> <ul style="list-style-type: none"> <li>• Workfare (coping) with community-driven development projects (management)</li> </ul>
		<p>E1. Producer organizations' services to members</p> <ul style="list-style-type: none"> <li>• Rotating credit schemes</li> <li>• Group insurance</li> <li>• Local purchases for food distribution systems</li> </ul>	

Source: HLPE (2011).

by the civil society; the top row distinguishes policies and interventions that focus on stabilizing prices or that assume that price volatility and shocks will occur and therefore try to manage those problems *ex ante* or to cope with them *ex post*.

The HLPE classification also includes a list of possible policies and interventions. This list offers concepts—such as food stocks—that could form parts of direct government intervention strategies that could stabilize prices (type C of these interventions). The point here is not to discuss or rank all the possible policies and interventions but simply to note that there is an extensive array of options for policymakers that should be analyzed and deployed in an integrated framework for price stabilization, agricultural production, and food security.

Therefore a unidimensional approach to policy analysis, emphasizing only the link between price volatility and the need to build public stocks, would risk neglecting other relevant policy levers (see Chapter 1). However, as agricultural and food stocks are often discussed in the context of price stabilization, the next paragraphs focus on them, particularly considering the important fiscal impact those programs may have in many developing countries (Table 8.12 from World Bank 2012).

**TABLE 8.12** Comparison of public spending on agricultural stocks

Country	Spending on public stock programs (% GDP)	Spending on agriculture (% GDP excluding A)	Spending on agricultural R&D (% GDP)
	A	B	C
India	1.0 (2004/05) to 1.5 (2008/09)	1.2 (2008/09)	0.06 (2008/09)
Indonesia	0.5 (2008–10)	0.8 (2008)	0.05 (2003)
Philippines	0.4 (2005/06) to 1.0 (2009)	0.8 (2005)	0.06 (2002)
Zambia	0.3 (2009) to 1.9 (2011)	0.6 (2010)	0.15 (2010)

**Source:** World Bank (2012), which lists the original sources of the data in the table.

The costs of operating public stock programs appear significant in the countries considered (between 0.3 percent to almost 2 percent of the GDP). They clearly exceed spending on agricultural R&D (which, as mentioned several times in this book, appear as more effective ways to increase agricultural production and reduce poverty). In some instances, the costs of public stock programs are larger than the rest of expenditures on agriculture.

In what follows, some economic and operational issues of public agricultural and food stocks will be discussed.



### Objectives and Types of Food Stocks

A common operational problem for food stocks is that they lack clear objectives or have multiple and at times conflicting ones (NEPAD 2004; Dorosh 2009). The objectives may include coping with emergencies, helping a population suffering from chronic hunger, stabilizing prices for producers at profitable levels, providing food to urban populations at prices that are stable and affordable, and other similar ones (NEPAD 2004). These varying objectives can result in food stocks of an inadequate size (too high or too low), confusing decisionmaking and managing structures that are prone to political interference and short-term horizons, high costs and operational inefficiencies, and inappropriate levels of funding and misallocation of resources. A basic starting point, therefore, is to properly categorize these objectives, which can be grouped into one of three general categories (NEPAD 2004; World Bank 2005, 2012).

First, emergency food stocks try to cope with natural disasters and other disruptions in the domestic or international supply of food. These are usually small and are supposed to bridge the supply gap until the arrival of commercial supplies or food aid. Hazell (1993) suggests that relatively small percentages of total consumption (which he estimates at 5 percent of total consumption in the case of SSA countries) may suffice to act as an insurance mechanism. More recently, NEPAD (2004) suggests that such stocks should be able to cover two to three months of consumption, which amounts to 17–25 percent of total consumption in the countries covered by the study.

A second category can be called food redistribution stocks. These serve as a rotating stock that backs up the distribution of food in programs that can take several formats, such as the following: targeted safety nets to help the poor and vulnerable; special programs such as school lunch programs, supplementary feeding programs for women and children, food-for-work (FFW) schemes, and the like; and semitargeted public distribution systems (such as fair price shops, ration shops, etc.) or even nontargeted public systems (although this option has been generally discontinued because of its high cost). These stocks may also cover some emergency functions.

Food redistribution stocks are typically bigger than emergency stocks, depending on the coverage and scope of the food distribution system of which they are a component. For instance, India's Targeted Public Distribution System (TPDS) is the largest food system of this type in the world (Dorosh 2008); it has a coverage of some 600 million people considered food vulnerable or undernourished. The National Food Security Act of 2011, expanded

and revised in 2013, increases this coverage to about 800 million people. This large system obviously requires large inventories, which has led to the government's purchasing up to one-third of the country's wheat and rice produced in recent years (Hoda and Gulati 2013).

Although additional consumption may not increase one-to-one with the rations distributed (see Rashid and Lemma 2011), the people receiving food support represent an additional level of demand that would not have existed without the domestic food security and domestic aid program. This additional demand tends to support food prices, even if the government buys at market prices.

At the same time, different studies show that at various points in time over the past two decades, India has accumulated inventories far in excess of the amounts needed for its food stock program, which generated large fiscal costs for the government and led to subsidized exports (Dorosh 2008). The program's operation may also have been pro-cyclical in recent episodes of global price spikes, without adequate releases of food stocks in the domestic markets and with even further stock accumulation during moments of high prices. This, coupled with additional exports, would not have helped poor consumers (Gouel 2013). The direct costs of the current TPDS have been estimated to be about 0.9 percent of India's GDP in 2009–2010 and 2010–2011 (Hoda and Gulati 2013) (see also Table 8.12, which has somewhat larger estimates). If the increase in coverage leads to a proportional increase in costs, the fiscal cost of the new scheme will be even higher. That cost, however, may not necessarily translate into an equivalent support to poor consumers because of waste and losses due to inadequate storage, handling, and transportation, leakages of funds and products, and diversion of food from the poorest members of the society: Hoda and Gulati (2013) estimate leakages and diversion of the TPDS to be between one-fifth and one-third of the subsidized food grain.

However, it must be noted that India has avoided a major food crisis since it started to procure cereals domestically in the mid-1970s for the public distribution system, even though there have been several instances of sharp declines in production (for instance, 1976, 1979, 1982, 1986–1987, 2002, and 2009 saw declines of more than 7 percent in cereal production) (Gouel 2013). Furthermore, the country has also been able to maintain reasonable stability in the domestic price of major food products, even in the face of important exogenous price shocks in recent years (although at the cost to other countries of exporting volatility to global markets) (Gouel 2013). The question here relates more to the costs of the current system and the possibility of designing

a more efficient and equitable scheme to provide a safety net for the poor, insure against food shocks, and support small farmers.

The third category is buffer stocks, whose purpose is to stabilize prices. These stocks generally tend to handle larger quantities of food than the other two categories; they may carry enough agricultural and food products to also serve as emergency relief and as a backup for the operation of a public distribution system (World Bank 2005, 2012). This is true in the case of India, where the system of public purchase and distribution, given its size, appears to have helped to stabilize prices in the domestic market, although at significant costs compared to other countries in the region that followed other, more market-based strategies (Dorosh 2008).

Stabilization stocks differ in the definition of the price targets, such as (1) a single price, (2) symmetric price bands (of different width), and (3) extreme values (in many cases asymmetrically, trying to ensure that they do not go above or below some level considered highly disruptive for consumers or producers).

If the real objective of the food stocks is price stabilization (and not subsidizing producers with above-market prices or taxing them with below-market prices), the target levels for prices or price bands should be updated to track mean trend values over the period of stabilization, such as a three-to-five-year rolling average (Timmer 1989). However, historical examples show that, with some exceptions, these stabilization stocks tend to drift into subsidized price support to producers, to the detriment of consumers and taxpayers, or into taxing producers with low prices to help consumers.

Theoretical and empirical analyses of price stabilization using standard economic indicators have generally found only small positive welfare effects for consumers (Gouel 2013) and some efficiency gains for producers, although still not very large (World Bank 2005). However, the primary gains may come not from stabilization per se (which is a symmetric concept including ups and downs) but from preventing large upward spikes (which may affect poor consumers irreversibly by hurting their health and nutritional status) or downward price spikes (which may force small and vulnerable producers into bankruptcy or a fire sale of assets).<sup>31</sup> At a macroeconomic and political level, the argument is that these large upward or downward spikes affect political stability and the general economy in ways that are not captured in the more limited welfare and efficiency measures mentioned above (Timmer 1989), although there are different views on whether these political and

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31 See Chapter 1 for the distinctions between cycles, volatility, and extreme events.

macroeconomic benefits from avoiding price spikes are as large as postulated (see World Bank 2005).

The challenge is how to move from the notional idea of price stabilization to operational schemes that actually deliver that outcome. Both food redistribution stocks (which in principle try to help specific poor and vulnerable consumers) and buffer stocks (which are not targeted in their effects on consumption) are more relevant when a country's consumption depends on a reduced number of basic products and when those products are less perishable (World Bank 2005).<sup>32</sup>

The importance of food security stocks may also change depending on how advanced a country is in its development, which, among other things, defines the quality and extension of infrastructure and the operation of the private sector.<sup>33</sup> The geographical position also matters; a landlocked country with infrastructural limitations may benefit more from a well-designed program of public food stocks than a country with easy access to maritime routes.

In summary, emergency and redistributive food stocks can play a role in food security arrangements. However, carrying stocks as an insurance mechanism or as a component of safety nets is different from using stocks to stabilize domestic grain prices. The latter, as noted, usually requires larger stocks, may be expensive, and is not always effective in stabilizing prices. While price stabilization schemes seem to have worked better in Asia (with an important fiscal cost), those schemes in African countries appear to have been mostly unsuccessful (see Galtier and Vindel 2013; NEPAD 2004). Developing countries in LAC, with relatively diversified diets and more developed private systems for food processing and distribution, have in general moved away from

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32 According to the food balance sheets calculated by FAO (FAOSTAT 2014), Indonesia, highlighted by Timmer (1989) as a positive example of price stabilization, is a clear example in which a product, rice, that is storable represents (using 2009 data) around 48 percent of the calories and 40 percent of the proteins consumed on average (these values were 56 percent and 53 percent, respectively, in 1980). India is closer to Indonesia but still more diversified, with 21 percent of the total average calories in 2009 resulting from wheat and wheat products and about 29 percent from rice. On the other hand, many African countries have a more diversified structure that utilizes some products (such as cassava and yams) that are difficult and costly to store (Díaz-Bonilla 2014).

33 For instance, Galtier and Vindel (2013) argue that the price stabilization scheme could be adjusted according to the level of a country's development: a less-developed country where agriculture is in a pre-green-revolution stage may need price bands, not too narrow but not too wide; developing countries with more productive agricultural and market institutions may reduce and even eliminate the lower support price but may maintain the upper part of the band to avoid shocks to consumers; finally, in developed countries, where producers are competitive and food has a smaller incidence in consumers' expenditures, the stabilization stock may be abandoned.

public food stocks and instead linked domestic food programs to general safety nets (see next section).

### **Purchasing Prices**

It has been noted that stabilization stocks may focus on single prices, on defending price bands (mostly symmetrically), or on price extremes (which may have an asymmetric definition, such as avoiding price spikes that hurt consumers). What follows presents some operational aspects of the different approaches.

It has been argued that the single-price approach may be very costly and may eliminate all incentives for private-sector traders to offer storage, which in turn forces the public sector to undertake a larger role in the operations needed to stabilize prices (Gouel 2013). In addition, if the level at which food prices are stabilized is higher on average than what it would have been without stabilization, this would help producers but hurt consumers, particularly poorer ones (Sumner 2000). Thus, there may be a trade-off for the poor between price stability and price levels, with price stabilization schemes at higher price levels possibly driving more people into food insecurity.

Purchasing prices above market-clearing prices can also lead to excessive accumulation of stocks, which eventually will have to be disposed of in the domestic or international markets, depressing prices. In the case of exports (which, to be competitive in world markets, may have to receive an explicit or implicit subsidy with respect to the purchasing price), this disposal of surpluses in global markets will most likely generate trade frictions with other countries (see Dorosh 2008, 2009).

Gouel (2013) shows that structuring purchases to defend a price band (to avoid excessively high or low prices) will lead to better prices for producers during the buildup of stocks but to lower prices (although also less volatility) once those levels have been reached, provided the stocks are not exhausted to defend certain levels and then permanently replenished, which will keep prices higher at significant fiscal costs (Thompson and Tallard 2010). Gouel (2013), in line with other literature, also shows that the notion that wider price bands lead to lower costs (supposedly because the government buys low and sells high and does not have to intervene that often) may be incorrect because it does not take into account the carrying costs of such policies, which increase with wider price bands because of the longer time that stocks have to be immobilized and maintained (see also World Bank 2012).

Thompson and Tallard (2010) analyze asymmetric interventions used only when prices are excessively high. They simulate a repeat, within a decade, of

sharp upward price spikes such as those in 2007–2008 and 2011. These simulations are relevant because this scenario is what many people have in mind when discussing volatility,<sup>34</sup> and because they illustrate many of the trade-offs related to the high/low food price policy dilemma highlighted before. The prices for wheat and rice are simulated to jump a sizable 70 percent over the previous year (which the authors argue would be similar to the 2007–2008 price shock) and then revert to trend levels. They consider three policies to confront a sudden price increase in the international wheat and rice markets: (1) trade measures (such as reducing import taxes when the country is a net importer or increasing export taxes in the case of net exporters) to prevent domestic prices from going above 35 percent of the preshock level; (2) consumer subsidies that limit the increase in consumer prices by 20–40 percent; and (3) additional public stocks for up to one-third of domestic consumption that are built and then released on domestic markets, if domestic prices rise by at least 40 percent in a specified period.<sup>35</sup> The results calculate the levels of producer and consumer prices in these countries, the fiscal costs of the policies, changes in the per capita consumption of wheat and rice, and the impacts on world prices.

In the simulations, world prices are higher than in the baseline when food stocks are being built, but then they are obviously lower during the year of the price shock when food stocks are released (about 20–25 percent lower than world prices would have been with the upward shock alone). Prices are then higher again if stocks are rebuilt. Producers benefit and consumers lose while the stocks are being built; during the price shock, the reverse happens. Producers in the rest of the world (outside the ten core countries considered) also benefit from the higher prices (underlining the fact shown in simulations by Gouel and Jean 2012, that additional trade measures are needed to keep the economic effects of building and releasing food stocks within the country). If the stocks are built and the price shock does not take place, prices will

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<sup>34</sup> In fact, upward spikes are only one form of volatility (see Chapter 1).

<sup>35</sup> The policies are assumed to be implemented by a group of ten countries (Argentina, Brazil, Chile, China, India, Indonesia, Russia, South Africa, Ukraine, and Vietnam) but not in the rest of the world (which nonetheless suffers the consequences of the policies implemented in the core group). The countries selected represented about half the world's population and some two-thirds of rice consumption and production, 45 percent of world wheat consumption for food, and 43 percent of world wheat production in 2010–2011. The new policies are in addition to any existing measures that these countries may have already had in place. The baseline (without the price surge and the new policies) and the simulated paths with the new policies cover a total period of ten years, with the price shock taking place somewhat before the midpoint of that period and the consequences of the shock and policies playing out until the tenth year.

have been maintained higher during the buildup and will then return to the trend once the desired level of stocks is achieved; however, the costs of building the stocks and of keeping them afterward increase significantly (about US\$160 billion over ten years for all ten countries considered).

It is important to look at the results in terms of rice and wheat consumption, which is, within the model, the relevant measure for food security. Over the ten-year period of the simulations, consumption of both those products is lower in the countries applying the policies and in the rest of the world. To understand these results, the following pair of scenarios must be considered: first, a world without a price surge and without new policies compared to a world without a price surge but with new food stocks; and second, a world with a price surge and without new policies compared to a world with a price surge and with new food stocks. The first result is obvious: food stocks have been built for no purpose (there was no price shock), leading only to price increases and therefore to a reduction of consumption. The second result is the combination of the period of the shock, when prices are lower and consumption is higher due to the release of stocks, and the rest of the years, when the positive effect in consumption during the price shock is more than compensated by higher prices and lower consumption during the periods of stock buildup.<sup>36</sup>

The trade-off is one common in insurance: consumers pay with less consumption during the years of building up stocks that will be used to limit a potentially large decline in consumption during the crises. The question is whether the insurance premium paid in less consumption during tranquil times compensates for the avoidance or reduction of the negative impact during the crises. The analysis also shows that the old dilemma of high/low prices highlighted in Chapter 1 cannot be avoided. In these simulations, producers in the ten countries (and in the rest of the world) benefit from higher prices; consumers, both in those countries and in the rest of the world, lose on average (although they suffer less during the price shock), and the whole scheme implies significant fiscal costs.<sup>37</sup> If as shown in Hazell, Shields, and Shields (2005), a nontrivial part of the domestic price variability is related to macroeconomic crises, then fiscal deficits caused by price food stabilization schemes may lead to

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36 The simulations are conducted in quantity units (not in monetary welfare metrics), and the results are not discounted over time.

37 It is also interesting to note that the other policies simulated (trade measures and consumer subsidies) increase the level of wheat and rice consumption in the ten countries considered when compared to a counterfactual of a price surge but no new policies; consumption increases more with consumer subsidies than with trade measures. However, in the rest of the world, both policies lead to smaller consumption, in addition to the decline caused by the price shock, although with consumption subsidies that further decrease is very small.

macroeconomic problems and destabilize domestic prices through other channels (see also Timmer 1989). More generally, macroeconomic crises lead to increases in poverty, with negative effects on food security, nutrition, and health (see, for example, Díaz-Bonilla 2008).

These results are based on food stock operations in which purchases are made at market prices. However, in many cases the objective may be to provide additional price support to farmers. Some analysts have argued that making purchases for food security stocks or domestic food aid at market prices will not be an effective way to attain developing countries' food security objectives. It is not clear, though, why buying at market prices should be ineffective. Certainly, to build food security stocks for emergencies and to provide domestic food aid for poor consumers, governments in developing countries would be far better off financially if they buy at market prices (especially during a context of high food prices). For poor countries, it makes sense not to add to the costs of the food security program by using above-market administered prices, which generate losses through buying high to support farmers and selling low to subsidize consumers.

Even when purchases are made at market prices, the program still offers some support to farmers (as noted in the simulations of Thompson and Tallard 2010).<sup>38</sup> Furthermore, that impact is reinforced if the food stocks are used annually and rotated as part of social safety nets or other public systems of food distribution targeting the poor and needy. As noted before, this type of redistributive program expands effective demand (that is, demand backed by purchasing power, in this case intermediated by government purchases) and leads to higher prices for producers than would have been the case otherwise. This cost would be borne by those consumers who do not receive food aid and by the taxpayers, but it has the counterpart of poor people acceding to higher levels of food consumption (discounting waste and leakages).

But if a government still wants to provide additional income support to poor and vulnerable producers (which is a separate objective from food security and nutritional support to consumers),<sup>39</sup> it seems more appropriate to

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38 See also Islam and Thomas (1996), who argue that if a government buys, say, 10 percent of the production of a crop at harvest time, paying market prices to achieve a stock-to-consumption ratio defined for food security reasons, then that operation would increase prices compared to the counterfactual of no intervention.

39 The Agreement on Agriculture (AoA) of the WTO refers to a special category of "low income or resource poor producers" (LIRP producers), which can receive investment and input subsidies under Article 6, Paragraph 2 of the AoA (Chapter 11).



use direct payments to those producers.<sup>40</sup> Providing income support directly to them goes to the heart of the matter. This is another application of the Bhagwati rule noted before regarding the need to target policies as closely as possible to the problem being addressed to avoid second-round problems if the policy targets a proxy. In fact, as argued several times in this book, if a country wants to help its poor and vulnerable populations, then targeting crops or livestock production is an indirect and many times inefficient and inequitable way to achieve poverty reduction and food security. Therefore, when food security concerns are invoked, the focus of the policy analysis should be on people rather than on crops or food products.

On the other hand, price stabilization schemes utilized to increase prices to all farmers (and not only poor ones), in addition to the problems discussed so far, will be regressive considering that the benefits will go disproportionately to larger farmers who have more production to sell.

If there were sharp downward price spikes because of international shocks (including import surges, perhaps due to unfair trade practices from other countries), trade measures such as safeguards and countervailing duties can be utilized as well, and developing countries, many of which have applied tariffs below the ones agreed in the WTO (called bound tariffs), can also adjust the levels of those instruments (see also Chapter 11 on trade issues). The drawback is that this approach would force the price and quantity adjustments onto the rest of the world,<sup>41</sup> or it may be self-defeating, as argued by Martin and Anderson (2011), if other countries did the same.

In many cases, problems of competitiveness in the farming sector (such as imports coming at very low domestic prices) may also result from overvalued exchange rates due to macroeconomic mismanagement. In this case, the right approach is to correct the overvaluation, which will help all tradable sectors, not just agriculture (more on this in Chapter 10).

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40 The conditions for these payments to be compatible with the WTO framework are in Section 5 of Annex 2 of the AoA.

41 Galtier and Vindel (2013) argue that such a change in tariffs should not be ad hoc but rather follow a rule such as variable levies and price bands. These mechanisms, which basically transfer the adjustment to other countries on a permanent basis, have been banned in the WTO. Ad hoc changes within bound tariffs are not restricted, though, and in fact, during the food price spike of 2007–2008, about half of the 159 countries surveyed by the IMF regarding their policy responses indicated that they had reduced import taxes (IMF 2008a and 2008b). During the period of lower world prices in the 1970s, the direction was the opposite, with many countries moving tariffs up toward bound levels (Martin and Anderson 2011).

### Other Operational Aspects

Governments of landlocked countries, with concentrated consumption of some food products that are less perishable and with difficult access to international markets, may find it necessary to maintain food security stocks to ensure against potential breakdowns in supply. If that food is procured domestically, those purchases, well timed at harvest, will provide some price support during a crucial time for farmers, even if those purchases follow prevailing market prices.

Depending on the conditions of the country, a food redistribution stock (the second category mentioned before) could also be an important component of a country's social safety nets and targeted food programs. It is important to have such safety nets (conditional cash transfers, nutritional programs for women and children, school lunches, food for work programs, and so on) in place already so that they can be scaled up if and when a sharp upward price spike occurs. But buying at market prices is the best option to build these stocks; if a developing country is buying food above market prices to provide farmers with high price support and then selling below market prices to help poor and vulnerable populations, it will most likely get into severe fiscal problems. All these interventions should be part of an integrated policy framework for food security and poverty alleviation that should include other components beyond public stocks.

If public stocks are built, they must operate with clear objectives and decisionmaking rules, as well as with strong financial, accounting, and audit safeguards; they should also be adequately sized and properly located (with the necessary transport, storage, and communications infrastructure). Finally, there should be adequate funding arrangements with properly trained staff (NEPAD 2004; World Bank 2005, 2012).

Whatever type of public food stocks is implemented, it is always important to consider additional policies such as credible early warning and food security information systems about harvest prospects, potential food shortages, and emergency needs, as well as embedding the operation of stocks in an integrated policy framework for food security. The latter should consider a full array of policies that support production, ensure market development, invest in infrastructure (transport, storage, and communications), help farmers and farmers' associations create and expand their stockholding facilities (including traditional on-farm options), and supplement these efforts with additional instruments such as warehouse receipts and credit, adequately use trade to

enhance food security, expand safety nets for the poor and vulnerable, and avoid ad hoc policy interventions by the government (NEPAD 2004).

### Special Fiscal Topics in Agriculture: Food Subsidies

Many countries have implemented over the years different types of programs to subsidize food consumption, with a variety of objectives: to help the poor and food insecure to reduce or eliminate calorie and nutrient deficiencies (thus building human capital), to maintain low (urban) wages, to change income distribution, to assure social and political stability, and so on (Pinstrup-Andersen 1988a and 1988b). These programs have been present in developed countries as well (such as the food stamp program in the United States). They may be permanent programs or may have emerged as a result of food price shocks and then been sharply scaled down or discontinued. For instance, the increase in food prices during the 1970s led to the expansion of different programs of consumer-oriented food subsidies (several of those programs are reviewed in Pinstrup-Andersen 1988a), while the jump in food prices of in 2007–2008 led as well to an increase in food subsidies (see IMF 2008a and 2008b). There are varieties of food subsidy programs. A first distinction is whether the financing of the subsidies is explicit in fiscal accounts (that is, there is a budgetary section with the subsidies identified) or implicit

**TABLE 8.13** Types of food subsidy programs

Type	Direct/Explicit Funding	Indirect/Implicit Funding
Universal	Fiscal cost may be large. Poorly targeted.	Usually price and trade measures. Economic costs for those paying the implicit tax may be large. Poorly targeted, as well.
Targeted	Smaller fiscal cost. Poor and vulnerable groups may be better protected (if they are the focus of targeting).	Programs combining targeting and indirect/implicit funding do not seem to exist.

Source: Author.

as a transfer from some other economic agents to the consumer (for example, the government may buy from producers at below-market prices through public-sector enterprises, or if the country is an exporter it may impose export quotas or taxes, which lower the domestic price of food). A second important aspect is whether the subsidies are universal (all households or individuals receive the subsidy, which, other things being equal, increases the fiscal burden) or explicitly targeted (only some people receive the subsidies, implying probably smaller fiscal costs) (Table 8.13).

Obviously, universal subsidy programs, while helping poor people's purchasing power and nutritional status, would also benefit middle- and upper-income groups, perhaps disproportionately so depending on the design and operation of the program (Pinstrup-Andersen 1988a and 1988b). Furthermore, targeting may not always mean that the program is focused on the poor: for instance, there may be food subsidies targeted to public-sector officials. Furthermore, even if the focus is on the poor and vulnerable population, there may be leakages to other groups.

Food subsidy programs also differ in other ways such as the number of products covered, whether the subsidies are given in physical products or in vouchers or stamps, and whether the distribution is done through a publicly operated system or through private markets. When considering the full implications for agricultural production, trade, and exchange rates, it would also matter whether the food products are procured internally or come from commercial imports and/or food aid.

### **Food Subsidy Programs During the 1970s and 1980s**

After the 1970s food price shocks, IFPRI conducted a large study of food subsidy programs in 13 developing countries from Asia, Africa, and Latin America during 1978–1986.<sup>42</sup> The case studies showed that many programs had important fiscal costs: according to Scobie (1988), in 1980–1981, Egyptian food subsidies were 20 percent of current expenditures and 7 percent of GDP; the rice subsidy in Peru in 1980 was 14 percent of the government deficit in Peru and between 1 and 2 percent of the GDP; in Sri Lanka, subsidies reached 14 percent of government expenditure and 6 percent of GNP by the late 1970s; in the mid-1970s, the Bangladesh food subsidies represented between 15 and 27 percent of current government expenditure; during the same period the maize subsidy in Zambia represented 50 percent of the agricultural budget; in the mid-1980s in Mexico, the deficits of the public food agency (CONASUPO) represented between 3 and 9 percent of the total fiscal deficit; and in the late 1970s the direct costs of Chinese food subsidies were estimated at 23–26 percent of government revenue. On the other hand, well-targeted subsidy programs, such as the food stamp program operating in Colombia during that period, had low fiscal costs.

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42 The developing countries analyzed were Bangladesh, Brazil, China, Colombia, Egypt, India, Mexico, Morocco, Pakistan, Philippines, Sri Lanka, Sudan, and Thailand. The food stamp program of the United States was also included as comparison.

However, the relevance of those programs cannot be judged only on the basis of the fiscal cost (which all public programs have) (Scobie 1988). There are several other considerations to take into account. First, are those subsidies an appropriate and cost-effective way of achieving the desired objectives? Presumably, a key objective would be to build the human capital of the poor and vulnerable, and then the issue would be if the design and operation of the programs help to reach those objectives at the lowest possible fiscal cost.<sup>43</sup> For example, Alderman (1991) calculates several possible indicators, such as the fiscal cost per beneficiary, the fiscal cost of transferring 1 dollar in subsidies, and the fiscal cost of transferring 100 calories per day per person for one year for several programs, finding large differences in the countries analyzed.

A second question is whether the program is the most appropriate way of ensuring that the poor and vulnerable can access food at an affordable price: for instance, rather than consumption subsidies, it may be more effective to make a sustained effort of investment in the efficiency of food production through R&D, rural infrastructure, improved marketing, and the like (which would expand production and reduce prices) and/or to improve the employment and income opportunities of the poor (which would ensure economic access) (Pinstrup-Andersen and Alderman 1988).

A third issue is the financing of the programs and the fiscal implications of increasing budgetary costs (which raises the issue of how those incremental costs will be financed) and the variability of food subsidy expenditures (which may then transmit that volatility to other budgetary items). Scobie (1988) estimated that in Egypt, where the deficit caused by food subsidies was mostly financed by money printing, a 10 percent increase in food subsidies during the 1980s resulted in a 5 percent increase in the rate of inflation. Then, the net effect on the poor and vulnerable must consider two opposite factors: the negative effects of inflation on their incomes compared to the benefits of food subsidies that were supposed to help them. Also, in some cases, increases in food subsidies were financed through cuts in other agricultural and social investments, which may reduce production and human capital through other channels (Scobie 1988).

Table 8.14 (slightly modified from Grosh et al. 2008) summarizes some of the pros and cons of different ways of funding those programs.

As discussed in the previous section, there are other nonbudgetary ways of funding the programs, such as shifting the costs to producers through forced procurement of the food items at below-market prices (which would depress

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43 The same question may be posed with respect to other objectives, such as income redistribution or political stability.

the incentives for agricultural and food production and would aggravate the consumption problems over time) (Scobie 1988).

Finally, there are general equilibrium effects on international trade and exchange rates, real wages, real incomes and income distribution, and agricultural and nonagricultural production. Food subsidies tend to increase imports and may also reduce exports, which led to a deterioration in the trade balance in several countries during that period (Pinstrup-Andersen 1988a and 1988b). The second-round effects depend on the policies applied to deal with the deficit in the trade balance: in some cases, governments resorted to devaluations of the domestic currency (which put pressure on domestic inflation and food prices, countering the effects of the food subsidies), and in other cases they used import controls, rationed the availability of foreign currency, or used multiple exchange rates (which affected production in other sectors). Regarding the latter measures, Scobie (1988) notes the cases of Chile, Indonesia, Tanzania, and Egypt in the 1980s, where worsening trade and foreign exchange conditions led to rationing of other imports, affecting general economic activity. In particular, he estimated

**TABLE 8.14** Pros and cons of various financing sources

Financing source	Advantages	Disadvantages
Expenditure reallocation	<ul style="list-style-type: none"> <li>• Finances programs within budget constraints</li> <li>• Increases overall productivity of government outlays</li> </ul>	<ul style="list-style-type: none"> <li>• No additional funds relative to the budget</li> <li>• Many countries have low levels of discretionary spending, and reallocation of the budget may reduce needed expenditures in other areas</li> </ul>
Increased taxation	<ul style="list-style-type: none"> <li>• More sustainable than other options</li> </ul>	<ul style="list-style-type: none"> <li>• Economic costs</li> <li>• Politically unpopular</li> </ul>
International grants	<ul style="list-style-type: none"> <li>• Increases availability of funds</li> </ul>	<ul style="list-style-type: none"> <li>• Inflexibility in use of funds</li> <li>• Instability of funding</li> <li>• Donor coordination issues</li> <li>• Government autonomy issues</li> </ul>
Borrowing	<ul style="list-style-type: none"> <li>• Finances investment in productive activities in countries with low public savings</li> <li>• Finances temporary expansion of programs during crises</li> </ul>	<ul style="list-style-type: none"> <li>• Currency mismatch in balance sheets</li> <li>• High debt service burden</li> <li>• Debt overhang impact on growth</li> <li>• Vulnerability to a solvency crisis</li> </ul>
Money printing	<ul style="list-style-type: none"> <li>• If it represents pure seigniorage,* it is an additional form of finance without inflationary consequences</li> </ul>	<ul style="list-style-type: none"> <li>• If it goes beyond pure seigniorage will generate inflationary pressures that may end up hurting the poor</li> </ul>

**Source:** Adapted from Grosh et al. (2008).

**Note:** \*Recall that seigniorage is the quantity of money that the government can print in line with the demand for money related to fundamental factors, such as GDP growth. This income to the government from money printing is not inflationary. The "inflation tax," on the other hand, is the additional private demand for nominal money that is needed just to maintain desired real balances in the presence of inflation.

that in Egypt a decline of 1 dollar in foreign exchange availability reduced food imports by only 5 cents, while raw materials and machinery fell by 15 and 30 cents, respectively; therefore, because food imports crowded out the imports needed for industrial production, a 10 percent increase in the price of commercial food imports would have led to a decline in current output and new investment in the industrial sector of between 1 and 2 percent.

Other case studies noted that a potential effect of food subsidies is to keep nominal wages lower than what they otherwise would have been. This effect appeared clearer in the case of public-sector wages, where explicit food subsidies seemed to have kept those wages in countries such as Egypt, Bangladesh, and Sri Lanka lower than what would have been the case without the subsidies (Pinstруп-Andersen 1988a and 1988b). An implication is that the fiscal savings from reducing food subsidies may be less than expected if their elimination had to be compensated by increases in public-sector wages.

Another more general implication is that if food subsidies reduce the nominal value of wages, then the final benefit for the poor and vulnerable will depend on the operation of labor markets, which would define the aggregate wage incomes as a combination of both a lower salary and, at the same time, presumably a higher level of employment (to the extent that the food subsidies reduce labor costs).

Grant Scobie aptly summarized the macroeconomic implications from the 1970s and 1980s case studies:

Food subsidies are clearly an important and potentially powerful policy instrument to protect vulnerable groups in developing countries. If they are directed to the deserving, viewed as public investment in human capital, and financed by transfers from higher income groups, they need not have deleterious consequences either for foreign trade or macroeconomic management. In contrast, food subsidy schemes that substitute imports for domestic output, tax low-income producers through forced procurement, create deficits that can be financed only by inflation, displace other social programs, and disrupt the flow of essential imports will inevitably have undesirable and costly consequences. (Scobie 1988, 76)

As noted, those studies covered the period of high food prices in the 1970s, when countries tried to protect domestic consumers from the adverse effects of rapidly increasing food prices in the international markets. But, as discussed in Chapter 3, the price of food (and of most commodities) dropped in the 1980s, which led to a reduction in real fiscal costs. The decline in food

processing also eased the policy pressures to try to shield consumers, which, combined with the continuation of fiscal difficulties in many developing countries, led to a series of reforms during the late 1980s and the 1990s. These reforms reduced or eliminated universal subsidies, and the programs that were maintained usually became more targeted. The following list presents some examples (based on Sdravovich et al. 2014).

### **Reforms of Food Subsidy Programs in the 1980s and 1990s**

- Jordan, which had food subsidies (wheat, rice, milk, sugar, and barley) of about 3 percent of GDP in 1990, started a process of gradual reduction and elimination ending in 1997.
- Mexico had embarked in the mid-1980s on a series of reforms, including the reduction of products receiving universal subsidies and the establishment of a more targeted food subsidy program. The most important of these general food subsidies was the one for corn tortillas, which was eliminated on January 1, 1999.
- In Morocco the cost of food subsidies was about 1.6 percent of GDP in 1999, the year the country started eliminating sugar subsidies and liberalizing cooking oil prices. The budget cost of food subsidies was brought down to 0.8 percent early in the year 2000.
- Tunisia's universal food subsidy program was about 3 percent of GDP in 1983, and the government tried a sudden adjustment that led to riots and was discontinued in 1984. The fiscal cost continued to increase, reaching about 4 percent of GDP in 1990, and several studies showed that the incidence of the subsidies was regressive. In 1991–1993 the country tried a more gradual program of reform, moving from a universal subsidy to a system based on self-targeting (subsidies were given to products consumed mostly by the poor).
- In 1997 India moved from the universal public distribution system to a targeted one focused on households below the poverty line, due to the high administrative costs and the fact that the distribution of benefits in the previous system included many nonpoor.
- After the 1997 Asian financial crisis, Indonesia moved to a targeted system of rice distribution in late 1990s (Sdravovich et al. 2014).



### Recent Developments

In the early 2000s, several new developments placed the issue of food subsidy programs in a new context. Economic growth accelerated in developing countries, and, although there is still a large heterogeneity of food insecurity conditions among developing countries, there have been improvements in the indicators related to the incidence of hunger and food security at the global level (see Chapters 1 and 3). Also, with increased incomes in developing countries, the food share of expenditures has declined and consumption has become more diversified. It is not necessarily healthier, considering the triple burden of malnutrition that affects several developing countries, where under- and overnutrition may coexist even within the same families (see Pinstруп-Andersen 2007; Garrett and Ruel 2003). At the same time, advances in improved infrastructure and integration of markets in many developing countries (Rashid, Gulati, and Cummings 2008), further increases in urbanization, and important structural modifications in the processing and marketing of food products linked to the expansion of supermarkets, even in poor urban and rural areas (Reardon and Timmer 2012), have contributed to the diversification of consumption and a decline in the percentage of calories and proteins associated with the usual staple crops considered in food security stocks.

These changes in nutrition concerns and consumer demand as well as in retail channels suggest that an approach to food security limited to a reduced number of staple crops distributed by the public system is becoming progressively less relevant in many developing countries.

With more fiscal space, larger incomes, and the expansion of public services, another change in several developing countries has been the expansion of social safety nets and the emergence of new subsidies related to energy, electricity, and water and sanitation, which in many cases exceed the value of public expenditures in food subsidies. In fact, now from a fiscal point of view (and, at times, also an operational one), it would be difficult to discuss food subsidies separately from the array of noncontributive programs.<sup>44</sup> The following list presents different examples of social safety nets implemented in developing countries (from Grosh et al. 2008).

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<sup>44</sup> Noncontributive programs are those financed mostly from general revenues, and therefore they are not based on specific contributions paid by the beneficiaries (contributive programs) such as retirement programs, unemployment insurance, health insurance, and so on.

## **Types of Social Safety Nets**

### **A. Programs that provide unconditional transfers in cash and in kind**

- Cash transfers, including near cash (vouchers, coupons, and the like). Needs-based social assistance, noncontributory pensions and disability transfers, family allowances, food stamps.
- In-kind food transfers. Targeted food transfers and rations, other food-based programs, supplements for mothers and children, school-based feeding programs and transfers.
- General subsidies. Subsidies for food, energy, housing, and utilities.

### **B. Income-generation programs**

- Workfare or public works programs. Public works programs in which the poor work for food or cash.

### **C. Programs that protect and enhance human capital and access to basic services**

- Conditional transfers. Transfers in cash or in kind to poor households subject to compliance with specific conditions in relation to education and/or health.
- Fee waivers for health and education. Mechanisms to ensure access to essential public services, such as fee waivers for healthcare services, school vouchers, or scholarships (Grosh et al. 2008).

The important jump in nominal food prices after 2005 and its relative persistence at higher levels since then have led to the resurgence of food subsidy programs. In some cases, they were included in the new targeted programs mentioned above. But in other cases, there was a return to universal or nontargeted approaches (or an expansion of those already in place), as well as reductions in consumption taxes and different trade measures.

It should be noted that, given that the jump in commodity prices after 2005 was more pronounced in energy products (as discussed in Chapter 3), the largest share of subsidies has gone lately to gasoline, electricity, cooking gas, and similar products rather than food. Countries reacted with a mix of reductions in fuel and food taxes and tariffs, increases in universal subsidies, expansions in transfer (noncontributive) programs, and increases in public-sector wages (a point already discussed in the context of the 1970s and 1980s reviewed before). The IMF estimated that out of almost 160 countries

surveyed, 79 experienced net increases in fiscal costs from all these measures,<sup>45</sup> with a median increase in 2007–2008 of 0.6 percent of GDP per year, but 19 had fiscal costs greater than 1 percent of GDP, and a further 10 countries had net increases of more than 2 percent of GDP (IMF 2008a and 2008b).

Regarding food subsidies alone, IMF (2008a and 2008b) notes that (1) food taxes were reduced in 84 countries between 2006 and 2008 out of 159 surveyed, with most of the cuts affecting import taxes (76 countries) rather than the VAT or other consumption taxes (26 countries);<sup>46</sup> (2) more than 20 countries increased food subsidies, both targeted and universal subsidies; and (3) about 30 exporting countries increased export taxes, introduced export quotas, and/or imposed bans on certain exports to try to limit the pass-through to domestic prices of higher world prices.

The fiscal cost of the tax changes for a sample of about 30 developing countries with data in IMF (2008a and 2008b) has been about 0.1 percent of the GDP in lost revenues. About 10 of these countries (mostly SSA countries) have reduced revenues between 0.4 percent and 1.2 percent of the GDP (IMF 2008a and 2008b), mostly because of cuts in import tariffs. Among the 28 countries with food subsidies, 6 have universal subsidies (Burundi, Egypt, Jordan, the Maldives, Morocco, and Timor-Leste) that exceeded 1 percent of GDP in 2008. Another 16 countries also increased food subsidies, with a median increase of 0.2 percent of the GDP.

The topic of food and fuel subsidies appears as particularly pressing in the Middle East and North Africa (MENA) countries,<sup>47</sup> where generalized subsidies have historically been part of the political and social consensus (Sdravovich et al. 2014): For instance, in 2011 fuel subsidies reached US\$237 billion (almost half of world fuel subsidies), equivalent to 8.6 percent of regional GDP (but with large variations across countries, particularly between the oil and non-oil exporters). In turn, food subsidies amounted to 0.7 percent of the regional GDP, but also with differences: in 2011, one-fourth of MENA countries did not record food subsidies on their budgets; in nine countries food subsidies were less than 1 percent; Jordan, Tunisia, and Algeria had food subsidies between 1 and 2 percent of GDP; and in Iraq, Syria, and

<sup>45</sup> In addition to the cost of programs already in place.

<sup>46</sup> Some countries implemented more than one of the policy changes mentioned in the list above, and therefore the total of reductions is more than the number of countries that did it.

<sup>47</sup> MENA countries in this study include Djibouti, Egypt, Jordan, Lebanon, Mauritania, Morocco, Sudan, Syria, and Tunisia (oil importers); and Algeria, Bahrain, Iran, Iraq, Kuwait, Libya, Oman, Qatar, Saudi Arabia, United Arab Emirates, and Yemen (oil exporters).

Egypt, they represented between 2.5 and 3.5 percent of GDP (Sdravovich et al. 2014).

As is usually the case with universal, nontargeted approaches, the distribution of food subsidies, although less regressive than the allocation of fuel subsidies, was in many MENA countries and products less than what would have been achieved with a uniform distribution of cash equivalent (for example, the lower 40 percent of income earners in those countries receive less than 40 percent of the equivalent cash value of the subsidies) (Sdravovich et al. 2014).

It should be noted, however, that the 2000s food price shock has been, under most metrics (such as in terms of GDP, exports, and household incomes), smaller than the one in the 1970s, even when combined with the increase in energy prices, which also happened in the previous episode.<sup>48</sup> Still, although the context has changed in other dimensions as well, many of the macroeconomic issues identified during the 1970s food price shock remain valid points of analysis.

In particular, it continues to be crucial to assess the cost-effectiveness of the programs and policies implemented and to ensure their fiscal sustainability. Different ways of funding the programs will lead to different macroeconomic and social consequences, as discussed before.

From an operational and fiscal point of view, it makes sense to subsume food subsidy programs as part of an integrated system of social safety nets.<sup>49</sup> It may be more efficient for poor consumers to use cash transfers or food vouchers and to let the private sector manage the physical handling of the product (see Hoddinott et al. 2013). Some civil society groups, such as Our World Is Not for Sale (OWINFS 2013), have argued that managing cash transfers or food vouchers is more cumbersome than the public physical distribution of the food items, but this argument seems largely incorrect. If the government has a system to identify poor households and to distribute the physical product, it can do the same with food vouchers. The administrative costs and the possibility for corruption and misallocation are similar in both schemes, but

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48 As noted in Chapter 3, commodity prices in the episodes of the 1970s and 2000s moved approximately together; that is, it was not only an agricultural and food price shock but also included important jumps in the prices of energy products and metals. That is why the overall terms of trade of many developing countries that were net food importers but that also exported other commodities did not decline or even increased during the commodity boom, depending on the structure of exports and imports. This highlights the importance of considering all commodities and other noncommodity exports together instead of concentrating only on the food price shock (Chapter 3).

49 For a detailed discussion of the many issues involved in the design and evaluation of impact and effects, see the comprehensive review in Grosh et al. (2008).

with food vouchers the government avoids losses stemming from handling the grain through bureaucratic structures. Of course, this assertion depends on the existence of a private sector that adequately covers the national territory, whose operations are reasonably efficient (no large losses in the physical handling of the products) and that behaves competitively along the procurement and marketing chain (that is, there are no intermediate actors with dominant market positions that may retain a larger share of the benefits of the redistribution, charging lower prices to farmers and higher prices to consumers). If this is not the case, then public losses and inefficiencies need to be compared to the ones affecting potentially ineffective and underdeveloped private-sector channels, and the possibility of abuse of market position by private-sector operators must then be compared as well to the possibility of corruption and abuse by the public staff operating governmental schemes.<sup>50</sup>

Of course, there is still the issue of how to ensure the physical delivery of the product to isolated areas, which cannot be guaranteed by simply handing out vouchers. The expansion of a private-sector delivery network is something that will evolve along with general economic development and supportive government policies. Then the question of whether the government or the private sector is better equipped to handle physical distribution for the poor and for isolated areas becomes an empirical issue.

In summary, the comparison is between the quality of the coverage, efficiency, and competitive behavior of the private sector on one hand and the performance of the public bureaucracy distributing food in terms of potential additional costs and inefficiencies on the other.

The previously noted triple burden of malnutrition also poses new challenges when considering public food distribution systems. For instance, a food security program centered on a limited number of products selected mainly because of their calorie content will have to contend with the fact that a lack of dietary diversity appears more correlated with the prevalence of child stunting and wasting and with underweight mothers (Arimond and Ruel 2006; Headey 2013). If lack of dietary diversity is a more relevant indicator to assess food security and nutritional problems, then food security stocks and programs focusing on a limited number of staple crops may not address the main problem.

More generally, changes in consumption patterns linked to increasing incomes in developing countries, which have led to the expanded use of other products exceeding the usual staple crops considered in food security stocks,

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50 These issues are discussed further in Chapter 11.

also question the traditional focus of these programs (see Hoda and Gulati 2013, who criticize India's National Food Security Act of 2013 for being "cereal centered").

In addition, except for the decreasing number of countries in which a significant proportion of calories and nutrients depends on only one or two products, the issue of food price inflation (and upward price spikes) is associated with a larger basket of goods; when those problems do occur, they are mostly related to macroeconomic imbalances. Public food distribution systems usually do not have the product breadth to address those problems and may actually contribute to the problems faced by the poor through inflationary pressures linked to money financing of fiscal deficits.

It should be further noted that an income redistribution program with discounted food vouchers for poor consumers would also lead to higher demand and therefore higher prices for farmers when compared to the counterfactual of no program, without the government having to physically intermediate the purchase of food and the distribution of food aid.<sup>51</sup>

### **Special Fiscal Topics in Agriculture: Input Subsidies**

It was already discussed how, according to the post–World War II development strategy, the role of agriculture was subordinated to the needs of industrialization. But within that general framework, there was still a variety of subsidy programs for agricultural products, from preferential credit to different types of subsidies for fertilizers, seeds, and irrigation. Those input subsidy programs were managed by public agencies, which supplied farmers with agricultural inputs at subsidized prices and often subsidized credit, too, and usually they commercialized the agricultural and food productions as well. Evaluations showed that, in many cases, those programs increased input use and agricultural productivity, but they were hampered by administrative inefficiencies, imposed a heavy fiscal burden, and, considering equity effects, mostly benefited richer farmers. Yet, when the subsidies were discontinued, input use and agricultural productivity appear to have declined (see Kherallah et al. 2002 for SSA; Rashid et al. 2013 for Asia; and World Bank 1986 in general).

The revision of the inward-oriented development strategy in the 1970s and 1980s also led to the reconsideration of agricultural policies. If the overall macroeconomic approach that was considered biased against agriculture was

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51 In the case of the United States, the political economy of the series of Farm Bills has always featured the alliance of farmers and social advocates who support food vouchers and similar redistributive programs. That alliance has been maintained through the different Farm Bills (Orden 2014).

going to be changed, then the compensatory agricultural policy of universal subsidies needed to be revised as well: sectoral interventions that supported and subsidized agriculture could be substantially scaled down, given that overall incentives would shift in favor of agriculture with the change in the general macroeconomic and trade framework. The World Bank offered several policy recommendations in that vein: developing countries should eliminate inefficient industrial protectionism, correct the overvaluation of the exchange rate, eliminate export taxes on agriculture, reduce the government's involvement in agricultural markets, and phase out administered prices, public-sector enterprises operating in output and input markets, and state-owned agricultural banks and directed agricultural credit schemes. Budgetary savings from the elimination of public programs of subsidies in agriculture, which were considered inefficient, contradictory, and open to waste and corruption, could be reassigned to investments in technology, extension and training, and infrastructure (World Bank 1986).

As discussed earlier, deteriorated public-sector finances during the 1980s (for SSA, fiscal problems began in the 1970s), along with the decline in world agricultural prices in the mid-1980s, led to fiscal adjustments and the reduction of support for agriculture in numerous developing countries. Subsidy programs were scaled down or eliminated, particularly in LAC and SSA, in many cases as part of loans from the World Bank and other international organizations that had the implementation of those policy changes as a condition for disbursements.

More recently, however, with the improvement in public-sector finances, there has been renewed interest in support for agriculture in many developing regions. In the 2003 Maputo Declaration, the signatory African countries committed to allocate 10 percent of their national budgets to agriculture. In several SSA countries, an important part of the increase in public expenditure for agriculture was devoted to input subsidy programs, following the example of Malawi's program of distributing free fertilizer to farmers that started in 1998. The Africa Fertilizer Summit held in Abuja, Nigeria, in 2006 issued the Abuja Declaration on Fertilizer for African Green Revolution, in which the signatory countries promised to increase fertilizer intensity through different actions, including the implementation of a "smart subsidy program" to improve access to fertilizers for small-holder farmers (Baltzer and Hansen 2011). Smart subsidy programs, as opposed to the universal subsidy programs of the 1970s and 1980s, are supposed to have some specific characteristics, such as being part of a wider strategy for agricultural development, strengthening the competitive operation of markets for inputs and the development

of the private sector, focusing on farmers' demands and needs and targeting farmers that were not using fertilizers but could profit from using it, being pro-poor, ensuring financial sustainability, and having an exit strategy (Morris et al. 2007).

In 2011, ten SSA countries representing 60 percent of the population of that region were spending almost US\$1 billion on input subsidies, representing on average 29 percent of their public spending on agriculture (Jayne and

**TABLE 8.15 Expenditures on input subsidies as percentage of GDP**

Country	2009 % GDP	2010 % GDP	Type
Burkina Faso	0.2	0.3	U
Ethiopia	0.2	0.1	O
Kenya	0.3	0.1	T
Ghana	0.2	0.2	U
Malawi	3.7	2.8	T
Mali	0.2	0.1	U
Nigeria	0.1	0.1	U
Senegal	0.3	0.3	U
Tanzania	0.5	0.6	T
Zambia	0.8	0.6	T

**Source:** Jayne and Rashid (2013).

**Note:** T = targeted; U = untargeted; O = other.

Rashid 2013). Table 8.15 shows the countries and the expenditures on input subsidies (mostly fertilizers) as percentage of GDP (data on subsidies and the classification as targeted or untargeted programs are from Jayne and Rashid 2013, and GDP in current US dollars is from the World Bank).

Contrary to common perception, targeted programs appear to be larger as a percentage of GDP than nontargeted ones; in particular, Malawi's program stands out for its scale (at 2.8–3.7 percent of the GDP), but also in Zambia and Tanzania these programs have a significant fiscal impact. These costs include fertilizers and related expenditures (plus seeds and other items in some cases), but the total amount of subsidies for specific crops may comprise other matters, and, therefore, may be larger. For instance, in the case of Zambia the costs of different programs subsidizing maize moved from 1.2 percent of the GDP in 2009 to 2.7 percent in 2011. During that period, all government expenditures rose from 22–23 percent to 25 percent of GDP, and the fiscal deficit increased from 2–2.5 percent to 3 percent per year in the same period (IMF 2013b). The implication of that figure is that, on aggregate,



Zambia's maize program did not displace other expenditures but increased the deficit (which was financed by additional public debt; IMF 2013b).

**TABLE 8.16** Fertilizer subsidies, 1980–2010

Countries/period	Fertilizer subsidy (billion US dollars)	% share of subsidy	
		Total public expenditure	Total agriculture expenditure
Bangladesh			
1980s	0.04	2.65	34
1990s	0.01	0.28	6
2000–2005	0.03	0.51	14
2006–2010	0.31	3.57	57
India			
1980s	1.01	2.68	36
1990s	1.83	3.43	55
2000–2005	2.10	2.25	47
2006–2010	5.71	3.13	54
Indonesia			
1980s	n/a	n/a	n/a
1990s	0.21	0.88	12
2000–2005	0.08	0.17	7
2006–2010	1.27	2.10	35
Pakistan			
1980s	0.13	2.19	72
1990s	0.03	0.32	29
2000–2005	0.05	0.30	12
2006–2010	0.53	2.65	34

**Source:** Rashid et al. (2013).

In several countries in Asia the programs of agricultural subsidization, which tended to be universal, were not eliminated but only scaled down during the 1990s (Table 8.16 from Rashid et al. 2013).

Bangladesh and Pakistan clearly reduced the amount of fertilizer subsidies during the 1990s, but then all countries scaled them back up after 2005. Using GDP data from 2006 to 2010, the value of the fertilizer subsidies amounted to 0.39 percent of the GDP in Bangladesh, 0.44 percent in India, 0.25 percent in Indonesia, and 0.33 percent in Pakistan. Hoda and Gulati show larger estimates of the cost of fertilizer subsidies in India of about

1.1 percent of the GDP on average per year between 2008 and 2011 (see Hoda and Gulati 2013, Table 12).

As an important agricultural program with significant fiscal implications, it is very relevant to determine what the impacts of those subsidies are. The opinions are divided. Jayne and Rashid (2013) summarize a set of country studies in SSA. They tend to find that there are increases in production,<sup>52</sup> but the expected reduction in prices of the products receiving subsidized inputs (such as maize) has been small. Regarding poverty and equity, the benefits tend to be concentrated among the wealthier farmers that were eligible (which in the countries considered are those with up to 10–20 hectares). The studies find important levels of diversion and crowding out as well: somewhat less than half of the quantity of fertilizer distributed through the subsidy programs appears to have been utilized at the farmer level for the target crops.<sup>53</sup> Also, crop response rates to fertilizer appear to have been hampered by soil acidity and other problems, lack of water, inappropriate cultivation practices, and untimely distribution of the subsidized fertilizer. Therefore, they find that the costs at the microlevel (or production level) of the subsidy programs appear to exceed the benefits in several of the countries analyzed (that is, the benefit/cost ratio is less than 1). In general, the guidelines for smart subsidies do not appear to have been followed in many countries (Jayne and Rashid 2013; see also Baltzer and Hansen 2011).

Other evaluations in SSA countries seem more positive. For example, Benin et al. (2013) evaluate Ghana's program, introduced in 2007, comprising four programs on fertilizer, mechanization, block farms, and marketing that include subsidies and other support. They found that the three programs on fertilizer, mechanization, and block farming have led to higher yields and outputs for the commodities covered. The benefit/cost ratios they calculate (not using a full economywide model) range from 1.2 to 1.6, all values greater than 1 and therefore indicating positive effects of the programs.

In the previous studies, cost/benefit analyses focused on the microeconomic level of production, or they were based on a partial equilibrium framework that did not consider all potential costs and benefits. If an economywide view of the impacts is utilized instead, the results show further improvements in the benefit/cost ratios. For instance, Arndt, Pauw,

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52 Although there have been some disputes about the official production statistics in some countries, such as Malawi.

53 However, as noted in Pauw and Thurlow (2014), they still may have been used in other crops and/or by farmers that were not the direct beneficiaries.

and Thurlow (2013) estimate the impact of Malawi's Farm Input Subsidy Program with a computable general equilibrium model and, using parameters from household surveys, find that considering the economywide effects increases the ratio of benefits to costs by about 40 percent, and the program shows positive economic returns under most of the assumptions about the response rate of crops to fertilizer use.

The model utilized assumes that labor is fully employed due to seasonal labor constraints in Malawi and that the total supply of capital is fixed, which limits the economywide multiplier effects of the increase in agricultural production. Therefore, it can be argued that an evaluation that considers the significant unemployment of the labor force in the country (officially estimated at close to 8 percent for the urban sector in the early 2010s) may lead to stronger multiplier effects of the increase in agricultural production, which may improve benefit/cost ratios even further (see also Pauw and Thurlow 2014).<sup>54</sup>

These analyses focused on SSA. Studies of Asian countries suggest that fertilizer subsidies played an important role in Asia's Green Revolution, but their positive impact on agricultural growth and poverty reduction has been declining over time, and other programs (such as agricultural R&D, roads, irrigation, and extension services) may have had stronger positive effects than the input subsidies (see Rashid et al. 2013; Mogues et al. 2012; and Fan 2008). Comparing the Asian and SSA programs, however, there are differences: in Asian countries fertilizer and seed subsidies were part of a package that included other investments (such as R&D, irrigation, extension, and roads), and, because of that and price support measures, the use of the more modern inputs was profitable even at comparatively higher real prices of fertilizers (Rashid et al. 2013).

From the point of view of fiscal implications, it is important to understand how the program is financed. If the funds come from cuts in other agricultural and nonagricultural expenditures, a general equilibrium analysis needs to consider the benefits lost from the programs scaled down or cut (as Scobie 1988 argued in the case of consumer food subsidies). In the case of Malawi, the sizable subsidy program does not seem to have been financed out of other agricultural programs (Pauw and Thurlow 2014), but it may have affected nonagricultural expenditures: data from the IMF (2014a) suggest that between 2011–12 and 2012–13 the incremental expenditures on fertilizer and seed subsidies (from 24 to 52 billion kwachas, or 2.5 and 4.2 percent

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54 Chapter 7 mentioned the larger multiplier effect in the simulations in Diao, Díaz-Bonilla, Robinson, and Orden (2005), where the model was run with unemployment in labor markets.

of the GDP) were financed by cuts in other public expenditures, considering that the deficit was estimated to decline from  $-6.8$  percent to  $-1.3$  percent in the same period. On the other hand, in the case of Zambia, discussed before, the additional expenditures for maize subsidies were financed by additional debt, and the government was cutting them as part of an IMF program. This program also contemplated a tightening of the monetary policy to counter the potential inflationary impact of the elimination of the fertilizer subsidies (IMF 2013b).<sup>55</sup>

The debates about the pros and cons of subsidy programs will continue. However, there is some convergence around what should be done to make them more effective and equitable. An important lesson from Asian countries is the importance of investing in infrastructure, agricultural R&D, and extension programs, as well as improvements in soil fertility, water control, and farm management practices, all of which increase the economic returns of using fertilizers and better seeds. Another issue is to improve targeting of poor and small farmers that may not usually purchase fertilizer, although there may then be a trade-off between equity and productive objectives. Programs with input vouchers that can be exchanged with private firms appear to work better than government-based options to distribute fertilizers. It also helps to avoid monocultures if the program has some flexibility in the use of the fertilizers across crops.<sup>56</sup> The design must minimize the opportunities for corruption (Jayne and Rashid 2013; see also Baltzer and Hansen 2011).

In summary, it is crucial to continue evaluating results under different policy alternatives for the input subsidy programs, both at the microproductive level and at the macro level. In the latter case, it is necessary to consider the way additional fiscal expenditures are financed. Cutting other government programs requires the consideration of their lost benefits (if any). Money financing will have inflationary implications, but cutting the subsidies will also have some (hopefully only short-term) upward impact on prices; then, as in the case of Zambia, there may be some tightening of monetary policy, and because

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55 The prices of the food products that received input subsidies were supposed to increase once those subsidies were removed, which would have an impact on inflationary pressures. However, it was noted in the text that the set of SSA country studies summarized in Jayne and Rashid (2013) found only a small reduction in prices of the products receiving subsidized inputs; therefore, the potential price increase in food products resulting from the elimination of subsidies should be small as well.

56 Some argue that because of increases in the quantity produced and incomes related to the targeted crop, and/or some land saved for other uses, and/or some diversion of fertilizers, farmers in the subsidy programs end up producing more of other crops as well, diversifying production. Others blame the subsidy programs for forcing farmers into monocultures. The evidence is still not clear one way or the other (Pauw and Thurlow 2014).

of that, the effects of this policy stance must be factored in as well. Finally, financing with additional debt has implications for future debt sustainability and the potential for debt crises.

More studies may be needed on the complex interaction of the factors discussed here and the cost/benefit for growth, poverty alleviation, and equity.

### **Some Final Considerations**

Many developing countries suffered from serious fiscal problems during the 1980s and 1990s, which seem to have affected the level of agricultural expenditures during the 1990s. The fiscal position has improved somewhat in the 2000s, and in general, the level of per capita agricultural expenditures and agricultural expenditures as a percentage of agricultural GDP both appear to have recovered lately. Still, the ratios of agricultural expenditures, including those in R&D, to agricultural GDP in developing countries are well below the levels seen in developed countries. The urban bias in public expenditures noticed by Lipton (1977), which is different from the price or internal terms-of-trade biases, may well still be present in many developing countries.

Therefore, although a better fiscal position seems to have led to increases in public expenditures in and for agriculture, it is not clear whether those levels are adequate to ensure strong, balanced economic growth in developing countries. Moreover, the composition of those expenditures needs to be analyzed as well: although there seem to have been some improvements in the balance of public goods versus private goods, there is still plenty of room to improve the allocation of fiscal resources toward public expenditures that have the best payoff for agricultural productivity, poverty reduction, food security, and environmental sustainability. These investments are usually those oriented to agricultural R&D, rural infrastructure, and health and education. Other expenditures, such as subsidies for fertilizers, water, and credit, may still play a role depending on the level of the country's development, either by helping to jump-start some activities in the short term or by contributing to the correction of market failures. But the validity of the assumptions on which those programs are based needs to be assessed.

Also, these expenditures use fiscal resources that may have a better alternative use for growth and equity in agriculture and for the whole economy. More generally, there are economywide effects whether those programs are funded within the budget through mechanisms that create second-round effects (such as inflationary money financing of deficits or increased indebtedness) and/or are financed off budget by shifting the implicit costs from general taxpayers to some specific economic agents. In addition, agricultural expenditures are often

unequally distributed, benefiting the well-off more than family and small farms or the poor and vulnerable.

On the other hand, public expenditures and investments that focus on important development outcomes—poverty reduction, social equity, environmental sustainability, enhanced land and water property rights for rural communities, and the proper operation of labor, credit, input and output markets—have important beneficial impacts on both the agricultural sector and the general economy (World Bank 2007c; FAO 2012; Moguees et al. 2012).

Moving from expenditures to explicit taxes (which is different from the implicit taxes linked to exchange rate overvaluation and industrial protection discussed elsewhere in this book), agriculture is considered a hard-to-tax sector, and improvements can thus be made in this regard. Although agriculture should not be taxed at a higher rate than other sectors, tax collection may be increased by utilizing land and income taxes along with a general VAT and by focusing on farmers with the ability to pay. Output and input taxes tend to have more problems from an efficiency point of view, but welfare and other impacts need to be analyzed in a general equilibrium framework. The decline in trade taxes has most likely improved economic efficiency, while overall revenues do not seem to have declined in most developing countries.

In summary, although it is difficult to determine in general terms whether developing countries' expenditure and taxation levels are adequate as related to agriculture, it seems that the composition of both components of the fiscal equation needs to shift toward configurations more supportive of agricultural growth and food security. Additional data and analysis are needed, both on expenditures and taxes, to design and implement these changes.

This chapter has also discussed some special topics with implications for agriculture and fiscal policies. One of them is the managing of commodity cycles (booms and busts). Many developing countries, always with exceptions, appear to have managed the fiscal implications of the past decade's commodity developments somewhat prudently, at least when compared to the levels of indebtedness generated by the same scenario in the 1970s. Still, it is not clear that the strengthening of developing countries' fiscal accounts will be enough if global economic conditions deteriorate in coming years.

Another recurrent issue with important implications for fiscal policy relates to the level and variability of agricultural and food prices. The discussions usually revolve around public stock to stabilize prices and subsidized food prices for consumers. This chapter has argued that focusing on price instability (or even price extremes) leaves aside many other factors that heavily influence agricultural production and food security at the household and

individual level. Food security is a multidimensional concept, influenced by many policies and contextual variables, and any single policy may have diverse impacts depending on other policies, structural issues, and household types. In that context, food stocks and consumer price subsidies are two possible policy instruments among others, whose contribution to national welfare varies significantly with the design and operation of the specific programs, consumption diversification, the perishability of the main food products, the level of the country's development (which, among other things, defines the quality and extension of infrastructure and the operation of the private sector), and its geographical position (landlocked or not).

Research and policy dialogue should consider an integrated framework for food security and poverty alleviation. The problem of price volatility and price extremes, as well as the possible contribution of food security stocks, can be discussed as one component among several others within that general framework.

Governments of landlocked countries, with concentrated consumption of some food products that are less perishable and with difficult access to international markets, may find it both useful and necessary to maintain food security stocks to ensure against potential breakdowns in supply. If that food is procured domestically, those purchases, well timed at harvest, will provide some price support during a crucial time for farmers, even if those purchases follow prevailing market prices.

Depending on the conditions of the country, a food redistribution stock (the second category mentioned before) could also be an important component of a country's social safety nets and targeted food programs. More generally, it is important to develop such social safety nets (conditional cash transfers, nutritional programs for women and children, school lunches, food for work programs, and so on) to help the poor and vulnerable during normal times and to be scaled up if and when a price spike occurs. Buying at market prices is the best option to build these stocks, as the cases of programs as different as Brazil's Zero Hunger and US food stamps show. If a developing country is buying food above market prices to provide farmers with high price support and selling below market prices to help poor and vulnerable populations, it will most likely get into severe fiscal problems.

Along with the extension of safety nets for poor consumers, in low-income countries it may be appropriate to consider safety nets for poor and vulnerable agricultural producers that can provide income support when harvests fail or in the case of sharp drops in prices.

Another topic discussed was input subsidies. In principle, there should be a balanced pattern of expenditures with investments in human capital, infrastructure, R&D, social programs, and productive subsidies if they have been evaluated as necessary to jump-start production. As noted in this and previous sections, that may be the case in Africa (with an adequate design of the subsidy program and complementary activities), while studies for Asia are showing that these programs have clearly diminishing returns over time (Mogues et al. 2012; Fan 2008), and in LAC some of the estimations suggest negative effects of the subsidies (Alcott, Lederman, and López 2006). The debates about the pros and cons of subsidy programs will continue.

In any case, all those interventions should be part of an integrated policy framework for agricultural production, food security, and poverty alleviation that should include other components as well, from overall good governance and macroeconomic stability to different types of investments to programs supporting women's empowerment and community organization and participation.

All these interventions must consider financial sustainability, cost-effectiveness, and an appropriate operational design.

Overall, it is important to maintain fiscal balances that can be sustained over time, to define a level and structure of the tax system that avoids disincentive effects, to implement an efficient and honest tax administration, to define levels and composition of expenditures that allow the attainment of the growth and equity objectives, and to use efficient and transparent budgetary and implementation systems for the public programs and investments.

Fiscal policy decisions may be decentralized and reflect ad hoc political economy processes, but they can be more than alchemy by applying informed analysis that aims to determine the growth, efficiency, and equity implications of alternative policy choices and by structuring a political process that facilitates the accommodation of the different perspectives in an integrated and, hopefully, longer-term perspective.





## MONETARY AND FINANCIAL POLICIES

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**T**his chapter, after recapitulating some concepts from Part 2, looks at the evolution of monetary and financial conditions in developing countries. Then it focuses on monetary policies and their different connections to agriculture and food security. A separate section analyzes financial and banking policy issues and the links to the agricultural sector.

### Introduction

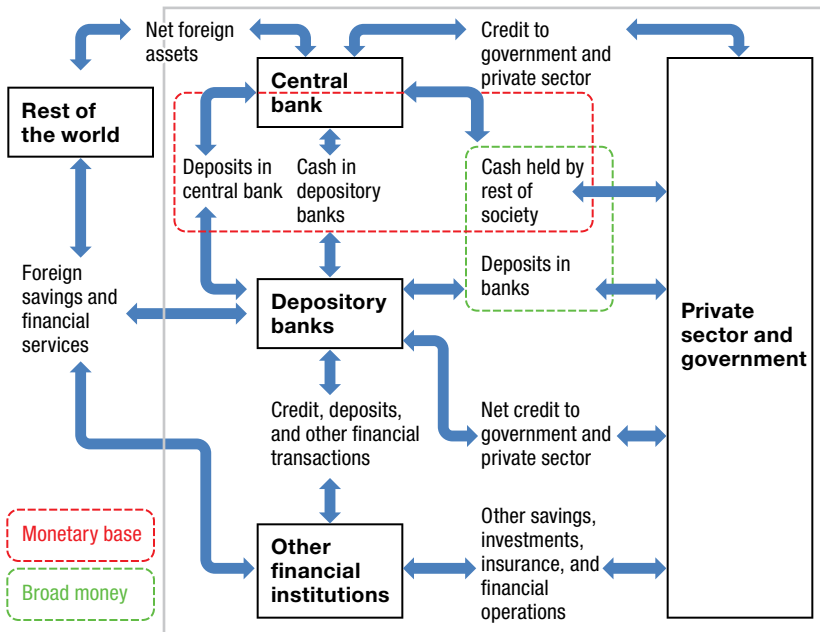
Monetary and financial policies affect growth, employment, inflation, exchange rates, interest rates, the operation of the banking and financial systems, and the probability of economic crises. These policies provide the monetary framework for the financing of agriculture.

Figure 9.1 presents a simplified sketch of the accounting concepts discussed in Part 2, and particularly in Chapter 4 related to the monetary, banking, and financial system.

There are three levels of financial institutions defined in national accounts and shown in the diagram: the central bank (or the equivalent monetary authority), depository banks, and other financial institutions. The central bank accumulates net foreign assets from the rest of the world and lends to the government, the depository banks, and, sometimes, to other financial institutions and the public in general. A key monetary aggregate is the monetary base (marked by the red dashed rectangle), which includes cash held by depository banks, cash held by the rest of the society, and the deposits of the depository banks in the central bank. The monetary base serves as the raw material for the expansion of broad money (see the discussion of the money multiplier in Chapter 4). The other level comprises the depository banks, whose main characteristic is that they accept deposits (demand, time, savings, and so on) that are included in the national definition of money (which may vary by country). Cash held by the society at large and those deposits in

depository banks are called here “broad money,”<sup>1</sup> the main liquid instruments that can be easily and speedily utilized to settle payments in monetary terms without having to wait or without suffering nominal discounts (see Figure 9.1). Depository banks are crucial in the operation of the payment system, without which the economy cannot function. Banking crises that disrupt the payment system usually lead to deep economic recessions.

**FIGURE 9.1** A simplified diagram of the monetary, banking, and financial system



Source: Author.

As discussed in Chapter 4, these depository institutions finance themselves by issuing liabilities (such as deposits, bonds, or other instruments, some of which may be in foreign currency) and then use the funds generated to lend to other entities, typically in the form of loans or other financial instruments.

Other financial institutions include insurance companies and pension funds, other financial intermediaries, and financial auxiliaries that provide services to financial intermediaries and financial markets but do not engage in financial intermediation (for example, security brokers, securities exchanges,

1 This category refers to different definitions of monetary aggregates, such as M3 (Chapter 4).

operators in foreign exchange, and so on). Their liabilities are not part of the definition of broad money, because they do not have the appropriate liquidity characteristics to be considered as such (Chapter 4). However, they provide a series of important financial services, such as intermediating less liquid forms of savings and investments (for example, equity shares in a company, or long-term bonds) and providing a variety of insurance and risk management instruments. Both the depository banks and the other financial institutions can intermediate not only domestic savings and investments but also those originated in the rest of the world (Figure 9.1).

The main objective of *monetary* policies is to ensure that the economy has an adequate level of liquidity to operate without disruptive inflationary processes and at socially acceptable levels of employment/unemployment and the use of other productive factors. The main objectives of *financial* policies are to make certain that the banking and financial institutions (1) perform effectively the functions of a payment system, (2) allocate savings and investments to the more adequate options, and (3) provide financial instruments and services for insurance and risk management.

**TABLE 9.1 Money, credit, and financial sector: Examples of policies and instruments**

- 
1. Money Supply
    - 1.1. Changes in credit, rediscounts, and other instruments to provide liquidity
    - 1.2. Changes in banking reserves
    - 1.3. Purchases/sales in the domestic bond market
    - 1.4. Purchases/sales in the foreign exchange market
  2. Interest Rates
    - 2.1. Management of the interest rate utilized as policy instrument
    - 2.2. Regulations affecting the temporal and sectoral structure of interest rates
  3. Credit Management
    - 3.1. Special credit programs to specific productive activities or economic sectors
  4. Management of the Central Bank
    - 4.1. Investment of official reserves
    - 4.2. Management of quasi-fiscal deficits and net wealth
  5. Operations of the Public Banks
    - 5.1. Management and supervision
    - 5.2. Programming the volume, composition, and timing of domestic credit
  6. Macro and Micro Prudential Regulations and Supervision of the Banking Sector
    - 6.1. Limits to credit growth, loan-to-value ratios, capital requirements (limits to leverage), liquidity requirements, limits to currency mismatch
    - 6.2. Other regulatory and supervision issues
    - 6.3. Deposit insurance programs
    - 6.4. Restructuring and reform of the financial sector
  7. Macro and Micro Prudential Regulations and Supervision of Other Financial Institutions
    - 7.1 Regulation and supervision of investment banks
    - 7.2 Regulation and supervision of stock exchanges
    - 7.3 Regulation and supervision of pension funds
    - 7.4 Regulation and supervision of insurance companies
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Source: Author.

Given that broad spectrum of objectives and the institutions and activities included in the monetary and financial sector, the array of related policies and instruments is also extensive. Table 9.1 shows different examples of monetary and financial policies and instruments.

## Evolution of Monetary and Financial Conditions in Developing Countries

### Inflation

In many developing countries, inflation increased until the mid-1990s and has declined since then, although the performance has varied over time and across regions (Table 9.2).

**TABLE 9.2** Inflation (% CPI annual change)

Region	1970s	1980s	1990s	2000–2009	Early 2010s
Advanced economies	8.6	6.5	2.9	2.0	2.1
Emerging and developing countries	15.1	41.7	47.3	6.9	6.7
Africa	11.8	15.5	24.5	9.2	9.1
Asia (developing)	9.3	9.2	8.6	3.8	6.3
LAC	27.3	100.2	151.9	6.5	5.2
World	9.8	15.8	15.3	3.8	3.9

**Source:** Author's calculations based on IMF (2013c).

Asia showed inflationary developments more in line with the industrialized world, converging during the early 2000s to rates below 4 percent annually. On the other hand, in LAC and SSA, inflation increased in the 1970s and 1980s and peaked during the early 1990s; the highest annual rate was 580 percent in 1990 in LAC (with cases of hyperinflation in some countries) and about 37 percent in 1992 in Africa. As a result, the whole decade of the 1990s showed the highest inflation rates, with more than 150 percent in LAC and almost 25 percent in Africa. In Asia, however, the highest average inflation for the region was far lower and occurred earlier during the 1970s (9.3 percent), with a peak in 1974 of about 30 percent, linked to the oil and food price shocks of that period.

### Financial Reform and Financial Deepening

The economic approaches in many developing countries during the 1960s and 1970s used a series of interventions in the banking and financial system to pursue developmental objectives. Early analyses, such as McKinnon (1973),

criticized what was called “financial repression,” a condition generated by unrealistic interest rates set by the government and other interventions such as directed credit. The administered interest rates tended to become negative either because of the delays in their adjustment in an inflationary context or because of theories that argued for subsidized interest rates to accelerate investment and growth. In addition to the negative impact of financial repression on the capitalization of financial entities and their medium-term sustainability and on fiscal accounts (due to recurrent bailouts of public banks), there were also concerns about the impact on growth. If the government established very low interest rates (passive and active) for the formal banking sector, this discouraged savings (at least in the formal financial system) and generated excess demand for credit. In this scenario, the banking system rationed the credit available among customers through means that would not necessarily direct funds to the most efficient economic alternatives and would exclude small and medium firms and farmers, all of which affected production, employment, and equity. On the demand side, the desire for financial assets by the public to allocate their savings would, in the absence of other alternatives, be satisfied through the accumulation of physical assets (gold, land, livestock in agrarian societies, some durable goods) beyond the requirements of efficiency in production. The result would be that the financial market could not adequately perform its task of intermediating between the different types of potential savers and prospective investors, and the economy would show lower levels of growth, efficiency, and equity.

A policy proposal was then to liberalize the financial system. But this led to other debates on whether the liberalization of interest rates might negatively affect growth and stability (Lanyi and Saracoglu 1983), including the possibility of stagflationary outcomes (stagflation is a combination of low growth [stagnation] and inflation), at least in the short run, through the negative impact of higher interest rates on aggregate supply via increased production costs related to the increasing costs of working capital (see, among others, McKinnon 1973; Kapur 1976).

Whatever the theoretical debates, indexes of financial reform, such as the one calculated by Abiad, Detragiache, and Tressel (2008),<sup>2</sup> show important

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2 The database uses seven different dimensions that try to reflect the fact that financial reform includes several components: credit controls and reserve requirements, interest rate controls, entry barriers to the banking system, state ownership of banks, policies on securities markets, prudential regulations and supervision of the banking sector, and restrictions on the capital account. Liberalization scores for each category are combined in a numerical index that is normalized between 0 (more restrictive) and 1 (more liberalized).

changes in developing countries, particularly since the 1990s; as usual, differences occur across developing regions and countries. Financial reform started earlier in LAC, but there were reversals during the 1980s debt crisis, after which reform proceeded at a faster pace in the 1990s. Financial liberalization in East Asia was more gradual than in LAC, taking place over decades in many cases, while South Asian financial sectors were highly repressed until the second part of the 1980s, and in SSA the process started even later. By the end of the decade starting in the year 2000, LAC and the countries emerging from the former Soviet Union were the more financially reformed among developing countries, with the other regions (Asian developing countries, MENA, and SSA) somewhat behind (Abiad, Detragiache, and Tresselt 2008).

The process of financial reform was accompanied by the financial deepening of developing countries' economies, as measured by a broad monetary aggregate in percentage of the GDP (Table 9.3).

**TABLE 9.3** Broad money (% GDP)

Region	1960s	1970s	1980s	1990s	2000–2009	Early 2010s
East Asia & Pacific	n/a	29.1	49.5	89.4	134.0	158.9
Latin America & Caribbean	20.2	23.5	30.5	34.7	41.2	52.6
Middle East & North Africa	31.1	39.4	65.2	61.5	65.3	84.2
Africa south of the Sahara	30.1	31.7	36.1	35.6	42.2	48.4
South Asia	22.7	26.6	36.9	43.1	61.7	72.3
High income: OECD	62.2	75.4	89.6	102.8	109.2	n/a
World	55.5	64.9	78.8	92.1	101.2	112.8

**Source:** Author's calculations based on World Bank (2014).

This indicator has increased over time, particularly in East Asia. High-inflation economies such as those of LAC and, to a lesser degree, SSA, although also showing greater monetization (or financial deepening) of their economies over time, are clearly below the average for industrialized countries and other developing regions. This suggests that for financial deepening, it is not only the process of financial reform that counts but the history of high inflation: LAC, which advanced in financial reform, still shows lower levels of financial deepening than other regions.

The counterpart of expanding broad monetary aggregates has been more credit availability in the economy (remember the equations for the central

bank and depository banks in Chapters 4 through 7, where broad money, BM, represents holdings of currency and deposits that are the counterpart of the expansion of credit, DCp and DCg).

Higher levels of financial deepening have been found to be associated with higher growth rates in some studies (Barro and Sala-i-Martin 1995), although less so in others (Sala-i-Martin 1997a, 1997b). This weak correlation between increases in the ratio of money or credit to the GDP and growth is related to the fact that, although credit is needed to sustain growth (a positive influence), sudden accelerations in the expansion of both overall money and credit have also been associated with financial crises (a negative influence).

### External Financial Openness

The external context of that monetization in many developing countries has changed as well, in part because of the progressive elimination of controls on a variety of financial operations with the rest of the world (the transactions in the current and capital accounts of the balance of payments). Figure 9.2 (Ito and Chinn 2013; see also Chin and Ito 2008)<sup>3</sup> shows the movement toward greater financial openness in three groups of countries, which, following the World Bank categories, are divided into high income, upper-middle income, and the combination of lower-middle income and low income.<sup>4</sup>

Although there is a general tendency toward greater financial openness, there are clear differences between high income countries (where many countries score close to the highest value of 2.44 in the index) and the other two groups, which, on average, still maintain more controls on external financial accounts. But there are also large differences across developing regions and countries, both in their evolution and current situation. Figure 9.2 shows that upper-middle-income countries have greater financial openness compared to lower-income ones. The figure also suggests a stagnation or even reversion in financial openness since the 2007–2008 financial

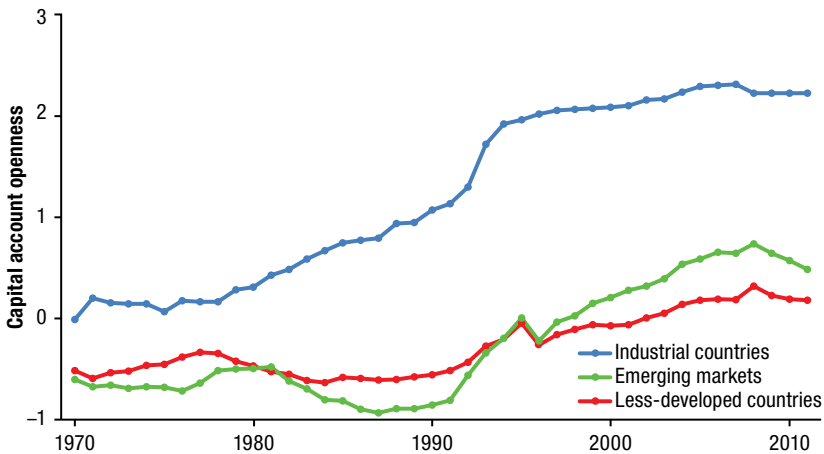
3 The authors calculated an index (KAOPEN) that measures the extent of controls on cross-border financial transactions considering four groups of interventions: the existence of multiple exchange rates; the presence of restrictions on current account transactions; restrictions on capital account transactions; and regulatory requirements of the surrender of export proceeds. The variables are equal to one when restrictions are nonexistent. The authors utilize statistical methods to calculate the final index, in which a larger value implies greater financial openness. In the latest version, the maximum value for KAOPEN is 2.44 and the minimum –1.86. The database includes the index for 181 countries for the 1970–2012 period.

4 Figure shows the average of the KAOPEN index for the groups of countries considered.



crisis. Table 9.4 shows that there are also important differences across countries in each of the regions. In geographical terms, China and South Asia appear more closed, along with Africa, while Southeast Asia and Latin America are in the middle, and emerging markets in Eastern Europe (not shown) have moved toward more open regimes (Chinn and Ito 2008).

**FIGURE 9.2** An index of financial openness



Source: Ito and Chinn (2013).

In Asia, China and India have consistently maintained controls on external accounts. On the other hand, Indonesia and Korea have more open regimes. In LAC there are contrasting pairs of countries that are financially more closed or more open, respectively, within small countries (Honduras and Guatemala), middle-sized countries (Colombia and Peru), and large countries (Brazil and Mexico). In Africa there are countries with open financial accounts (such as Egypt, Kenya, Uganda, and Zambia), but most have closed ones. Table 9.4 also shows the negative impact on financial openness of the crises of the 1980s in LAC, of the 1997–1998 Asian crisis in several countries in that region, and of the economic problems of the late first and early second decades of the 2000s in all the regions.

While with strict controls on external financial operations, the level of official reserves of foreign currency can be mainly related to the need for financing a certain amount of imports and/or the payment of external debt, once the capital accounts become more open those reserves may be needed to confront

**TABLE 9.4** Index of financial openness

Region/country	1970s	1980s	1990s	2000–2009	Early 2010s
<b>Asia</b>					
Bangladesh	-1.9	-1.9	-1.1	-1.2	-1.2
China	n/a	-1.5	-1.4	-1.2	-1.2
India	-1.2	-1.2	-1.2	-1.2	-1.2
Indonesia	0.9	2.2	2.1	1.1	0.5
Iran, Islamic Rep.	-0.1	-1.3	-1.9	-0.3	0.1
Korea, Rep.	-1.0	-0.7	-0.5	0.0	0.8
Malaysia	0.5	2.2	1.3	0.0	-1.2
Pakistan	-1.3	-1.2	-1.2	-1.2	-1.2
Philippines	-1.0	-1.1	-0.1	0.1	-1.2
Sri Lanka	-1.4	-1.2	0.2	0.1	0.1
Thailand	-0.1	-0.1	-0.1	-0.3	-1.2
<b>LAC</b>					
Bolivia	1.2	-0.3	0.7	1.2	0.2
Brazil	-1.9	-1.9	-1.7	-0.1	0.0
Colombia	-1.9	-1.9	-1.4	-0.4	-0.1
Guatemala	1.3	-1.1	0.8	2.3	2.4
Honduras	2.2	-0.9	-0.5	0.0	-1.2
Mexico	2.4	-0.4	0.7	0.9	1.1
Peru	-1.3	-0.7	1.1	2.4	2.4
<b>Africa</b>					
Burundi	-1.2	-1.2	-1.2	-1.4	-1.9
Cameroon	-0.5	-0.4	-0.9	-1.2	-1.2
Congo, Rep.	-0.7	-1.2	-1.1	-1.2	-1.2
Egypt, Arab Rep.	-1.9	-1.9	-0.4	2.2	1.8
Ethiopia	-1.2	-1.2	-1.3	-1.2	-1.2
Ghana	-1.3	-1.9	-1.3	-1.2	-1.2
Kenya	-1.2	-1.2	-0.5	1.1	1.1
Malawi	-1.2	-1.2	-1.1	-1.4	-1.9
Mali	-0.4	-0.1	-0.5	-1.2	-1.2
Nigeria	-1.2	-1.1	-1.6	-0.6	-0.5
Senegal	-0.4	-0.1	-0.5	-1.2	-1.2
South Africa	-0.8	-1.7	-1.1	-1.2	-1.2
Uganda	-1.2	-1.3	-0.3	2.4	2.4
Zambia	-1.2	-1.4	-0.4	2.4	2.4

**Source:** Ito and Chinn (2013).

other problems: if domestic economic agents consider that there is an excess of domestic liquidity (that is, too many pesos compared to the amount of dollars held in the net official reserves), they may anticipate a devaluation, and, without controls on the current account or capital transactions, they would rush to buy foreign currency and force a currency crisis (Krugman 1979).

Because of that possibility, and with greater financial openness, the ratio of reserves of hard currency to domestic money can be considered an insurance against financial and exchange rate crises and an important indicator of the potential occurrence of those crises when that ratio declines significantly. The variable used in the World Development Indicators of the World Bank (and the one shown in Table 9.5) is the inverse: broad money divided by foreign currency reserves; in this case an increase in its value would suggest a greater risk of a currency crisis.

**TABLE 9.5** Ratio of broad money to total reserves

Region	1960s	1970s	1980s	1990s	2000s	Early 2010s
<b>Asia (developing)</b>						
average	5.6	4.2	5.1	4.7	3.3	2.9
median	2.6	3.0	5.3	3.6	3.2	3.0
<b>SSA</b>						
average	5.8	8.6	21.2	12.8	3.1	2.5
median	3.5	5.7	9.9	3.6	2.4	2.1
<b>MENA</b>						
average	4.4	3.7	7.7	9.1	9.7	3.5
median	3.6	2.5	3.5	4.9	3.7	3.3
<b>LAC</b>						
average	6.6	5.3	10.7	6.6	4.2	3.3
median	5.4	4.5	4.8	3.6	3.1	2.8
<b>Developing countries</b>						
average	5.8	6.1	13.3	9.0	4.5	3.0
median	3.8	4.1	6.1	4.0	3.0	2.6

**Source:** Author's calculations based on World Bank (2014).

**Note:** The countries included are as follows: Asia: Afghanistan, Fiji, India, Indonesia, Malaysia, Nepal, Pakistan, Philippines, Samoa, Sri Lanka, and Thailand; SSA: Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Congo (Democratic Republic of the), Congo (Republic of the), Rep. Cote d'Ivoire, Ethiopia, Gabon, the Gambia, Ghana, Kenya, Madagascar, Malawi, Mali, Mauritius, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Tanzania, Togo, Uganda, and Zambia; MENA: Algeria, Bahrain, Arab Republic of Egypt, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Qatar, Saudi Arabia, Syrian Arab Republic, and Tunisia; LAC: Argentina, the Bahamas, Barbados, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, and Trinidad and Tobago.

With capital accounts mostly closed, the quantity of domestic currency per unit of international reserves was higher during the 1960s and the 1970s. That ratio peaked during the 1980s, when many developing countries suffered

debt, exchange, and banking crises. But afterward, with the capital accounts becoming more open, the ratio declined (there were fewer pesos per dollar in official reserves) for most regions (except MENA) and for developing countries as a whole in the 1990s and 2000s. The decline indicates more restrained expansion of domestic credit (public and private) and/or the need to retain larger levels of international reserves as a cushion against a lack of confidence in the domestic currency. Large reserves per unit of broad money have costs for the economy to the extent that such liquidity is maintained in central banks invested in assets with low financial returns, when there may be other alternative uses with higher returns for the economy.<sup>5</sup>

In any case, although there is no magic number under which the probability of crises declined, the evolution of this indicator suggests that there is now a relatively lower probability of exchange and financial crises as a result of sudden demand shifts from domestic currency into dollars.

### **Dollarization**

While governments have been trying to insure their economies against currency crises by accumulating larger reserves of hard currency to back up domestic circulation of the local currency, economic agents—particularly in those countries with a history of inflation and currency crises—have also been taking defensive measures. One has been increasingly adopting the direct use of foreign currency to fulfill some or all of the monetary functions of their own currency, as medium of exchange, unit of account, and store of value. In some instances, countries (such as Panama and, more recently, Ecuador and El Salvador) have unilaterally abandoned their own currencies, without coordinating with the country that issues the core currency they are using, and without becoming members of a monetary union with that core country. A very different case occurs when countries become members of a monetary union, as in the European Union monetary system. But there are other examples of increases in the domestic use of foreign currencies, particularly since the 1980s.

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5 Another impact of that accumulation of reserves is that, because they have been invested in dollar instruments (or the equivalent for other industrialized countries), interest rates in the United States (and other developed countries) have been kept lower than would have otherwise been the case, fueling the overinvestment cycle and global imbalances. Paradoxically, financial prudence on the part of developing countries (which tried to insure themselves by increasing reserves) contributed to global imbalances that were at the core of the 2007–2008 world financial crisis.

TABLE 9.6 Dollarization by region, 1980–2001

Region	1980–1985				1988–1993				1996–2001			
	Number of countries	Foreign currency deposits to broad money (%)	Total external debt to GDP (%)	Share of private debt in total external debt (%)	Number of countries	Foreign currency deposits to broad money (%)	Total external debt to GDP (%)	Share of private debt in total external debt (%)	Number of countries	Foreign currency deposits to broad money (%)	Total external debt to GDP (%)	Share of private debt in total external debt (%)
Africa	43	0	67	3	46	2	114	2	48	7	126	3
Emerging Asia	23	3	53	8	26	8	88	7	26	11	91	13
Middle East	13	11	38	4	14	20	66	11	14	21	60	19
Transition economies	0	0	33	0	22	17	37	3	26	29	50	19
Latin America	29	5	60	10	29	13	106	4	29	23	62	11
(of which South America)	11	10	58	20	11	23	61	8	11	35	47	27
Total	108				137				143			

Source: Reinhart, Rogoff, and Savastano (2003).

This trend has been called “dollarization.”<sup>6</sup> The term, however, covers different phenomena, from countries that unilaterally abandoned their own currencies (such as those mentioned in the previous paragraph) to countries that experienced different degrees of currency substitution (use of foreign currency in parallel with, or displacing, the local currency), domestic asset and liability dollarization (for instance, increases in dollar-denominated deposits and loans in the banking system), and external indebtedness in dollars.

Reinhart, Rogoff, and Savastano (2003) use different indicators to identify various types of dollarization: foreign currency deposits as a share of broad monetary aggregates, total external debt as a percentage of gross national product, private-sector participation in that debt, and domestic government debt denominated in (or linked to) a foreign currency as a share of total domestic government debt. Under most of those indicators (Table 9.6), dollarization has gone up in developing countries. Looking at the share of deposits denominated in foreign currency and the share of private debt in total external debt, the process is clearly more relevant in LAC, particularly the southern cone, and in the transition economies. Due to a lack of reliable data, the indicators mentioned do not include in-country cash holdings of foreign currency and offshore deposits, which may be important for the Middle East (cash holdings) and for Africa (offshore accounts) (Reinhart, Rogoff, and Savastano 2003).

It should also be noted that dollarization appears to have declined somewhat after peaking in the early 2000s in some developing regions, but it is still too early to determine whether this is a sustained reversal in the previous upward trend.

There are several points to be noticed regarding the different components of dollarization. First, consider the case of developing countries where an important percentage of both deposits and loans in the banking system is denominated in dollars. Although this seemingly takes care of the currency mismatch from the point of view of the banks (deposits and loans are in the same foreign currency), the underlying problem is not solved if debtors receive their incomes in domestic currency and, therefore, large adjustment in the exchange rate may force them to default on their dollar loans. In turn, neither banks nor the domestic economic authorities may have enough foreign exchange reserves to finance large withdrawals of foreign currency deposits from economic agents that see the financial deterioration of the banks and want their foreign currency deposits returned to them in physical hard

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<sup>6</sup> This is a simplified way to refer to the increased use of a foreign currency, usually (but not only) the US dollar in different economic transactions in a country.

currencies. Therefore, as happened in Argentina in the early 2000s (with dollar deposits) and later in that decade in Cyprus (with euro deposits), when confidence in the banking system declined, constraints had to be placed on the amount that depositors could withdraw in cash from the deposits denominated in foreign currency. This then led to deep economic recessions due to lack of liquidity for normal economic operations, the fact that banks stopped lending or were even forced to recall loans, and because of hoarding of currency outside the banking system by a frightened population.

A second and related problem posed by dollarization occurs when governments and private sectors that are increasingly indebted abroad—and whose tax receipts and sales, respectively, are denominated in local currency—are hit by large devaluations. For a government with dollarized public debt, such a devaluation may result in a fiscal crisis as well through different channels: first, the increase of payments of the public debt in pesos is not matched by tax receipts that, obviously, remain in domestic currency; second, the likely banking crisis (when dollarized debtors cannot pay their debts) may require intervention by the public sector with public funds; and third, the recession caused by the banking crisis reduces tax receipts. Private-sector firms with external debt denominated in foreign currencies may be also forced into bankruptcy.

For all these reasons, dollarization creates a strong constituency for exchange rate stability, which has been called “fear of floating” (Calvo and Reinhart 2000). That fear may, however, lead to bigger crises: if domestic inflation in a dollarized country is higher than in its trade partners, the attempt to maintain stable exchange rates may lead to overvalued domestic currencies, trade deficits, and eventually a sharp adjustment in the value of the domestic currency, triggering the public and private debt and banking crises that the stable exchange rate was supposed to avoid. Concerns about floating appear not only in emerging economies (or urbanized countries, in the categories of the World Development Report 2008), but also in low-income countries such as in SSA: Slavov (2011) found that about half of the countries in that region show signs of fear of floating, which is attributed to both dollarization and economic authorities’ lack of credibility.

In summary, the main policy issues are (1) whether dollarization could limit the possibility of adequate policy responses to confront negative shocks using monetary, financial, fiscal, and exchange rate instruments and, related to that, (2) whether the rigidities imposed by dollarization could lead to more frequent and/or deeper banking and economic crises. Recent empirical studies show that dollarized economies experience lower and more volatile growth, and that dollarization appears to have heightened the possibility of banking crises

(Levy-Yeyati 2005). De Nicolo, Honohan, and Ize (2003) also find that dollarization negatively affects solvency and liquidity indicators in the banking system.

On the other hand, dollarization may have helped to increase financial deepening in high-inflation economies (that is, it would have been very difficult in those countries to expand the domestic banking system without allowing for dollar deposits). However, the cost of a greater likelihood of financial crises should dissuade countries from following that route.

This changed monetary context is not equally present in all developing countries: as noted, large countries such as India and China maintain controls on the current and capital accounts of the balance of payments and do not show important levels of dollarization. Asia in general, which historically has experienced lower inflation rates, is less dollarized than LAC or SSA. In addition, Latin American countries also have largely open current and capital accounts. For agriculture (or in general for directed sectoral credit as it was used in the 1960s and 1970s), an implication is that the possibility of resorting to credit financed by money creation (which may affect the ratio shown in Table 9.5) is very different among those countries (more on this below).

### Interest Rates

Another variable to consider is the real interest rate (Table 9.7 presents a sample of countries in each region).<sup>7</sup> With an open capital account and with domestic and foreign financial instruments that are close substitutes, domestic interest rates in developing countries are linked to world markets,<sup>8</sup> and governments cannot maintain them artificially low as before. As a consequence, there were increases in real interest rates in the 1990s, particularly in SSA and LAC, and declines during the early 2000s (except for SSA). More recently, in

7 The countries included are as follows: SSA: Botswana, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Republic of Congo, Equatorial Guinea, Ethiopia, Gabon, the Gambia, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mauritius, Nigeria, Rwanda, Sierra Leone, South Africa, Swaziland, Tanzania, Tonga, Uganda, Zambia, and Zimbabwe; Asia (developing): Bangladesh, Bhutan, China, India, Indonesia, Republic of Korea, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, and Thailand; LAC: Bahamas, Belize, Bolivia, Chile, Colombia, Costa Rica, Ecuador, Guatemala, Guyana, Honduras, Jamaica, Peru, Trinidad and Tobago, Uruguay, and Venezuela; MENA: Bahrain, Arab Republic of Egypt, Kuwait, Mauritania, Morocco, Oman, Syrian Arab Republic, and United Arab Emirates.

8 In that case, as discussed in Chapter 7, the domestic rate is related to the world interest rate by the following approximate equation:  $INTR = R_w + E(dER/ER) + CR$ , where, as before,  $INTR$  is the domestic interest rate for the time period considered in domestic currency financial instruments;  $R_w$  is the world interest rate in financial instruments in foreign currency;  $E(dER/ER) = E\{[ER(t+1) - ER(t)]/ER(t)\}$  is the devaluation (in percentage terms) that is expected ( $E$ ) at time  $t$  to take place at time  $t + 1$ ; and  $CR$  is country risk, also expressed in percentage terms. As noted before, the equation is just an approximation; the exact arbitrage equation includes another term for the interaction of world interest rates and the rate of devaluation.



the context of the 1997–1998 global financial crisis, real rates went down further, but they still seem high in SSA (also in LAC, although less so).

**TABLE 9.7** Real interest rate (%)

Region	1980s	1990s	2000s	Early 2010s
SSA				
Average	2.7	8.3	16.0	9.0
Median	4.5	7.2	10.4	6.3
MENA				
Average	5.5	6.4	5.8	−3.6
Median	5.2	7.2	4.2	−2.7
Asia (developing)				
Average	4.9	5.1	4.3	1.9
Median	4.6	6.3	3.8	2.2
LAC				
Average	1.4	14.7	9.7	4.7
Median	3.7	10.9	9.8	5.8

**Source:** Author's calculations based on World Bank (2014).

Honohan (2000) has argued that as financial liberalization progressed, real interest rates increased more in developing countries than they did in industrial countries; interest rate volatility also increased in the most liberalizing countries.

In developed countries, it has been recognized that interest rates affect agriculture, which tends to be more capital intensive than other sectors of the economy (Thompson 1988). There is no comparable literature on the links between interest rates and agriculture in developing countries, but it is likely that the same effect applies. In such a case, the trend toward higher real interest rates would not be positive for agriculture in developing countries. On the other hand, as discussed below, farmers in developing countries either do not have access to formal credit or, if they do, they may receive preferential (subsidized) rates through different governmental schemes.

### Final Comments on This Section

In general, the indicators discussed suggest somewhat better monetary and financial conditions for developing countries. Inflation is lower, which would also reduce volatility in price levels. Lower inflation has led to a greater economic monetization, which would support further expansion of credit.

Economies also seem to have stronger ratios of foreign reserves to liquidity in the domestic currency, which would reduce the possibility of currency crises. On the negative side, the expansion of dollarization seems to have increased the likelihood of currency, debt, and financial crises, while higher real interest rates may also affect growth and employment.

## **General Monetary Policy Issues**

### **Money, Growth, and Inflation**

The links between money, growth, and inflation have long been debated. In monetary theory, there are different opinions: for instance, it has been argued that inflation does not impact growth (Sidrauski 1967); that the impact is positive (money is a substitute for capital and inflation, which leads to people holding less money, then forces them to accumulate more capital; Tobin 1969); and that the relationship is negative (Stockman 1981 uses a model in which money is complementary to capital and, therefore, inflation leads to less holdings of money and capital). With theory being inconclusive, the issue has been analyzed empirically in both industrialized and developing countries.

In industrialized countries, the discussion has focused on the slope and (the possibly nonlinear) shape of what has been called the Phillips curve,<sup>9</sup> the empirical observation (at least in the short run) that there is a negative relationship between unemployment and inflation (that is, when unemployment is low, inflation is high, and vice versa).

The debate about the empirical parameters of that relationship, its validity over longer time periods, and its theoretical foundations has focused mostly on industrialized countries and is not reviewed here.<sup>10</sup> Part of the discrepancies focused on whether there is a trade-off that can be exploited by monetary policy to reduce unemployment, as Keynesian economists thought: that is, whether (somewhat) more inflation can lead to (somewhat) less unemployment. Monetarist economists, on the other hand, argued that there is a natural rate of unemployment (sometimes called nonaccelerating inflation rate of unemployment, NAIRU) defined by structural factors, which cannot be influenced by monetary policy. Therefore an expansionary monetary policy may only result in increased inflation. A similar debate may become more

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9 The original article by Alban William Housego Phillips, a New Zealand economist, analyzed the inverse relationship between money wages and unemployment in the United Kingdom (Phillips 1958), which was later extended to the inverse movement of inflation and unemployment in other countries (Samuelson and Solow 1960).

10 Many macroeconomic texts have a good treatment of the issues involved; see, for instance, Romer (2001).

relevant in advanced middle-income countries that have moved to inflation targeting (see below), although centered on the trade-off between inflation and growth.

In the case of developing countries, the early debates in the 1950s and 1960s revolved around the structuralist and monetarist views of inflation. For structuralists, inflation was an unwanted side effect of growth in the context of fragmented economic structures (and it was therefore a lesser evil that had to be tolerated to foster economic development). These theories are related to productive rigidities and bottlenecks in different markets (see, for instance, Olivera 1971); the extent of distributive conflict or class struggle, depending on your analytical background (Saad-Filho 2000); and the influence of market power by firms (Chirinko and Fazzari 2000),<sup>11</sup> or by labor unions (another manifestation of the distributive conflict).

In that context, inflationary pressures were not necessarily attributed to excess aggregate demand; rather, it was thought that relatively normal levels of aggregate demand could generate inflationary pressures because the productive sector of the economy was fragmented, with key sectors operating at full capacity or showing bottlenecks and rigidities to increase the level of operation, while other sectors experienced higher levels of unemployment and unused capacity. Consequently, inflationary pressures were supposed to fade away once the investment process integrated and balanced the productive structure of the economy, making the production bottlenecks disappear. This process was believed to be basically the development and expansion of the industrial sector and related infrastructure. Also, inflation was thought to be an expedient way of generating forced savings through the inflationary tax generated by the monetary policy of the government, which in turn sustained the process of capital accumulation (a discussion of views on inflation and development can be found in Johnson 1984). Finally, if inflation was the result of a distributive conflict, then monetary policy, although it could contribute to a wage-price spiral,<sup>12</sup> was not the primary cause of inflation, and

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11 Some studies show a link that goes from inflation to increases in monopoly power, and not the reverse (Chirinko and Fazzari 2000): when there is high inflation firms have more market power to increase prices because buyers usually lack the time and resources to conduct a detailed search for price information across firms, products, and geographical spaces.

12 It should be noted that in many structuralist models, there is an underlying monetary expansion mechanism that allows the price adjustments or the distributive or class conflict to continue at ever-increasing levels of prices and wages. In that sense, structuralist approaches do not ignore the monetary conditions framing the postulated sectoral, market, or distributive imbalances. They simply believe it is not the main cause.

other policies, such as more active public management of wages and prices (an incomes policy), would be needed.

An opposite position, although recognizing that the inflationary tax might help to raise funds needed for economic development, considered that the uncertainties generated by inflation and the utilization of resources needed to hedge against them more than offset the possibly positive effects of the public investments financed by the inflationary tax. Also, even if the basic cause was the distributive conflict, an expansionary monetary policy, as noted above, could push the wage-prices spiral ever higher, leading to explosive inflation with potentially very negative consequences for growth and equity.<sup>13</sup> Consequently, it was argued that stability, rather than high and variable inflation, advanced growth and societal welfare in the medium to long run (see the early discussion in Johnson 1984).

To the extent that inflation began to get increasingly out of control in the 1970s and 1980s in many developing countries, especially in LAC and to a lesser extent in SSA, the argument about the potential negative impact of inflation on growth began to receive more attention. Empirical studies, such as Fischer (1993), found that higher inflation was correlated with lower growth, but it was shown that the results depended mostly on some specific unusual cases, and thus the findings were not robust (Levine and Zervos 1993).

Other authors have argued that those weak results were the consequence of a nonlinear relationship with different interactions between inflation and growth at different levels of the variables. Therefore, several studies have attempted to estimate the relationship between inflation and growth using nonlinear specifications, asking whether (1) there are threshold effects (for example, inflation must reach some minimum before the negative impact on growth becomes notorious) and/or (2) there is a “kink” in the relationship

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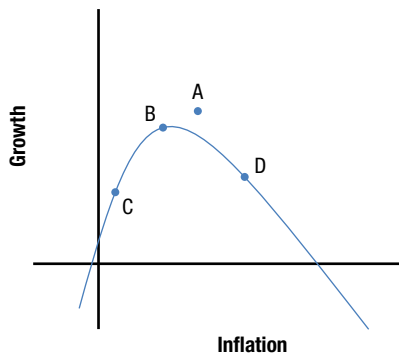
13 Several of the theories (monetarist, variously Keynesian, structuralist, or Marxist) linking inflation to market power and bargaining structure in labor and product markets, although they differ in many details and phrase the issues differently, may have more in common than recognized: whether you argue in terms of the institutional aspects of labor contracts and price strategies by firms (as a variety of monetarists and Keynesian do), or talk about distributive conflict (a structuralist view), or class struggle and the “reserve army of the unemployed” (the latter generated by power relations and successive crises to discipline workers, as in the Marxist view), all these arguments point to institutional and structural aspects of the bargaining process between labor and capital (see a discussion in Stockhammer 2008). Only those that believe the unemployment rate is exclusively the result of exogenous technological conditions and worker preferences would not fall within some of the categories mentioned above. At the same time, it must be recognized that market power and bargaining structure in labor and product markets outlined above are played out within a context of evolving technological conditions and also changing preferences in consumers.

(inflation might be positively related to growth up to some levels of inflation, after which—the kink—the relationship changes sign).

For instance, Dornbusch and Fischer (1991) argued, before the generalized period of disinflation in the second half of the 1990s, that the negative impact of inflation on growth happened at relatively high levels of inflation (a threshold effect) that they estimated to be above the range of 15–30 percent, the upper limit of what they called “moderate inflation.” With more formal methods, Fischer (1993) found other thresholds: below 15 percent, the impact of inflation on growth was negative but small; at 15–40 percent, there was a strong negative effect of inflation on growth; and over 40 percent, the impact was negative but the main damage to growth occurred in the previous threshold.<sup>14</sup>

Other studies have found a different nonlinear relationship characterized by a period in which growth and inflation start out positively correlated, an inflection point is reached (a kink), and the relationship turns negative. Figure 9.3 shows a possible shape for this hypothetical correlation: in the upward segment, the economy is growing fast, and that is why inflation is increasing, while in the downward segment because inflation is too high, growth is affected.

**FIGURE 9.3** Growth and inflation



**Source:** Díaz-Bonilla and Robinson (2010).

**Note:** Point A = countries growing “too fast” and with accelerating inflation; Point B = the inflection (or kink) in the estimated curve relating the levels of growth and inflation; Point C = where the policy target for inflation is set too low; and Point D = where high inflation negatively affects growth.

14 Reinhart and Rogoff (2009, 4–5) argue that “a number of studies, including our own earlier work on classifying post–World War II exchange rate arrangements, use a twelve-month inflation threshold of 40 percent or higher as the mark of a high inflation episode. Of course, one can argue that the effects of inflation are pernicious at much lower levels of inflation, say 10 percent, but the costs of sustained moderate inflation are not well established either theoretically or empirically.”

Several econometric studies offer a range of estimates in the levels of growth and inflation where the inflection (or kink) in the curve takes place (point B). The estimates usually range from 2.5 to 19 percent, with most estimates between 5 percent and 15 percent (Bruno and Easterly 1995; Sarel 1996; Ghosh and Phillips 1998; Burdekin et al. 2000; Khan and Senhadji 2001; Drukker, Gomis-Porqueras, and Hernandez-Verme 2005; Pollin and Zhu 2005; and Li 2006). For countries growing “too fast” (point A), and therefore potentially experiencing some inflationary pressures, it would make a difference which side of point B the economy will eventually tend toward. Policymakers may negatively affect growth by generating monetary conditions that lead to high inflation (point D). However, if the policy target for inflation is set too low (point C), the country would also be paying a price in lower growth. These interactions must be considered when analyzing monetary policies for developing countries.

### Monetary Policies

The following equation helps to think about monetary policy by showing (in an eclectic fashion) different factors affecting inflation (Fortin 2003):

$$INF = a_0 + b_1 * (Lg)INF(-1) + b_2 * INF_{exp} + b_3 * (Lg)XD + b_4 * (Lg)Z + e,$$

where current inflation (INF) depends on five components:  $INF(-1)$  indicates lagged inflation, a backward-looking variable (with Lg indicating the presence of lags:  $t - 1$ ,  $t - 2$ , and so on);  $INF_{exp}$  indicates expected inflation, a forward-looking variable; XD is a measure of excess demand, such as the output gap, unemployment, or capacity utilization; Z refers to other structural factors and shocks;  $a_0$  is the intercept of the equation;  $b_1$ ,  $b_2$ ,  $b_3$ , and  $b_4$  are the coefficients of the equation, multiplied (using the sign \*) by the respective variables; and  $e$  is an error term.

First, policies may try to avoid inflationary inertia (the backward component,  $b_1 * (Lg)INF(-1)$ ). This inertia may result, for instance, from contracts whose renewal is indexed to adjustments to past inflation (such as wage agreements), to entrenched inflationary expectations, or to other similar factors (this would be part of the income policies advised by some Keynesian and structuralists). Second, there may be policies aimed at managing expectations (the forward component,  $b_2 * INF_{exp}$ ). Some ways in which that can be done include preannouncing the path for some variables, such as the money supply, the exchange rate, or inflation itself as in the case of inflation targeting (these approaches are discussed below). Monetarists and Keynesians would consider the management of inflationary expectations a crucial issue. Third, there

are different policies (fiscal, monetary, and others) that try to align aggregate demand and potential output (one of the aspects of the output gap present in  $b_3 * (Lg)XD$ ). Different measures of unemployment may be utilized here as well; as mentioned before, most monetarist, Keynesian, structuralist, and Marxist views consider those indicators relevant, although for different reasons. Fourth, other measures may focus on expanding potential output (another part of the output gap considered in  $b_3 * (Lg)XD$ ) by increasing investments in physical capital, human capital, infrastructure, and technology, as most structuralists would suggest. Fifth, all of this must take into account different structural aspects and exogenous shocks, such as sudden increases in food and oil prices ( $b_4 * (Lg)Z$ ). Again, structuralists and some Keynesians would emphasize these factors.

**TABLE 9.8** Monetary policy framework

Types		Number of countries	Description
Exchange rate anchor	US dollar	44	The monetary authority buys or sells foreign exchange to maintain the exchange rate at its predetermined level or within a range. The exchange rate thus serves as the nominal anchor or intermediate target of monetary policy. These frameworks are associated with exchange rate arrangements with no separate legal tender, currency board arrangements, pegs (or stabilized arrangements) with or without bands, crawling pegs (or crawl-like arrangements), and other managed arrangements. It may be pegged to the US dollar, to the euro, to a currency basket, or to some other target.
	Euro	27	
	Composite	13	
	Other	8	
Monetary aggregate target		26	The monetary authority uses its instruments to achieve a target growth rate for a monetary aggregate, such as reserve money, M1, or M2, and the targeted aggregate becomes the nominal anchor or intermediate target of monetary policy.
Inflation targeting		34	This involves the public announcement of numerical targets for inflation, with an institutional commitment by the monetary authority to achieve these targets, typically over a medium-term horizon. Additional key features normally include increased communication with the public and the markets about the plans and objectives of monetary policymakers and increased accountability of the central bank for achieving its inflation objectives. Monetary policy decisions are often guided by the deviation of forecasts of future inflation from the announced inflation target, with the inflation forecast acting (implicitly or explicitly) as the intermediate target of monetary policy.
Other		39	The country has no explicitly stated nominal anchor, but rather monitors various indicators in conducting monetary policy. This category is also used when no relevant information on the country is available.

Source: IMF (2013a).

Within that general approach, monetary policy frameworks have been evolving and can be classified according to the objectives, intermediate targets (which are supposed to lead to the objective), the operational targets (to which the policy instruments are directly aimed), and other factors. Table 9.8 shows the classification of different monetary policy frameworks, as defined and interpreted by the IMF (2013a), and the number of countries in each category.

Lower-income developing countries appear mostly in the exchange rate anchor and monetary target categories, while some higher-income developing countries and most industrialized countries are in the inflation target and other categories.

Table 9.9 presents a more detailed discussion of the taxonomy, including a distinction within the exchange rate regimes between nominal and real exchange targeting (from Habermeier et al. 2009).

**TABLE 9.9** Taxonomy of monetary policy regimes

Target	Monetary targeting	Nominal exchange rate targeting	Real exchange rate targeting	Inflation targeting
Final policy goal	Inflation	Inflation	Competitiveness/growth. Inflation (secondary)	Inflation
Intermediate target	Money supply	Nominal exchange rate path or range	Real exchange rate	Forecasted inflation
Operational target	Monetary base/bank deposits at central bank	Nominal exchange rate/short-term interest rate	Rate of devaluation crawl	Short-term interest rate
Primary shock absorber	Nominal exchange rate	International reserves	International reserves	Nominal exchange rate
Secondary shock absorber	Interest rate	Money supply	Interest rate	International reserves

**Source:** Habermeier et al. (2009).

In what follows, the different approaches are discussed in somewhat more detail.

### Monetary Targeting

To understand this approach, it helps to recall the accounting equation of the central bank presented in Chapter 6:

$$ONRA + DC_{cb} + DC_{pcb} + DC_{gcb} = Ch + Cb + RD + NW_{cb},$$



where, as discussed before, ONRA is official net foreign assets; DCbcb is credit to the depository banks by central bank; DCpcb is credit to the private sector by the central bank; DCgcb is credit to the government by central bank; Ch is currency held outside the central bank by the private sector other than depository banks; Cb is currency held by depository banks (cash in vaults); RD is deposits of depository banks in the central bank; and NWcb is net wealth of the central bank and other items (which will be mostly ignored in what follows).

It was also explained that  $Ch + Cb + RD$  was called the monetary base (BM0) (see also Figure 9.1) and that there was a relation between BM0 and broader monetary aggregates (say M3; broad money in Figure 9.1), given by the money multiplier (let's call it  $mm$ ), which depended on a series of policy and behavioral parameters (Chapter 6).

$$M3 = mm * BM0.$$

Further consider a money demand function (Chapter 6), where money demand depends on the velocity of circulation of money ( $v$ ) (which may include a variety of influences), a price index (in that chapter, the deflator of the GDP,  $P_{gdp}$ , was used, but other prices can be utilized such as the Consumer Price Index (CPI), which is calculated at shorter intervals) and real GDP; then the demand equation for money, say M3, can be written as a function ( $F[. . .]$ ) of those variables:

$$M3 = F[v, CPI, GDP_r] = mm * BM0.$$

A monetary targeting policy can then be implemented starting with a growth forecast for  $GDP_r$ , an inflation objective (using CPI usually), and estimates of money velocity ( $v$ ) and the money multiplier ( $mm$ ). With that, the monetary authorities project a demand for M3 that is linked to the monetary base (BM0) through the money multiplier, as in the following sequence:

Given  $v, CPI, GDP_r \rightarrow$  calculate M3 and given  $mm \rightarrow$  calculate BM0.

BM0 includes variables that the central bank is supposed to control:

$$BM0 = Ch + Cb + RD = ONRA + DCbcb + DCpcb + DCgcb.$$

The liability side of the central bank includes the quantity of physical cash in the economy ( $Ch + Cb$ ) and the minimal quantity of deposits that banks need to keep at the central bank (RD, although banks may hold more than the minimum). On the asset side, the central bank can control the domestic credit that the institution offers to depository banks (DCbcb), to the private

sector (DCpcb), and to the government (DCgcb); also, depending on the exchange rate regime, the central bank may control the level of net foreign assets (ONRA) (with a floating ER, the central bank will have more control than when committed to a fixed or predetermined ER).

The supply and demand equations for M3 can be utilized for the monetary targeting and for what is called financial programming as well, the typical consistency approach in the context of IMF programs. The exercise can be expressed as follows:

$$M3 = mm * BM0 = mm * (Ch + Cb + RD) = mm * (ONRA + DCbcb + DCpcb + DCgcb).$$

It works as follows. First, growth projections, the inflation target, and estimates of money velocity ( $v$ ) define the demand for M3; with the estimated money multiplier ( $mm$ ), BM0 is determined. Then, it is necessary to ensure that money supply is compatible with money demand, given the growth projections and inflation objectives. To do that, quantitative targets are defined for ONRA (usually a minimum, which would force the country to have a more flexible exchange rate) and for domestic credit (a maximum of domestic credit to banks, DCbcb; private sector, DCpcb; and particularly for the government, DCgcb).

With or without IMF programs, many developing countries have followed this approach since the 1970s: central banks would define a projection for M3 (usually called the intermediate target) and set quarterly or biannual targets for BM0 (the operational target that is supposed to be under the control of the central bank).

This approach may have helped reduce inflation rates in several low-income countries that followed it (IMF 2014b), and it is still utilized by many of those countries (26 in the early 2010s; see Table 9.8). This is particularly the case in SSA.<sup>15</sup> However, in the 2000s the number of countries implementing money targeting has declined by about 40 percent in the countries the IMF calls emerging market countries (EM) and by 20 percent in the rest of the developing countries. Those countries have been moving to more flexible money targeting (such as Rwanda since 2012), simplified

15 For instance, Tanzania has utilized a money-targeting framework, with the bank deposits in the central bank as its operating target and M3 as its intermediate target. To manage the bank deposits, the central bank utilizes a specific path of sales of foreign exchange and other operations with depository banks. The country has reduced inflation from more than 20 percent in the mid-1990s to some 6 percent in late 2013, with an intermediate period of higher inflation rates during the food and fuel price shocks just before and after 2010 (IMF 2014b).

inflation-targeting regimes (see below) (such as Uganda in 2013), or some other mixed regimes (IMF 2014b).

The reasons for that change have been related to concerns about the instability of the estimates of the money demand, which seem to suffer from sharp movements in velocity and also changes in the money multipliers. Strict adherence to targets in those circumstances have led to large volatility in interest rates, exchange rates, and GDP,<sup>16</sup> or to the abandonment or recasting of the targets (which affected the credibility of central banks) (Andrle et al. 2013). Also, the instability in money demand appears to have weakened but not eliminated the link between inflation and monetary aggregates, at least for low-inflation countries, and in the short run (IMF 2014b). Among the positive reasons to change away from strict monetary targeting has been the fact that reform in the domestic financial markets (noted before) is allowing the use of other policy instruments, such as the short-term interest rate, to define the monetary policy stance (IMF 2014b).

Still, money targeting may be relevant for countries with high inflation rates or low levels of financial development. Even if monetary aggregates are not utilized directly in the policy framework, their evolution and analysis would still be part of the indicators to evaluate the monetary policy stance and inflationary conditions (IMF 2014b).

### Exchange Rate Targeting

In the second half of the 1970s, several Latin American countries implemented programs that tried to reduce high inflation rates through the establishment of predetermined rates of devaluation of the exchange rate.<sup>17</sup> The theory was that the preannounced exchange rate (1) would make domestic inflation of traded goods converge with the lower international inflation; (2) would give a visible anchor for inflationary expectations in countries where economic agents closely follow ER developments because the domestic currency is affected by high inflation; and (3) in the context of opening capital accounts, would also restrict the discretionary management of monetary

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16 In this regard, IMF (2014b) contrasts the cases of Tanzania, which adhered to its money-targeting regime before 2010 and has suffered more volatility in interest rates, with the more stable situation in both Kenya—which has been abandoning monetary targets and paying more attention to short-term interest rates—and Uganda, which moved to a simplified inflation-targeting regime in 2011.

17 They are also called *tablitas* (“little tables” in Spanish) for the way the information was presented in some Latin American countries that utilized this approach.

policy by the government (the ER rule was a proxy for a general monetary rule restricting money growth).

Most of those programs collapsed during the 1980s, generating a lively debate on the causes of their failure (see, among others, Edwards 1984; Balassa 1985; Corbo and de Melo 1985; Edwards and Teitel 1986). Changes in international conditions related to the ebb and flow of financial capital and commodity prices were critical to understanding these collapses (as discussed in Chapter 3), but most of the literature focused on domestic policies. The main explanations of the causes of failure from the perspective of domestic policies can be separated into two groups. One line has emphasized problems in the sequence of liberalization of the external accounts: the capital market would have been liberalized prematurely, when the proper sequence should have been first to open up the goods market and only then to reduce the restrictions on external capital flows (Edwards 1984). The second line of analysis focused on inconsistencies in managing the exchange rate, which would have become misaligned with the fiscal policy (as in Argentina) or with the wage policy (as in Chile).

In any case, the programs were accompanied initially by large inflows of foreign capital (facilitated by the liberalization of the capital account). This accelerated economic growth and, therefore, weakened the expected convergence to lower inflation, while contributing to the overvaluation of the exchange rate, which led to the debt problems of the 1980s. At the same time, overvaluation coupled with trade liberalization (implemented in parallel to enforce convergence with world inflation) negatively affected domestic producers, including efficient firms and sectors that could have operated adequately with a more realistic exchange rate. The collapse of many firms put pressure on the banking system. Finally, when the overvaluation was too obvious, the use of the exchange rate as a monetary anchor lost its credibility, a massive outflow of capital took place (anticipating the expected devaluation), the banking system imploded, and the economy collapsed (see Calvo and Vegh 1999, for an overview of exchange rate-based stabilization schemes and the severe economic, banking, and debt crises experienced by several middle-income countries in the 1980s and 1990s).

Still, Table 9.8 shows that by far the largest number of countries (about 90) are classified as utilizing the ER as the nominal anchor through fixed, pre-announced, or heavily managed pegs. In some cases this happens as part of broader monetary arrangements (such as monetary unions), but in other cases the ER targeting is operated independently. In any case, it is different to use

the ER as nominal anchor in the context of lower inflation and a more financially closed and nondollarized economy than to try to manipulate the ER to reduce inflation from higher levels in economies with a more open capital account and a dollarized banking system.

Also, as noted in Table 9.9, it is different to use the nominal ER approach (with the exchange rate operating to control inflation but that may lead to overvaluation and balance of payment problems) or the real ER approach (which is concerned with growth and competitiveness but does not serve to anchor inflation). This illustrates the important differences between the two approaches to monetary and exchange rate policy (Corden 1990) (more on these topics in Chapter 10 on exchange rates).

Central banks intervening in the foreign exchange market (for example, buying or selling dollars) to maintain certain ER parity also affects money supply (as shown above in the equations of the central bank). Therefore, even with ER targeting, central banks should monitor other monetary variables as well.

### **Inflation Targeting**

In the early 1990s, several industrialized countries began to adopt inflation targeting (IT) as a monetary framework for their central banks. This approach focused mostly on  $b_2 * \text{INF}_{\text{exp}}$  (inflationary expectations) and  $b_3 * (\text{Lg})\text{XD}$  (the existence of an output gap). It was based on the notion that the central banks should announce numerical inflation targets (usually a relatively narrow band in single digits over some horizon) and pursue these targets in the medium term through transparent interest rate policy rules: central banks would increase (decrease) interest rates when the actual or, more likely, forecast inflation was above (below) the announced range. It was an approach based on one target (inflation) and one instrument (interest rate). For those policymakers and public concerned about other objectives such as employment or GDP, the argument offered was that the best option to maintain economic activity as close as possible to its potential was to focus on inflation and keep it stable (what has sometimes been called the “divine coincidence,” to the extent that one instrument would attain two objectives, which was certainly disputable; Blanchard, Dell’Ariccia, and Mauro 2013).

In the process, central banks should maintain clear communication of forecasts and intentions with the public. Although central banks would have some flexibility to reach these targets in the face of unexpected shocks, they would be held accountable for those results; this accountability also required

that central banks be granted the independence to follow the monetary policies they considered necessary to reach the announced inflation target.<sup>18</sup>

The adoption of such a scheme in developing countries, it could be argued, would be more difficult given a stronger inertia in inflation ( $b_1 * (Lg)INF(-1)$ ), the presence of structural factors (rigidities, lack of competition, and so on), and considering that the size of the exogenous shocks experienced by those countries ( $b_4 * (Lg)Z$ ) is larger than in industrialized ones. However, the other alternatives (such as targeting the exchange rates or some of the main money supply aggregates) had problems too, as noted: ER regimes led to deep economic crises in the 1980s and 1990s in several middle-income countries, and the approach based on targeting the money supply suffered from the variability in money demand and in the money multipliers. Therefore, as discussed, it was not clear that controlling those monetary aggregates would control inflation.

Toward the end of the 1990s and in the early 2000s, several middle- to higher-income developing countries also began to adopt IT schemes, in several cases after collapses in exchange-based stabilization approaches. International financial institutions also began to promote the IT framework as best practice for developing countries. The policy recipe has been to establish an IT regime for central banks and to let the exchange rate float, discouraging the use of heavy intervention in foreign currencies markets that was common in the past, which many saw as the main culprit in the economic crises of the 1980s and 1990s. By the early 2010s, more than 30 industrial and developing countries had adopted full-fledged inflation targeting (Table 9.8).

There have been diverse views regarding whether the IT approach helps to maintain adequate macroeconomic performance, considering not only inflation but also other variables such as growth and employment, both in levels and volatility (Bernanke and Woodford 2004). This debate, which is part of the more general topic of optimal monetary policies (see, for instance, Woodford 2003, 2006), includes comparisons with the other possible approaches (such as those mentioned before) or other variables (such as employment and wages) (Blanchard 2003; Frankel 2011).

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18 Bernanke and Woodford (2004, 10) argued that “inflation targeting offers a number of the basic elements of a successful monetary policy framework, including a clearly defined nominal anchor, a coherent approach to decision making, the flexibility to respond to unanticipated shocks, and a strategy for communicating with the public and financial markets. However, as in any other framework, making good policy requires sensitivity to the specific economic and institutional environment in which policymakers find themselves, as well as the technical capability to modify and adapt the framework as needed.”

On the positive side, it has been argued that IT anchors expectations faster, in part because it focuses directly on the variable of interest (inflation) rather than using intermediate variables (the exchange rate or monetary aggregates)<sup>19</sup> and thus allows for greater flexibility in adjusting to circumstances. Defenders also argue that inflation targeting involves a lower economic cost if a policy failure occurs, particularly compared with exchange rate approaches (Batini and Laxton 2006).

On the other hand, others believe that IT may lead to worsening performance in other macroeconomic objectives, such as growth or employment (Blanchard 2003; Kumhof 2001; see point C in Figure 9.3, where trying to maintain low inflation leads to lower growth as well).

There are several studies on the performance of IT regimes. Batini and Laxton (2006) look at the empirical evidence on IT for developing countries before the 2007–2008 crisis by comparing 13 developing countries that are inflation targeters with 29 that are not. They compare the performance of inflation targeters before and after adopting inflation targeting relative to the performance of nontargeters, using as a baseline for the break date for nontargeters the average adoption date for inflation targeters. Although all countries reduced inflation, they found a comparatively larger decline in inflation and volatility of inflation in targeters compared to nontargeters. Regarding GDP, they only report volatility, concluding that the improvements in inflation have not been achieved at the cost of destabilizing output. However, they do not mention growth in levels, which it has been argued may decline with IT.

Other studies predating the late 2000s global crisis also found that the IMF category of emerging markets that utilized IT monetary frameworks moved to a more countercyclical monetary policy and reduced output volatility (McGettigan et al. 2013). But again, the study focuses on volatility, not on output growth.

Roger (2009) compares IT and non-IT countries divided into higher and lower income for the period 1990–2008 (that is, just before the global crisis). His evaluation (summarized in Figure 4, page 20) shows that for higher-income countries, the differences between targeters and nontargeters in growth and inflation volatility are negligible, but IT countries improved growth in levels, while non-IT countries grew less by the end of the period

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<sup>19</sup> It should be noted that this distinction is not completely correct, because, as noted in Table 9.9, the IT has the interest rate as an instrument in the same way that the money supply and exchange rate approaches have monetary aggregates and the exchange rate, and that the latter approaches also indicate their inflation preferences. The only difference would then be in the degree of emphasis in the announcement and communication of the inflation target.

analyzed. In the case of lower-income countries, IT countries, which as a whole had higher volatility before they started with the new monetary framework, show less volatility of GDP growth and inflation afterward. But lower-income non-IT countries (contrary to the case of higher-income) are still growing faster than IT ones (although all improved relative to the starting point).

In summary, while it is clear that inflation in levels and output and inflation volatility decreased with IT regimes, the impact on growth in levels is less clear, once other factors are considered.

More recent studies focusing on the 2008 price shocks show that targeters seem to have experienced lower inflationary rates (by more than 2 percentage points), but this result does not control for other influences (Habermeier et al. 2009). Once other factors were considered, IT countries did only marginally better. Although the adoption of IT frameworks appeared to have helped to anchor inflation expectations and reduce second-round effects of the international commodity price shocks, the quantitative effect was small: the difference between targeters and nontargeters in long-term inflationary impact of a 10 percent increase in international fuel price inflation was only 0.2 percentage points (lower in targeters) (Gelos and Ustyugova 2012). Other factors, such as the severity of previous inflation, the shares of food and fuel in the CPI, and governance issues, were more relevant in determining the domestic impacts.<sup>20</sup>

Beyond the general conceptual issues, there have also been debates about operational issues, such as what indicator of inflation should be targeted. Usually it is the CPI, but two concepts can be distinguished: one is the overall CPI (with all the items included, what is sometimes called the headline CPI), and another is the CPI excluding volatile items such as food and energy prices (called core CPI). There have been some debates about whether to focus on the core CPI instead of the headline one, because volatile items revert to their average values, and therefore monetary authorities should not

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20 Gelos and Ustyugova (2012) have estimated that, after the 2008 shock, economies with initial inflation above 10 percent suffered an inflation that on average was 6 percentage points higher than countries with previous inflation below 10 percent. Also, countries with worse governance (measured by a combination of variables such as bureaucratic quality, corruption, democratic accountability, and law and order) suffered more inflation from the shocks: a country in the bottom fifth of the governance rating experienced on average a 0.9 percentage point higher increase in inflation than a country in the top fifth. On the other hand Gelos and Ustyugova did not find evidence that higher financial development or extensive dollarization considerably influenced how international price shocks affected domestic inflation; nor that labor market flexibility or trade openness affected the pass-through of world commodity price inflation into domestic prices.



overreact to what is thought to be a short-term impact.<sup>21</sup> However, most IT countries now target the overall CPI (Roger 2009). Others have argued that commodity-exporting developing countries should consider commodity prices in the design of inflation-targeting arrangements. Frankel (2005) has suggested that those countries, as normative policy, should focus on the export price index rather than the CPI (more on this later).

The exclusive focus on the short-term interest rate as the policy instrument was also debated, initially at the theoretical level and later by the sequence of shocks before and after 2010 (from commodity booms to growth collapses to price spikes again). Before those events it had been argued that in emerging markets, the possibility of sudden stops in capital flows and the extensive presence of domestic debt denominated in foreign exchange (domestic liability dollarization) make interest rates for IT a weak instrument, especially during periods of high volatility (Calvo 2006). In volatile times, it may be advisable to switch temporarily to other instruments such as an exchange rate peg, which could require significant levels of reserves in the central bank. In consequence, because nominal anchors are seriously challenged in economies suffering from imperfect credibility due to domestic factors (such as persistent fiscal deficits) or external shocks (such as sudden stops in capital flows or sharp terms-of-trade deterioration), governments have had to resort to additional schemes to help whatever nominal anchors they were utilizing (Calvo 2006; see also Frankel 2011, who argued that notwithstanding the formal declarations, policymakers in developing countries have always had an eye on other variables, particularly the exchange rate).

The recent crises show that those concerns about the limitations of the orthodox one-objective and one-instrument IT approaches were reasonable. There have been reassessments of several aspects, including the recognition that central banks in developing countries cannot avoid paying close attention to the exchange rate; it has also led to attempts to smooth volatility in foreign exchange markets because of concerns that large increases in capital flows may significantly appreciate the domestic currency and affect tradables, while deep

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21 There may be some theoretical arguments to target core CPI as well, based on models that show that social welfare is improved by focusing on smoothing sticky prices (as, for example, Aoki 2001). This argument, though, may be more relevant in advanced countries than in developing ones.

depreciations of the domestic currency may have negative consequences for agents indebted in foreign currencies, for the banking system, and for the GDP.<sup>22</sup>

A review of how central banks actually operated IT regimes in LAC during the recent shocks (but whose findings can be extended to other countries that used the same approach) shows that the one-target, one-policy instrument of the orthodox approach was significantly revised in practice (Céspedes, Chang, and Velasco 2014). Central banks used interest rates for inflation but also looked at other policy targets (such as the real exchange rate) and utilized other instruments, such as foreign exchange intervention, changes in reserve requirements for banks, taxes or restrictions on international capital movements, and special provisions of liquidity to banks.

### **Some Final Remarks on Monetary Issues**

First, regarding IT regimes, it was mentioned that while it is clear that inflation in levels and output and inflation volatility decreased with IT regimes, empirical studies do not appear to discuss the impact on growth in levels. Calvo (2006) in a stylized model shows that, if credibility of the central bank is limited, IT can lead to problems not unlike those of exchange rate pegs and other stabilization schemes. While exchange rate stabilization programs under imperfect credibility lead to overheating (that is, higher growth than the levels that are sustainable over time) and current account deficits, under IT, using the interest rate, the result is underutilization of capacity (lower growth than possible) and a current account surplus. Both approaches, however, appear to lead to real currency appreciation, at least during the initial stages of the non-credible stabilization experiment. When the experiment ends, endogenously or because of external shocks, the strong adjustment in the exchange rate under IT may be as damaging as under full-fledged exchange rate stabilization schemes.

If IT regimes lead to less volatility but at the expense of lower average growth (perhaps because the country has selected an inflation target that places it too low on the left part of the curve in Figure 9.3), then we have to confront the argument advanced by Lucas (1987 and 2003) that the welfare

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22 For instance, Blanchard, Dell’Ariccia, and Mauro (2010, 13) state that “central banks in small open economies should openly recognize that exchange rate stability is part of their objective function. This does not imply that inflation targeting should be abandoned. Indeed, at least in the short term, imperfect capital mobility endows central banks with a second instrument in the form of reserve accumulation and sterilized intervention. This tool can help control the external target while domestic objectives are left to the policy rate.” They also note the importance of financial regulation to manage the different problems of dollarization in the financial system.

benefits of smoothing consumption were minimal compared to the greater significance that differences in long-term growth have.

Then it would be crucial what inflation target is selected, which should provide some sense of price stability but without compromising growth and leading to overvalued exchange rates. It could be argued that a 2 percent annual inflation rate is too low for a developing country, considering that reaching that target may require high real interest rates that affect growth and could bring capital flows that appreciate the local currency. But inflation in the range of 25–30 percent or higher would most likely have negative effects on growth and would also generate an appreciation of the domestic currency through other channels (such as a rate of devaluation lower than inflation, in part to try to control inflationary pressures).<sup>23</sup> Additionally, inflation may have a more negative effect on the poor, which may or may not be compensated by higher growth (depending on how pro-poor growth is). For instance, Easterly and Fischer (2000), using household data for 38 countries, found that both in their perception (the poor are more likely to mention inflation as a concern) and in reality (several measures of welfare of the poor are negatively correlated with inflation in general, and high inflation lowers the share of the bottom quintile and the real minimum wage and increases poverty), inflation is a real problem for the poor.

A second point to be noticed is that the different policy frameworks seem to be converging, but from different starting points: the money targeters are moving toward inflation targets; inflation targeters are considering the ER and using changes in reserve requirements and provision of liquidity; those that utilize ER anchors are also considering the consistency with the other monetary policy instruments and variables.

Third, the policy approach, stance, and instruments need to differentiate across several states of the world: (1) policies to maintain a level of inflation considered adequate (or minor adjustment around those levels) in tranquil times; (2) policies to reduce inflation from high levels (which seem to need a combination of inflation and monetary targets, a managed ER, along with fiscal and incomes policies); (3) policies to confront positive shocks (such as capital inflows) that lead to overheating; (4) policies to confront shocks in food

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23 A similar debate about the adequate level of targeted inflation is taking place in developed countries, but for different reasons: whether the desirable level of inflation should move from the current standard of 2 percent to something higher, say 4 percent, for monetary authorities to have more room before hitting the zero lower bound in interest rates (Blanchard, Dell'Ariccia, and Mauro 2010, 2013). The suggestion of increasing the target level has generated a strong controversy.

and fuel prices, both external and internal (such as droughts); and (5) policies to manage global shocks to growth and financial conditions. Cases 3, 4, and 5 may require the deployment of the full set of monetary instruments as shown in Céspedes, Chang, and Velasco (2014). More generally, the variety of conditions requires the use of a full range of policy instruments in an integrated framework.

Fourth, there are important tradeoffs that need to be considered in monetary policy. Rising interest rates to control inflation may conflict with growth objectives. Countries need to make those choices in the face of uncertainty about such matters as the transitory or permanent nature of the shocks and the evolution of the global economy. Rising interest rates may also conflict with financial stability concerns, if a tighter monetary policy negatively affects domestic financial systems. Also, there may be trade-offs with the exchange rate policy. Rising interest rates may bring further capital inflows that appreciate the RER, lead to an expansion in domestic credit, and generate higher inflation (Habermeier et al. 2009).

Fifth, monetary policies should not be analyzed separately from other macroeconomic variables and policies, particularly those related to fiscal accounts and the exchange rate. The presence of high fiscal deficits and the need to finance the government lead to what has been called fiscal dominance over monetary policy, signaling the difficulty to attain the monetary and inflation objectives in that context. Conversely, more orderly fiscal accounts provide an important support for the conduct of monetary policy. The combination of a rules-based monetary policy with a fiscal policy similarly framed by fiscal rules<sup>24</sup> seems to produce more solid macroeconomic performance than either of the two policies separately (Combes et al. 2014). The fiscal and monetary rules, however, must be cross-compatible with the budget constraints related to both fiscal and monetary accounts.

Finally, it may have to be recognized that in increasingly democratic societies, citizens may care about different objectives and that, implicitly or explicitly, central banks are expected to consider them all, such as inflation, but also the level of output, employment, and the ER, as well as banking/financial stability.

Therefore, central banks in developing countries may have to  
(1) strengthen the communication of objectives and policies, starting with

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24 Fiscal rules are defined as a “permanent constraint on fiscal policy, expressed in terms of a summary indicator of fiscal performance, such as government budget, borrowing, debt, or a major component thereof” (Combes et al. 2014).

inflation but also covering other targets and projections; (2) collect a variety of indicators to monitor inflation and other targets and inform the public; (3) develop an operational and streamlined model that is transparent in the links between objectives and policy instruments and takes into account interactions with other macroeconomic variables, including the coordination with fiscal and exchange rate policy; and (4) ensure that it can operate the relevant operational policy levers as publicly stated.

## **Monetary Policies Related to Agriculture**

What are some of the possible implications of the trends and policies discussed previously for the agricultural sector? Here the focus is on monetary aspects (the general policy framework for managing inflation and other nominal aggregates), while banking and financial issues (the linkages between savings and investments) will be discussed in another section. The discussion is divided between world monetary issues and domestic monetary issues.

### **World Monetary Conditions**

There are several channels through which world monetary conditions, interest rates, and inflation trends can affect the performance of developing country agriculture.

It is usually recognized that world interest rates have direct effects on the business cycle, economic growth, and economic crises in developing countries (Calvo, Leiderman and Reinhart 1993; Uribe and Yue 2003). High real and nominal rates tend to depress growth, while changes in monetary policy conditions that lead to relatively sudden upward adjustments in interest rates in industrialized countries have been at the root of many of the financial crises that afflicted developing countries during recent decades. As has already been discussed in Chapter 3, world growth and economic crises also have repercussions for developing countries and their agricultural sectors.

For example, a monetary contraction in key industrialized countries that raises the real interest rate will affect real commodity prices, including agricultural products. Frankel (1984, 1986, 2006) has argued that, in such cases, real prices must fall and will actually need to overshoot downward. The reason for this, similar to Dornbusch's theory of exchange rate overshooting (Dornbusch 1976), is that commodity prices, being easily adjustable while other prices adjust slowly, must drop enough so that the expectation of future increases is sufficient to compensate for the higher interest rate plus the costs of carrying inventories. So until all variables return to their equilibrium values, a

monetary contraction and increases in real interest rates will have a noticeably negative impact on agricultural prices.

On the other hand, expansionary monetary policies will have an upward influence in commodity prices. In fact, Anzuini, Lombardi, and Pagano (2010) find that expansionary global monetary policy shocks drive up all components of the commodity price index they utilize in their estimation (the period covered goes from 1970 to 2009). They find differences in the response by oil, metals, and food: while the response of the first two groups of commodities to the monetary policy change is sharp, peaks between 6 and 18 months, and then vanishes, food commodities respond in a more smooth and persistent fashion, with the effects remaining significant until about three years after the policy shock.

Catão and Chang (2010) show an important correlation between world food prices and a general world price index since 1960 (the correlation coefficient they estimate is 0.54). Furthermore, statistical measures of causality suggest that fluctuations in the global relative price of food influence changes in world prices more than oil price shocks. Therefore, they argue that “in spite of the considerable attention usually being devoted to fuel commodities as a main source of global inflationary pressures, there is more compelling evidence that food price shocks have been at the center of global inflation” (Catão and Chang 2010, 5).

Díaz-Bonilla and Robinson (2010) show that changes in world real interest rate, growth, and real agricultural prices appear interconnected. Acceleration of world growth is linked to both increases in interest rates and increases in agricultural prices. At the same time, increases in interest rates depress both world growth and real agricultural prices, with a lag. Those results are consistent with the view that higher growth is associated with increases in the price of agricultural products. These developments, reflecting generalized inflationary pressures, lead to contractive monetary policies and increases in interest rates, which in turn depress both agricultural prices and world growth. These estimations suggest the need to consider the reverse effect: from food prices (say, because an extended drought, a supply shock, or the upward shift in demand related to biofuels) to monetary policies in developed and developing countries.

The next section moves to the consideration of domestic policies to grapple with those global shocks.

## Domestic Monetary Issues

### DIFFERENTIATED CONDITIONS AND POLICIES

The general question is: What monetary policy framework would align growth, inflation, and exchange rates in ways that support agricultural development and that, vice versa, will allow the economy to maintain growth and relatively stable prices when the agricultural sector suffers supply shocks (for example, a drought) or demand shocks (such as a sudden increase in biofuel demand because of a policy change)?

The first point to be noticed is that such a policy framework would most likely differ between countries that have opened their current and capital accounts (most of the higher-income developing countries identified by the World Bank as urbanized economies) and those that maintain significant controls on external accounts. Additionally, among those with open capital accounts, the level of dollarization of the financial system will also make a difference for the monetary response.

On one extreme, countries with open current and capital accounts and with high degrees of dollarization would be restricted in the implementation of an independent monetary policy. Also, because these countries may be reluctant to allow sharp exchange rate devaluations, if domestic inflation is higher than that of their trading partners, the domestic currency would quickly become overvalued, affecting growth in general and tradable production, such as agriculture, in particular. The monetary framework in those countries would be constrained to maintaining inflation aligned with their trading partners and would use regulatory measures to try to “de-dollarize” the economy. Alternatively, if inflation is higher than in their trading partners, the exchange rate in these countries will have to adjust at a comparable rate with domestic inflation in order to avoid an overvalued domestic currency.<sup>25</sup> If the income of the sectors indebted in dollars does not adjust at the same pace as the devaluation of the domestic currency, those agents will face difficulties in paying their debts. But to have a lower rate of devaluation to protect domestic firms with foreign-currency debts will only work temporarily until the overvaluation of the domestic currency forces a larger devaluation.

On the other extreme, countries with strict capital controls and low or no dollarization will have more room to pursue independent monetary policies. Still, they would need to articulate those policies and their planned levels of inflation with a properly managed exchange rate in order to avoid

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<sup>25</sup> This approach focuses on targeting the real exchange rate. It will be discussed in more detail in Chapter 10 on exchange rate policies.

overvaluation of the domestic currency. In this case, however, devaluations will not trigger the same type of debt and banking crises as in the first example.

### **INFLATION TARGETS, GROWTH, AND AGRICULTURE**

With countries moving to IT regimes or more explicitly announcing inflation targets within other monetary policy frameworks, it may be important to analyze the impact of the selected target level for inflation on agricultural performance. This concern is similar to the one presented before in the context of overall growth: how to define an inflation rate that provides a measure of price stability without compromising growth and leading to overvalued exchange rates. As noted before, the target annual inflation rate may be too low (leading to high real interest rates that affect growth and bring capital flows that appreciate the local currency) or too high (and in that case, it would also have negative effects on growth and the competitiveness of the ER). The impact on the ER may be more important for agricultural and food production given that it encompasses many traded goods.

A question then is whether the domestic macroeconomic policies used to reduce inflation to targets that are too low may be simultaneously slowing growth, increasing unemployment, and appreciating the real exchange rates in ways that could more than compensate for the positive impact of lower inflation on the economy and on agriculture.

On the other hand, if the target is too high, there may be repercussions for poverty and food security. As noted, when consulted, the poor cite inflation as a central concern, and, given the larger shares devoted to food, inflation in these products may be more relevant than overall inflation. Therefore, there may be a trade-off between agricultural and food producers that may benefit from (somewhat) higher inflation in their commodities and the poor consumer, who may suffer from it. In the end, it depends on the proper alignment of inflation targets that are not too tight to suffocate growth and employment generation but not so high that they affect the poor and vulnerable.

It may also be worth recalling that, from the point of view of food security, more relevant than price spikes (the problem that agricultural price stabilization schemes try to solve) may be the problem of high and persistent food inflation (which most likely needs to be treated with macroeconomic and not sectoral policies).

The definition of a very low target may have a further implication. As mentioned before, Frankel (1984, 1986), using the overshooting model of Dornbusch (1976), suggested the possibility of differentiated effects of monetary



policy on commodities, depending on whether their prices are more easily adjusted (flex-price goods and services) or their prices adjust slowly (fixed-price goods and services). In that setting, the question would be the possible negative impact on agriculture (and on commodity-producing sectors or sectors with greater price flexibility in general) of approaches that force down inflation as measured by a general price index, which would also include goods and services with prices that are sticky. Within the target for the general price level, agricultural prices, being more flexible than other goods and services, may be forced to absorb larger adjustments, at least in the short run, according to the flex-price/fixed-price setting. Therefore, until all variables return to their equilibrium values, a monetary contraction and increases in real interest rates should have a larger negative impact on agricultural prices, with real prices of agriculture (or flex-price commodities in general) overshooting downward (and with an expansionary monetary policy, those commodities may overshoot upward, which might have been partly responsible for the price shock of 2008).

If, as some have argued over the years (Schultz 1945, 1954; Timmer 1991), price volatility is more important than average prices in explaining agricultural supply, agriculture may benefit from a monetary policy framework that does not force excessive adjustments in goods with flexible prices.

A related issue is what to do in the case of developing countries when inflation is imported as a result of price shocks in food and energy. The sources of inflation should matter for the policy response (Stiglitz 2008). Very strict inflation targets sustained in the face of those external shocks would force a double hit on the economy: the direct impact on growth and inflation of the price shock plus the increase in interest rates aimed at maintaining low inflation. A way around this problem may be to accommodate those shocks by focusing on a consumer price index that excludes food and energy: the CPI core vis-à-vis the CPI headline (Frankel 2011). Yet this may create communication problems with the public, which experiences inflation according to the full inflationary shock registered in the CPI headline, and may lead to a loss of credibility in the monetary policy (also, see some of the debates below about the implications of excluding food items).

#### **WHAT INFLATION INDICATOR SHOULD BE TARGETED?**

Earlier discussion distinguished targeting the overall CPI and focusing on a stripped-down version that excludes the prices of volatile items, such as energy and food. While excluding volatile items may be acceptable in industrialized countries, it has been argued that it would be inadequate in developing countries. First, Walsh (2011), based on a new dataset of CPIs for 91 countries that

distinguish food and nonfood components, shows that in lower-income countries, food price inflation is higher, more volatile, and more persistent than nonfood inflation, and shocks to food prices propagate strongly into nonfood inflation. Therefore, although food prices are indeed volatile, their higher inflation, persistence, and impact on nonfood items would make it inappropriate to exclude them from the inflation index that monetary authorities must consider in their policy framework. Walsh argues that excluding food prices would lead to higher inflationary expectations, would bias forecasts downward, and would generate delays in policy responses that may lead to entrenched inflationary pressures.

Second, different simulations with stylized models suggest that targeting inflation indices with food excluded would lead to lower overall welfare for the society (see, for instance, Catão and Chang 2010; Pourroy, Carton, and Coulibaly 2012).

A separate debate is whether countries specializing in commodities exports should consider other nominal targets instead of the CPI. For instance, Frankel (2005) suggests that those countries should peg their currency to the prices of the commodities they export. This policy, labeled pegging to the export price index (PEPI), would target a representative basket of export commodities for that country (which is different from a generic world commodity standard). This approach would provide both adjustment to trade shocks and a nominal anchor that would have benefits over policies that target the CPI. The argument is that when export prices fall, the local currency should depreciate against the dollar; PEPI achieves this result, whereas CPI targeting does not. On the other hand, if import prices rise, CPI inflation targeting leads to a tightening of monetary policy, which would appreciate the currency further. This seems to be the wrong reaction to a deterioration of the terms-of-trade and would most likely exacerbate movements in trade and output. Frankel (2005) argues that monetary policy should tighten when export prices go up (as PEPI would do) and not when import prices increase (as would be the case under CPI inflation targeting).

At a minimum, this argument means that commodity-exporting developing countries should analyze the effects of commodity price movements on exchange rates and use that information as a guide for the conduct of monetary and exchange rate policies. This implies the consideration of commodity prices in the design of inflation-targeting arrangements and evaluating whether exchange rates have deviated excessively from their equilibrium value (more on this in Chapter 10 on exchange rates).

**DOES THE MONETARY PROGRAM CONSIDER CREDIT TO THE AGRICULTURAL SECTOR?**

A separate consideration is related to whether or not there are allowances for the financing of the agricultural sector within the monetary program. One of the characteristics of the developmental state in many developing countries was the granting of preferential loans through sector-specific institutions (industrial as well as agricultural and rural banks). For instance, in Brazil during some years in the second half of the 1970s, interest subsidies for agricultural credit amounted to about 5 percent of the GDP (World Bank 1986). The expansion of credit was commonly financed through rediscounts from the central bank or similar institutions. In the context of closed capital accounts, the creation of excess liquidity through agricultural subsidies added to inflationary pressures and/or fueled trade deficits, but the country retained some level of independence in the conduct of its monetary policies.

Since the market liberalization reforms starting in the late 1970s and continuing through the 1980s and 1990s, this approach has been far more restricted, particularly in countries with open capital accounts and higher degrees of dollarization. The creation of excess liquidity (through credit extended to the private or public sector) would lead to inflation and, potentially, also to exchange rate and banking crises. Financing agriculture through generous rediscounts from the central bank that are then channeled through specialized institutions appears now more limited by the general monetary conditions in countries with open capital accounts, even without considering the failures, real or alleged, of the agricultural financial intermediaries in the past. However, in several developing countries, these funding mechanisms still exist, although on a smaller scale than in the past (see the following section). The question is whether or not that expansion of agricultural credit is considered within the general monetary program.

The decline in inflation and the increased monetization or financial deepening of the economies, as seen in Asia in general, can help to increase agricultural credit as part of the general expansion in private credit. However, if prevalent market conditions discriminate against agricultural credit or against some type of farmers due to risks or other reasons, specialized institutions could be required. These institutions will need better management and incentives than have existed in the past and must be framed within a sustainable monetary program that does not lead to inflation or exchange rate crises (see also the next section).

## General Financial Policies

During the analysis of the Social Accounting Matrix (SAM) in Chapter 5, it was mentioned that an important subgroup of transactions was included in the block of cells and columns usually called the flow-of-funds matrix. That block of transactions in the SAM represents the operation of the financial sector. Table 9.10 includes the flow-of-funds matrix within an abbreviated version of the full Social Accounting Matrix.

**TABLE 9.10** Simplified version of flow of funds

			Capital account (savings and investments)			
			Private sector	Government	Monetary sector	Rest world
			Ip	Ig		
Capital account	Private sector	DEPRp + Sp			dDCp	dFCp
	Government	DEPRg + Sg	dB		dDCg	dFCg
	Monetary sector	Sb	dBMp	dB Mg		
	Rest world	Srw			dNFA	

**Source:** Author

**Note:** The letter “d” indicates change in stocks from the baseline time to the next period considered; DEPRp = Depreciation (private sector); DEPRg = Depreciation (government); SP = Private-sector savings (Current Account); Sg = Government savings (Current Account); Sb = Monetary-sector savings (Current Account); Srw = Rest of the world Savings (Current Account); Ip = Private Investment; dB = (change) Government Bonds, Ig = government investment; dBMp = (change) net of government’s deposits; dDCp = (change) Domestic Credit to private sector; dDCg = (change) Domestic Credit to government; dNFA = (change) Net Foreign Assets of the monetary sector; dFCp = (change) Foreign Credit to private sector; dFCg = (change) Foreign Credit to government.

The table shows in a simplified manner how depreciation plus savings from the private sector (Sp), government (Sg), the monetary sector (Sb), and the rest of the world (Srw)<sup>26</sup> help finance, in the final analysis, physical investments (Ip and Ig). But those flows are channeled through a series of financial instruments. In the SAM presented in Chapter 5, the types of financial assets included money (BMp and BMg, which we saw included currency plus deposits), bonds in domestic currency (B, which here are only issued by the government), domestic credit (DCp and DCg, provided by the monetary sector to finance the private sector and the government, respectively), foreign “credit”<sup>27</sup>

26 It must be remembered that the government may be running a deficit (in which case Sg would be negative; that is, the government is absorbing savings from the rest of the sectors). Also, here it is assumed that the country is borrowing from the ROW, in which case Srw is positive. But if the country is lending, Srw would have a negative sign.

27 Here, “credit” is in quotation marks because FC may include foreign investments, external loans, and domestic bonds denominated in foreign currency that have been bought by the rest of the world.

offered by external economic agents to the private sector or the government (summarized in FCp and FCg), and foreign assets (NFA, which may include gold, SDRs, and other external debt instruments issued by nonresidents in foreign currency). The SAM simplifies the types of assets considered, and also the flow-of-funds matrix presented above considers just four sectors: the private sector, the monetary sector, government, and the rest of the world.

In practice, the menu of assets and sectors (as lenders and borrowers) is broader. The System of National Accounts utilizes a more detailed disaggregation of sectors, which includes households, nonfinancial firms, financial firms (divided in turn into central bank, depository banks, and nonbanks), government, and rest of the world. Also the menu of financial instruments is more complex, containing, for example, monetary gold and Special Drawing Rights; currency; transferable deposits; other deposits; loans; debt securities; equity and investment fund shares; insurance, pension, and similar sectors; and other categories.

The adequate functioning of the financial system in the three dimensions—as payment system for the economy, as the intermediary between savings and investments, and as key provider of insurance and risk management services—is crucial for the operation of the economy and the welfare of the population. The importance of the financial system is more clearly perceived during crises that affect banks and financial institutions, which lead to deeper recessions than those generated by other possible causes. The profound negative impact on the general economy is linked to the fact that crises affecting the banking and financial sector disrupt the payment system and the flow of financial transactions, which provide the liquidity and credit that allow most economic transactions to take place.

In developing countries, these crises have usually been linked to misaligned exchange rates that led to strong devaluations to correct imbalances and that forced the collapse of affected borrowers and banks, due to unpayable loans in foreign currency (a currency mismatch). The global financial crisis of 2007–2008 has shown that an excess of credit in key industrialized countries leading to high valuations of certain assets (such as houses), when working in reverse, can create the same negative effect on the banking and financial sector and lead to a deep recession. In this case, the misalignment was mainly between long-term loans financed by very short-term instruments (a maturity mismatch), with financial institutions that did not have enough equity capital (and sometimes liquidity) to absorb the losses generated by the decline in the housing market.

Therefore, there is now a more generalized interest in documenting and understanding the sources and interlinkages of potential risks that may lead to

systemic banking and financial crises. Those risks, from the point of view of the financial system, can be of three classes:<sup>28</sup>

1. Credit risk: This is the possibility of losses because borrowers cannot repay their debts in the terms agreed.
2. Market risk: This is the possibility of losses due to changes in interest rates, exchange rates, and other financial variables that mainly alter the cost of funding.<sup>29</sup>
3. Liquidity risk: This is the possibility of losses because banks and financial institutions may not have liquid instruments (cash and other assets easily transformed into cash) to ensure that they are in a position to meet their obligations at all times. Those obligations may go from returning the cash to depositors who want to withdraw it to the payment of debts to other bank and financial institutions when they are due.

The main policy concern relates to the macroeconomic consequences of those crises: what would be the financial regulations that reduce the possibility of crises and, if they happen, how to minimize their systemic impacts. Regulations must consider the following:

- Currency exposures: for instance, not allowing lending in a foreign currency to domestic economic agents that have incomes in the national currency
- Loan-to-value ratios: defining what is the maximum loan against the value of an asset, such as a house
- Capital adequacy ratios: how much usable equity a bank has to own in order to confront losses without going into bankruptcy
- Liquidity ratios: what type of liquid assets and how much as a percentage of other variables—such as deposits, loans, and borrowings—should a financial institution hold

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28 From the point of view of individual institutions, there are other risks that need to be considered, such as operational risks, reputational risks, business model risks, strategic risks, and so on. Here we are concentrating on those risks that affect the whole system.

29 Banks and financial institutions fund themselves with deposits and other shorter-term instruments and lend longer term (what is called maturity transformation). Therefore, changes in interest rates may generate losses. Also, they may be borrowing in one currency and lending in another; thus, variations in exchange rates could also generate losses. Even when these transactions are hedged with counterparties, these transformations in maturity or currency create risks due to the solvency of those counterparties.

- Cyclical regulatory tools: requiring large provisions for losses or increased capital ratios when credit is growing too fast or imposing other restraints if some categories of assets are showing signs of a bubble in valuations

Central banks also need to have the credibility and the financial instruments to be able to inject liquidity into the financial system without triggering currency substitution or capital flight fueled by a frightened population.

In summary, it has been recognized that monetary policy and regulatory tools need to be articulated considering the macroeconomic dimensions of the functioning of financial systems, which raises the issue of how to achieve coordination between the monetary and regulatory authorities, including the possibility of integrating both functions in the central banks (Blanchard, Dell’Ariccia, and Mauro 2010).

## **Banking and Financial Issues Linked to Agriculture**

### **A Historical Perspective**

The financing of the agricultural sector is just one component of the larger monetary policy framework and of the banking/financial structure that links savings and investments. As mentioned before, the approach in many developing countries has been one of directed credit to agriculture, credit (interest rate) subsidies usually linked to the use of certain inputs (such as fertilizers) and to specific agricultural and food products, and the use of public banks and public agencies to deliver credit. Governments also have imposed mandates on private banks to lend to the agricultural sector a certain percentage of their loans, and there have been controls to keep interest rates under some ceilings in general or only for certain productive sectors. This approach was part of the more general banking and financial policy that was called financial repression, as discussed earlier.

Governments utilized a series of arguments to justify their direct intervention in agricultural credit operations, such as the need of additional lending to finance inputs and expand production, the perception that the formal banking system ignored rural markets, while informal money lenders charged exorbitant interest rates and operated exploitative schemes, and the expectation that increased lending to small farmers will help alleviate poverty.

This government-regulated approach began to be reviewed as part of the more general concerns about the negative effects of financial repression on growth, efficiency, and equity and the mounting fiscal costs of some of the credit schemes. A review by Adams, Graham, and von Pischke (1984) argued that public agricultural credit programs undermined the banking system

through low collection rates or unsustainable subsidies, did not allow for proper mobilization of rural savings, benefited mostly large farmers, failed to ensure that funds were not diverted to other uses, and did not have a clear impact on the sustainable expansion of new agricultural technologies.

At the microeconomic level, subsidized credit or interest rate ceilings would create excess demand; therefore, small farmers (whose smaller loans imply larger transaction costs for the banks measured per dollar of credit)<sup>30</sup> would be excluded by the financial institutions in favor of larger farmers. The latter then would be able to buy more land and displace smaller farmers. Subsidized credit also offered opportunities for corruption. In many cases, those programs were tied to specific inputs, investments, or crops, limiting the flexibility of farmers to respond to market opportunities. Because the credit systems were aimed at lending alone and they were subsidized or operating under interest rate ceilings, it was not possible to develop financial instruments such as savings deposits that would have allowed rural families to manage their savings (World Bank 1986). So in terms of the desired objectives, the results of the general approach appeared meager or even counterproductive.

Furthermore, subsidized schemes, if financed by money creation by the central bank, would contribute to inflation (as it was in the case of Brazil during the second half of the 1970s mentioned earlier). If the subsidies came through the public budget, they would contribute to the deficit, and again, depending on the way the fiscal gap was financed, would also add to further inflation or increase public debt. Higher inflation and controlled interest rates discouraged savings in the banking system and made banks more dependent on government support, in a potential vicious cycle of more deficits and more inflation.

Although more recently other analysts have argued that—along with the problems discussed in the previous paragraphs—there have been successes as well (Giehler, Seibel, and Karduck 2005; more on this below), the critical analysis summarized above was very influential and led to a change in approach in the 1980s and 1990s. Interest in agricultural credit programs declined among multilateral financial institutions as part of the decline in overall agricultural lending (FAO/GTZ 1998). Since the mid-1980s, the IMF, World Bank, and other international organizations have financed different structural adjustment and stabilization programs, which included policy reforms in the

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30 Usually there are some fixed administrative and legal costs to process a loan. If the loan is small, those fixed costs are larger per unit of currency lent. Therefore, banks would try to minimize the costs of their lending operations by making bigger loans.



financial and agricultural sectors. In particular, those programs incorporated conditionality that led to the elimination or scaling down of public sector agricultural agencies and agricultural banks.

However, the reaction to the perceived failings of the approach based on agricultural development banks and regulated credit was not the same in all the developing regions: Seibel, Giehler, and Karduck (2005) argue that LAC and Africa mostly followed what they call the “closing” strategy, while Asia mainly implemented the “reforming” one.

In the case of Africa, Kherallah et al. (2002) enumerated a series of policy changes in different countries: Zimbabwe tightened the terms for agricultural credit in the late 1980s; Senegal closed the public enterprise in charge of providing credit and inputs for groundnuts; in Malawi, the Smallholder Agricultural Credit Administration collapsed due to low repayment rates in the 1990s; and in Benin, the Caisse Nationale de Credit Agricole (CNCA) collapsed in 1988 and then was restructured in the 1990s. In addition to agricultural banks, marketing boards and other parastatal companies that commercialized key crops were also restructured, and many closed down. Because these institutions (as in the case of Senegal) also provided credit to farmers, the result was a decline in credit to the agricultural sector during the 1980s and 1990s (see the impact on African countries in FAO/GTZ 1998; Kherallah et al. 2002). In summary, “governments tightened the terms of agricultural credit, relaxed the regulations regarding sectoral allocation of credit, raised interest rates to make them positive in real terms, and reduced or eliminated financial support to unviable cooperatives and financial institutions” (Kherallah et al. 2002, 45).

In Latin America, there was also an extensive restructuring or closing of agricultural financial institutions, along with upward adjustments in interest rates (De Janvry, Key, and Sadoulet 1997). For instance, in Colombia the reform of the rural financial sector in 1990–1994 raised real interest rates and restructured and recapitalized the rural development bank, the Caja Agraria. In Ecuador, subsidies to the Banco Nacional de Fomento were lowered starting in 1991, and interest rate ceilings on deposit accounts were removed in 1993. Haiti closed its Banque Nationale de Développement Agricole et Industriel in 1989. In Mexico, the Banco Nacional de Crédito Rural (BANRURAL) closed about 60 percent of its branches and cut staff by more than half in 1992. Interest rate subsidies were reduced, leading to positive real interest rates. Government transfers to development banks were decreased and agricultural credit declined from 22 percent of all credit in 1983 to 8 percent in 1992. In Nicaragua, the Banco Nacional de Desarrollo has raised real

interest rates significantly since 1992. In Peru, preferential interest rates to agriculture were eliminated; the Agrarian Bank of Peru (BAP in Spanish) was declared bankrupt in 1992 (De Janvry, Key, and Sadoulet 1997).

These developments, in combination with changes in monetary conditions discussed before and the sequence of financial crises during the 1990s that affected developing countries (Chapter 3), appear to have led to declines in agricultural credit.<sup>31</sup> Wenner and Proenza (1999) estimated that agricultural credit declined for a number of LAC countries<sup>32</sup> from 1984–1986 to 1994–1996, both as percentage of total credit (from 18 percent to 11 percent) and percentage of agricultural GDP (from 39 percent to 27.5 percent). In Brazil, agricultural credit as percentage of total agricultural production (not GDP) was about 70 percent in the late 1980s and about 30 percent in late 1990s (Helfand 2001), but the country maintained several public institutions and schemes supporting agricultural credit (in that sense, Brazil followed more the reforming approach rather than the closing one prevalent in LAC). More recent data show that the ratio of agricultural credit to agricultural GDP (not total production) has moved up from about 18 percent in 2003 to some 25 percent in 2007 (OECD 2009).

In Asian countries, as mentioned, the strategy for agricultural credit was more one of reforming the institutions than closing them (Seibel, Giehler, and Karduck 2005), although the depth of reforms varied significantly.

India has maintained for many decades an extensive system of agricultural credit, administered at the top by the Reserve Bank of India (RBI, the central bank) and a public bank (the National Bank for Agriculture and Rural Development, NABARD), plus other financial institutions that must follow the directives of the RBI. For instance, since the 1970s the RBI introduced a mandatory allocation of lending by commercial banks to priority sectors, including agriculture. Numerous branches were opened in rural areas, which in addition to providing agricultural credit began to offer deposits to the rural population, resulting in large increases in savers' deposits (World Bank 1986).

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31 It is difficult to disentangle the impact of the reforms from the more general problems that affected many developing countries, mainly in Africa and LAC, related to the early 1980s global recession, the decline in commodity prices during the mid-1980s, and the generalized problems with the external debt during those years (Chapter 3). For instance, in Nigeria the share of lending to the agricultural sector as part of total credit increased after the structural adjustment program of 1988 but then declined with the financial sector liberalization of late 1990s (Balogun 2007). However, the share in total credit does not indicate the level of total credit, or what is the ratio regarding agricultural GDP or total agricultural production.

32 These were Bolivia, Brazil, Costa Rica, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Peru, and Dominican Republic.

Later, the Kisan Credit Card (KCC) scheme introduced in 1998 simplified procedures for borrowing (combining information in a single instrument similar to a credit card) (Hoda and Gulati 2013). In fact, India has increased its level of agricultural credit from about 10 to 30 percent of the agricultural GDP (not total agricultural production) during the 1970s, 1980s, and 1990s to between 60 and 70 percent in the second half of the next decade (Subbarao 2012).<sup>33</sup> As a country with a history of capital controls, India has been able to maintain central bank financing for agricultural credit and continue with credit subsidies, at least for smaller value loans (less than US\$7,000). Hoda and Gulati (2013) estimated the value of agricultural interest subsidies at US\$400–800 million per annum in 2008–2011, and the cost of a series of debt-relief programs at US\$1.7–3.8 billion, also annually, during the same period (or about 1–3 percent of total GDP).

In China, although there appear to have been declines in the supply of rural credit in the second part of the 1990s with possible negative consequences for nonfarm rural enterprises (Cheng and Xu 2004), directed credit through public programs has increased significantly during the 2000s, particularly through the more than 30,000 Rural Credit Cooperatives (RCCs). They operate under the direct guidance of China's monetary authorities, which decided in the early 2000s to step up credit to the agricultural sector and rural areas. Lending jumped from less than US\$20 billion in 1990 (less than 5 percent of agricultural GDP) to US\$127 billion by the end of 2005 (about 40 percent of agricultural GDP), mostly as a result of the government program financed by China's central bank (Gale and Collender 2006). However, only about 60 percent of that appears to have been used within the agricultural sector.

Indonesia offers an example of clear reform during the 1980s leading to the transformation of the Bank Rakyat Indonesia (BRI), a government-owned and mostly rural bank.<sup>34</sup> During the 1970s, in line with the paradigm of the time, the government of Indonesia operated a subsidized credit program with negative real interest rates to promote rice production, mainly through the use of fertilizers. The program worked through village branches of the bank, located particularly in areas of agricultural potential. Rice production increased, but studies suggested that the main reasons were not necessarily the

33 Data from Kumara, Singhb, and Sinhac (2010) show far lower percentages in 2008–2009 of about 31 percent of agricultural GDP. Still, this is a large increase from 5 percent in the 1970s, 7–8 percent in the 1980s and 1990s, and 12 percent during the early 2000s.

34 The next paragraphs on BRI come mostly from World Bank (1986) and Seibel and Schmidt (2000).

subsidized credit but other factors such as remunerative farm prices for rice and better extension services. It was also clear that the credit, although subsidized, was not cheap for farmers once the transaction costs, payment of bribes to officers, and the inflexibility in its use were factored. BRI also started in the mid-1970s to offer bank accounts with a higher deposit rate to encourage savings by small depositors and began another program of small loans financed by grants from the Ministry of Finance for diversification in rural areas. The three programs (subsidized agricultural credit, subsidized deposits, and subsidized small loans) were an increasing fiscal burden for the government (World Bank 1986).

The decline of the price of oil that started with the global recession at the beginning of the 1980s (Chapter 3) made it very difficult for the government to sustain the levels of subsidies involved in the rice, savings deposits, and small loans programs. On the other hand, to close or significantly scale down the operations of the BRI, with more than 3,000 branches and 14,000 employees, was not considered a realistic option.

In mid-1983, deep reforms were instituted: direct controls on interest rates and the volume of credit were eliminated; village branches were reorganized; interest rates on most loans were raised to positive levels, above the deposit rates; these deposits in village branches also paid interest rates above the rate of inflation but lower than the interest on loans, helping finance the operations of the branches; and loans were allowed to be used for different purposes, eliminating the rigid allocations. Between mid-1983 and mid-1985, deposits at the village branches almost doubled, supporting more lending and allowing BRI branches to begin to break even. Repayments increased and the default rates dropped below the ones experienced under the previous scheme (World Bank 1986).

The program of small loans was transformed into an extensive system of microfinance operating at market rates of interest and offering unrestricted deposit services. In fact, the BRI weathered the 1997–1998 Asian financial crisis better than most banks in Indonesia, helped by the strength of the BRI Microbanking Division: with local funding and lending in domestic currency, the bank avoided the problems that the strong devaluation generated for firms that borrowed in foreign currency and for the many commercial banks that had lent to them (Seibel and Schmidt 2000). BRI continued growing afterward. In 2003, its equity was open to the private sector, and in 2013, 43 percent of the shares were in private hands, 80 percent of which were held by domestic investors. In 2013, BRI had more than 40 million banking accounts, with assets of about US\$60 billion and a net income of US\$2 billion.

This experience shows that reform is possible, creating a profitable and self-reliant financial intermediary that provides important microcredit and savings services to low-income people at market rates of interest (Seibel and Schmidt 2000).<sup>35</sup>

Notwithstanding the failures of the 1970s and 1980s, agricultural credit through public institutions or special public schemes continues to exist in many countries. Seibel, Giehler, and Karduck (2005) surveyed 57 agricultural development banks in Asia (about half of the sample), Africa (somewhat more than 40 percent) and LAC (9 percent). They note that those banks have an important presence in rural areas in the countries surveyed, represent a heavy investment in people and institutions, and that it is possible to build on the positive stories of reform and complete the job of offering adequate financial services to agriculture and food producers and the rural population.<sup>36</sup>

Therefore, it is still relevant to consider how to best structure those programs, strengthening rural financial markets and the public and private institutions serving the agricultural sector and rural population. There are several debates regarding the best way to provide credit to the sector. Table 9.11 (which combines AZMJ 2011 and Seibel, Giehler, and Karduck 2005) summarizes the differences in paradigms for agriculture financing. With the old paradigm still operative in several developing countries, it is still useful to consider alternatives. The new paradigm focuses on creating a sustainable financial sector and financial institutions, treating borrowers and savers as clients rather than beneficiaries, developing products that are in high demand in the rural population (including the key issue of banking deposits), and pricing products and services to cover costs and risks and to ensure longer-term sustainability (Meyer 2011).

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35 In addition to BRI, Seibel, Giehler, and Karduck (2005) review other cases of what they consider successful or at least promising reforms, including the Bank for Agriculture and Agricultural Cooperatives (BAAC) in Thailand, Centenary Rural Development Bank (CRDB) in Uganda, and the Banque Nationale Agricole (BNA) in Tunisia.

36 They argue,

If a credit bias is the problem, why not solve that problem by mobilizing savings deposits as the main source of funds and at the same time a much demanded service to the rural population? If cheap credit is the problem, why not introduce market rates of interest? If governance is the problem, why not find alternatives to government ownership or other solutions to political interference? If financial repression is the problem, why not engage in a policy dialogue and adjust the legal and policy framework? These issues may not be entirely unrelated: As cheap credit together with a credit bias create dependency on public resources and invite interference by the government and politicians, savings mobilization as the main source of funds and the deregulation of interest rates on deposits and loans might eliminate the material basis for government interference. (Seibel, Giehler, and Karduck 2005, 2)

**TABLE 9.11** Comparing old to new paradigms for rural and agricultural finance

Category	The old world of directed credit	The new world of institution building
1. Objectives	Boost agricultural production and reduce poverty through lending	Reduce market imperfections and transaction costs, and expand financial services for income generation and poverty reduction
2. Role of financial markets	Stimulate production Help the poor	Intermediate savings and investments, and provide a variety of payment, insurance, and risk management services
3. Development approach	Supply-driven	Demand-driven
4. Policy environment	Banks as input providers	Banks as profit-oriented actors within an efficient and equitable financial system
5. Legal framework	Public-owned or public-financed financial institutions without supervision; governments keep distressed institutions alive	Supervised private commercial institutions, member-based cooperatives, NGOs, and public banks
6. Institutional structure	Monopoly institutions	Various competing financial institutions
7. View of users	Beneficiaries: borrowers	Clients: borrowers and depositors
8. Selection of clients	Targeting by donors and governments	Self-selection
9. Loans and other products	Specified targeted loan schemes for single purposes; lack of savings deposits and facilities	Cash flow-based credit; universal banking
9. Subsidies	Heavily subsidy dependent	Increasingly independent of subsidies
10. Sources of funds	Vertical: governments and donors. Commercial banks forced to provide funds	Horizontal: primarily voluntary deposits. Commercial banks offer products tailored to poorer clients
11. Associated information systems	Dense, fragmented, and vertical—assessing whether targets were met	Less dense and mainly horizontal—management information systems
12. Sustainability of agricultural banks	Largely ignored	Major concern
13. Outreach	Banking as public service; short-term focus	Banking with clients; long-term concern
14. Evaluations	Credit impact on beneficiaries—mainly primary data	Performance of financial institutions—mostly secondary information

**Source:** Author's adaptation of AZMJ (2011) and Seibel, Giehler, and Karduck (2005).

The next section focuses mainly on three general issues related to the creation of an equitable, efficient, and sustainable financial system to support agricultural and food production and to serve rural customers: (1) the source of funds, (2) the type of financial intermediaries, and (3) the type of financial products offered to the rural population and agricultural producers.

## **Sources of Funds, Financial Institutions, and Financial Products**

### **SOURCE OF FUNDS**

Table 9.10 showed the flow of funds. At the more general level, the sources of funds are (1) budgetary allocations from the government; (2) monetary sources, which link to the issue of money supply (such as rediscounts from the monetary authorities or reduction of required reserves when banks lend to targeted sectors) but may also include other aspects such as compulsory lending to the agricultural sector of a given percentage of deposits; (3) financing from the rest of the world, such as loans from international organizations that are then lent to farmers, usually through public sector banks; and (4) financing from the private sector, which may be households and firms already working in the agricultural sector (that is, self-financing) or savings from households and firms outside the agricultural sector (in this case, those savings may be intermediated by the banking and financial system).

The largest source of funding for agriculture in developing countries is typically self-finance. Budgetary allocations and special credit lines from the central banks to the agricultural sector have also been important sources of funds, despite their recent decline in many developing countries. Loans from international organizations have declined since the 1980s as noted, but lately there has been more interest from various international public and private actors in getting involved in cross-country lending for agriculture (although these external private capital flows seem to have focused more on land acquisition than production credit).

Giehler (1999) presents a more disaggregated description of sources of funds and some instruments to channel them as well as a snapshot of the source of funds in the mid-1990s for a list of agricultural banks and related institutions (Table 9.13).

In this sample, most of the funding comes from deposits on a voluntary basis (that is, the banks and cooperatives were not operating under a compulsory lending percentage). The amount of direct lending from central banks seems reduced, with the exception of India. Regrettably, there does not seem

to be comparable evidence of the evolution of different sources of funds since the study by Giehler (1999).<sup>37</sup>

**TABLE 9.12 Funds for agricultural lending: Sources and funding**

Funds	Borrowings		Deposits		Trust funds	Debt instruments	Equity
	Commercial	Concessionary	Voluntary	Compulsory			
Donors		A			B		C
Government		D		I	E		F
Central bank		G					
Savers			L	K		O	
Banks	M			H			
Financial markets						N	P
Self-finance							R

**Source:** Giehler (1999).

**Note:** A = credit lines of development agencies; B = donor trust fund (e.g., revolving funds); C = technical and financial aid (grants, risk capital); D = government credit lines; E = government trust funds; F = operational subsidies and equity grants; G = central bank credit lines; H = compulsory funds from other banks; I = accounts of state-owned entities; K = compulsory deposits from loan clients; L = deposits from the general public; M = interbanking loans; N = debentures (unsecured or bonds); O = negotiable certificates of deposit; P = share capital; R = retained earnings, reserves, and paid-in capital.

Some recent data for Brazil (Bittencourt 2003) show that the sources of agricultural credit in 1985 came directly from the government's treasury (64 percent of all credit) and from mandatory lending as a percentage of checking deposits (32 percent); by 1995, the share of budgetary resources (counting different sources) declined to about 30 percent, and mandatory lending from checking accounts decreased to 13 percent, while mandatory lending from savings accounts in rural areas increased to 36 percent of total lending. By 2001, mandatory lending from checking deposits had gone back up to 59 percent; from saving accounts, this number was 10 percent (there were other sources to add up to 100 percent).

Each source has pros and cons, as summarized in Table 9.14 (also from Giehler 1999) from the point of view of borrowers. These are costs and benefits from a microeconomic perspective, but there are also macroeconomic effects to consider, such as the fiscal consequences of government loans, the

37 FAO has a website ([http://www.ruralfinance.org/library/agribank-statistics/en/?no\\_cache=1&filter=34019](http://www.ruralfinance.org/library/agribank-statistics/en/?no_cache=1&filter=34019)) with some data for 15 countries. It would be useful to develop a more integrated data set with larger coverage.



monetary impacts of central bank funding, the external debt implications of international loans, and the additional costs for the whole financial system of compulsory lending.

A crucial issue is the lack of long-term financing for agriculture. Part of the difficulties in some developing countries is related to inflationary problems and expectations of devaluation that keep deposits in domestic currency extremely short term. Also, banks may be concerned about lending longer term to a risky sector, even if they had access to a somewhat longer-term

**TABLE 9.13** Relevance of different funding sources

Funding source/ country	Government loans	Donor loans	Central bank loans	Compulsory deposits	Voluntary saving deposits	Commercial borrowings	Bond issues	Equity
1. Agricultural banks <sup>a</sup>								
Iran			*	**	*			
Indonesia					##			
India			#					
Thailand				*	**		*	
Vietnam					**		*	
Pakistan		*	#					*
Malaysia	*				##			
Morocco		**			*			*
Egypt					#			*
Jordan		*						**
Zimbabwe	*	*					**	
Mali		*			**			**
Venezuela	##							
2. Co-operatives (in general)								
Primary co-ops, India			#		*			
3. Unit banks (in general)								
					##			
4. Commercial banks								
					#	*		
5. NGOs (in general)								
		#				*		

**Source:** Giehler (1999).

**Notes:** a. The information refers to specific agricultural banks; see the list in Giehler (1999); ## = more than 75 percent of total liabilities and equity; # = more than 50 percent but less than 75 percent of total liabilities and equity; \*\* = more than 30 percent but less than 50 percent of total liabilities and equity; \* = more than 15 percent but less than 30 percent of total liabilities and equity.

**TABLE 9.14** Sources of funds for agricultural lending: Microeconomic pros and cons

Sources of funds	Advantages	Disadvantages
Government loans	<ul style="list-style-type: none"> <li>• Low financial costs</li> <li>• Low interest-rate risk</li> </ul>	<ul style="list-style-type: none"> <li>• High administrative costs</li> <li>• Unpredictable and limited supply</li> <li>• Autonomy limited</li> <li>• Negative effects on repayment discipline</li> </ul>
International loans	<ul style="list-style-type: none"> <li>• Low financial costs</li> <li>• Long-term funds</li> </ul>	<ul style="list-style-type: none"> <li>• High administrative costs</li> <li>• High foreign-exchange risk</li> <li>• Unpredictable and limited supply</li> <li>• Negative effects on repayment discipline</li> </ul>
Central bank loans	<ul style="list-style-type: none"> <li>• Low financial costs</li> <li>• Stable supply</li> </ul>	<ul style="list-style-type: none"> <li>• High administrative costs</li> <li>• Negative effects on repayment discipline</li> </ul>
Compulsory lending	<ul style="list-style-type: none"> <li>• Low financial costs</li> <li>• Low degree of direct external intervention</li> </ul>	<ul style="list-style-type: none"> <li>• Unpredictable supply and conditions</li> <li>• Negative effects on repayment discipline</li> </ul>
Savings deposits	<ul style="list-style-type: none"> <li>• Low financial costs</li> <li>• Permanent minimum core balance</li> <li>• Improve information on loan clients</li> <li>• Unlimited source</li> <li>• Incentives for good governance and management</li> </ul>	<ul style="list-style-type: none"> <li>• High fixed-operational costs</li> <li>• High liquidity risks due to volatility</li> <li>• High interest-rate risk</li> <li>• Reserve requirements</li> <li>• Have to be mobilized actively</li> </ul>
Commercial borrowings	<ul style="list-style-type: none"> <li>• Fast supply</li> <li>• Fixed amount of known duration</li> <li>• Incentives for good governance and management</li> </ul>	<ul style="list-style-type: none"> <li>• High financial costs</li> <li>• Costly disclosure of information</li> <li>• High interest-rate risk</li> <li>• High liquidity risks</li> </ul>
Debt instruments	<ul style="list-style-type: none"> <li>• Long-term funds of known duration</li> <li>• Low interest and liquidity risk</li> <li>• Incentives for good governance and management</li> </ul>	<ul style="list-style-type: none"> <li>• High financial costs</li> <li>• Costly disclosure of information</li> <li>• High asset quality required</li> </ul>
Equity	<ul style="list-style-type: none"> <li>• Flexible costs</li> <li>• Long-term funds</li> <li>• Leverage effect</li> <li>• Risk cushion</li> </ul>	<ul style="list-style-type: none"> <li>• Limited supply</li> <li>• Difficult to raise</li> <li>• Expensive in the long run (if it is not a donation)</li> <li>• Additional decisionmakers</li> </ul>

**Source:** Giehler (1999).

deposit base. That is why several developing countries resort to other sources of medium- to long-term funding such as budgetary allocations (as is also the case in several industrialized countries) or central bank funding (which should be part of a consistent monetary framework). Also, the expansion of pension funds in several developing countries may be another source of long-term funding (see the case of Uganda, where a reformed pension system is considered as a potential source of long-term financing in general; World Bank 2009c). In any case, there are still several challenges to confront: government funding badly managed may lead to fiscal and monetary problems; there is always the political temptation on the part of governments to enact general debt-relief schemes; and borrowers may consider public money a handout and will not repay on time.

More comparative studies may be required to better understand how the agricultural sector and rural populations in developing countries operate within rural financial markets and where the funding comes from (see, for instance, the household base study of rural financing in Mexico by Richter, Boucher, and Woodruff 2006).

#### **TYPES OF FINANCIAL INTERMEDIARIES**

The second consideration is the type of institution that delivers credit and manages savings. There are several institutional options: agricultural development banks, commercial banks, savings and credit cooperatives, community and village banks, microcredit formal institutions, NGOs and charitable institutions, and informal lenders. As noted, the approach based on agricultural development banks was criticized because of lack of sustainability, failures to mobilize rural savings, a lack of other financial services needed by the rural population, inefficiency and excessive bureaucracy, capture by large farmers, and corruption (Adams, Graham, and von Pischke 1984). Therefore, many institutions were dismantled or drastically revamped during recent decades. However, the declines in agricultural credit because the gap was not covered by private banks, the example of successful transformations of several public agricultural banks, and the fact that various developing countries maintained those financial institutions in some form or another have led to calls to reconsider their role in a more modern version (Seibel, Giehler, and Karduck 2005). This interest has been reinforced by the strength of agricultural and food prices since 2005.

Still, reforming and managing those institutions pose clear challenges regarding governance and management structures that make technically

sound credit decisions without political interference<sup>38</sup> and that commit to charging interest rates that fully cover costs (Meyer 2011).

Commercial banks are able to mobilize deposits and are supervised by formal regulatory systems, but they tend to be concentrated in urban areas, and when they operate in rural areas they lend mostly to market-oriented and large farmers (not to small producers). Therefore some governments have imposed regulatory obligations on commercial banks, such as expanding branches in rural areas and requiring banks to lend some percentage of their deposits to agricultural activities. These regulatory obligations have costs for the financial system that must be considered along with the expected benefits that expanded agricultural credit may bring to society.

Savings and credit cooperatives and community and village banks may have difficulty mobilizing deposits to lend; they also typically operate under weaker regulatory systems, face problems of scale, and have had problems of mismanagement in the past. On the other hand, these institutions have a more rural orientation and better local knowledge. Several African countries have focused their efforts on these institutions to extend financial services to the rural population. For instance, Ghana's network of rural and community banks attempts to ensure access to financial services across all of the country's rural areas (Nair and Fissa 2010, who describe the business model, services, and financial performance of this network and discuss its challenges, including how to build the apex institution). Another case is Uganda, where the government has been implementing the Rural Financial Services Strategy, which involves establishing operational Savings and Credit Cooperative Organizations (SACCOs) in every county (World Bank 2009c).

Although micro-finance institutions have gained increasingly higher levels of professionalism in their operations, many of these institutions, as well as NGOs and charity organizations, depend on external donors and have less formal management structures, which may make their operations less sustainable over time. However, there are several cases of microfinance institutions that have evolved into profitable financial institutions. BRI in Indonesia is a case of a traditional agricultural bank that was reformed to become a successful bank with public-private shareholding on the strength of the microlending component of its operation.

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38 Meyer (2011, vii) states that one way to help avoid political capture is "to make small loans using microfinance technologies and slowly graduate to larger loans as institutional capacity grows and access to commercial funding sources is achieved. . . . Sophisticated risk management techniques are needed . . . for financial institutions that expect to make large loans to farmers and nonfarm businesses."

### FINANCIAL PRODUCTS

The third consideration relates to the type of financial products offered to the rural population and agricultural producers. On the one hand, it is important to develop instruments that give liquidity and savings services to the rural population, such as different types of checking and saving deposits. These help depositors manage their cash flows and savings and are a necessary component of the funds used to extend loans and other financial instruments to borrowers. Savings deposits in particular are an important risk mitigation tool for rural households (AZMJ 2011).

There is the notion (based on the perceived need for rural development and poverty alleviation) that funds mobilized in rural areas should stay in those areas to finance rural enterprises. However, this may or may not happen. For instance, Bangladesh has tried to encourage banks to expand in rural areas, and agricultural credit expanded somewhat as a result. However, between 1996 and 2005, the proportion of loans to deposits in rural branches declined significantly as banks utilized rural deposits to finance urban loans: in 2005, for every taka in rural deposits, about 0.57 cents were lent to rural operations, and between 1996 and 2005, agricultural loans dropped from 17 percent to 10 percent of total bank lending. However, that ratio was only marginally better for public banks in Bangladesh, suggesting that reasons other than a public-private divide were at play (Ferrari 2008). We have seen that in the case of Brazil, there are mandatory percentages for rural lending out of rural deposits; still, that percentage is 40 percent (which is supposed to be a floor, not a ceiling; Bittencourt 2003).

On the other side of the ledger, there are different types of loans for working capital farm investments, as well as for commercialization and processing. There is typically not much long-term credit available for these investments, and financial institutions tend to have a bias against lending to the agricultural sector for several reasons: (1) the costs to serve dispersed populations; (2) covariate<sup>39</sup> weather risks; (3) covariate market risks; (4) covariate risks related to animal and plant pests and diseases; (5) the diversity of (and lack of information about) spatial and risk characteristics; and (6) seasonality of production, which generates discontinuous cash flows when loan payments are expected to follow a fixed schedule (Meyer 2011).

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39 They are covariate in the sense that many farmers may be experiencing those risks at the same time, which increases lending risks to the financial institutions due to the possibility of generalized defaults.

At the same time, some new financial instruments have been developed that can help the financing of the agricultural sector, although they may operate separately from the banking and financial institutions. Microinsurance and weather-index-based insurance are among the instruments that can help mitigate risks both for farmers and for the banks and financial institutions lending to them. However, microinsurance can be expensive to administer and has experienced problems related to adverse selection and moral hazard, affecting its sustainability on a full-cost-recovery basis (Wiedmaier-Pfister and Klein 2010). On the other hand, weather-index insurance seems to better address the problems of adverse selection and moral hazard while simultaneously reducing administrative costs (Meyer 2011; Skees and Collier 2010). Governments can improve the sustainability of these instruments by investing in weather stations and basic data collection and analysis (Meyer 2011; Kloeppinger-Todd and Sharma 2010).

Credit guarantee schemes and funds are another option that may help reduce risks and facilitate agricultural financing. These usually need governmental support to be established, as well as to design and operate adequate systems of evaluating risks. At the same time, they alone may not be enough to induce additional lending if lenders lack the interest (Meyer 2011).

Warehouse receipts are another potential instrument to reduce risks for lenders (and therefore may lead to more agricultural financing) to the extent that they serve as a collateralized commodity that can be liquidated in the event of loan default (Meyer 2011). In this scheme, commodities are stored in licensed and bonded warehouses, which issue receipts certifying the amount and quality stored. Those receipts can be pledged as collateral for loans by the farmers who own the commodities. Warehouse receipts help with postharvest credit but usually do not provide the financing of working capital to plant a new crop (Meyer 2011). Therefore, this instrument does not address the fact that small farmers need production loans at the beginning of the planting season rather than marketing loans after harvest. However, warehouse receipts may improve commodity storage and marketing functions in value chains, which may help farmers. Use of this instrument has expanded recently for export crops (Meyer 2011). Still, there do not seem to be detailed analyses of the conditions under which warehouse receipts systems contribute to improved access to agricultural credit, particularly for small farmers.

A related instrument is leasing, which allows for the financing of productive assets with medium-term loans (3–5 years) using the capital good

as a guarantee. This significantly reduces the problem of a lack of collateral that constrains common loans; leasing also usually requires lower down payments than the equity required for loans. From the perspective of the lessor, it alleviates the difficulties involved in securing the loans; in many cases, these operations are not constrained by interest rate ceilings and mandatory credit allocations to some sector (see a more detailed discussion in Nair 2010).

Another form of financing that helps to better include small farmers is supply-chain or value-chain lending. In this scheme, small farmers enter into contract farming agreements with more established companies (traders, processors, supermarkets). These companies are the ones actually getting the loan, which is then distributed among the farmers (see van Empel 2010, who describes operations of the Rabobank in several developing countries). As noted in AZMJ (2011, 7 and 8),

understanding transaction dynamics and building trust across the value chain is critical. The value chain finance (VCF) approach examines a value chain in its entirety, identifies and provides for not only financing needs but also market linkage and technical assistance needs for each key player in that chain in a way that reduces risks and costs for lenders and other providers. . . . Market information and pricing is important to value chains and facilitates access to finance. . . . Using value chain concepts and risk mitigation tools can reduce risk and facilitate investment in agri-SMEs and smallholders.

The value-chain approach must also consider input suppliers (and there have been successes in expanding short-term rural finance) and equipment suppliers (where there are fewer examples of access to medium- and long-term funds needed to finance larger agricultural investments) (AZMJ 2011).

A financial vehicle that usually operates separately from banks is agricultural investment funds. In these instruments, private investors pool capital and invest using professional fund managers that evaluate investment opportunities and administer the investment portfolio (Meyer 2011). This form of investment tends to focus on larger commercial agricultural operations. However, those investments may help smaller farmers if they finance value chains that integrate those producers or if they invest in financial institutions that operate with farmers and rural people (Meyer 2011). Socially responsible investors may be interested in

these vehicles to support green trade, fair trade, and similar initiatives (AZMJ 2011).

### **Other Related Issues**

Several of the new instruments and approaches discussed above may need governmental support to establish their operations. In some cases, technical assistance will be needed, and in others, perhaps a certain amount of subsidization to get them started may be required as well.

However, subsidies to interest rates remain a controversial issue. It is true that studies in advanced countries have shown that high real interest rates affect agriculture, which tends to be more capital intensive (Thompson 1988); and in developing countries, it has been argued as well that high interest rates lead to reduction in the use of fertilizers and other inputs, adversely affecting agricultural productivity (Desai and Mellor 1993). But at the same time, it is important to recall the negative impacts on financial markets and institutions of badly designed subsidy schemes. To devise more adequate interventions, it is useful to understand the components of the final interest rate to farmers; a simple formula would be

$$\text{Final interest rate (nominal)} = \text{costs of funds} + \text{inflation} + \text{risks} + \text{administrative and transaction costs.}$$

Public policy can help with some of the components without interfering with financial markets in the setting of funding costs (that is, the market-determined interest rate). For instance, the government may try to reduce inflationary pressures (which would help reduce the nominal interest rate). The government may also offer subsidies to financial institutions to cover the relatively high administrative and transaction costs per unit of loan value that affect small farmers. Furthermore, it is possible to improve the functioning of commercial courts and of public agencies working on land titling, which also reduces transaction costs. Government investments in public goods such as agricultural R&D, small irrigation schemes, drought-resistant seeds, improved sanitation and preventive health services, and weather forecasts diminish risks and can lead to lower overall interest rates (Meyer 2011). In some instances, the government may offer budgetary or central bank matching funds to help reduce funding costs, but these operations should be transparent and should not distort the market rates needed to mobilize rural savings.

Furthermore, other factors such as accessibility through an extensive geographical coverage of local financial offices may be more relevant to



rural borrowing, savings, and deposits in developing countries than the interest rate (Desai and Mellor 1993). In that regard, more extensive and more efficiently used information and communication technology (particularly cellular phones) has proven to be very useful in reducing transaction costs and expanding financial services into rural areas. These technologies can facilitate electronic payment systems and branchless banking, thereby reducing transaction costs, and they can also serve to identify and monitor clients, thereby improving repayment rates (see Lonie 2010 for a discussion of cell phone-based payment services with more than 9 million clients in Kenya; and Giné 2010 for a discussion of biometric technology to monitor repayment performance of individuals in rural Malawi). The Internet can also help producers connect with potential sources of financing and markets, reducing costs and facilitating transactions (AZMJ 2011). However, these new technologies (such as cell phone banking) may require substantial investment to achieve the operating volume needed to reduce the costs of technology enough to include rural clients (AZMJ 2011).

Also, small farmers face constraints in other markets such as fertilizer, seeds, extension services, soil testing, animal health, and so on. Credit alone may not be enough to overcome those constraints.

Therefore, a holistic approach is needed in which access and use of credit may depend on access and use of other nonfinancial services, including technical assistance and training that can reduce business risks for farmers and banks (see AZMJ 2011 and Mahajan and Vasumathi 2010, who describe this “bundling” approach in India; and Campaigne and Rausch 2010, who do the same for Kenya).

Swinnen and Gow (1999, 45), analyzing the agricultural credit problems in Central and Eastern European countries moving from centralized economies, provide a compelling summary of many of the issues involved:

Part of the agricultural credit problem is caused by high inflation, uncertain property rights, ineffective land markets, low profitability in farming, and high transaction costs in financial intermediation. Therefore, optimal government policy should be to address the causes of the problems by reducing the budget deficit and cautious monetary policies, speeding up the land reform and privatization process, by developing regulations and institutions for a land market to develop, by creating the environment for a private agriculture to function and by investing in rural infrastructure and agricultural research,

and by creating an environment in which the commercial rural financial institutions can develop. To the extent that the government credit programs are inconsistent with this, they will have a perverse effect on solving the agricultural credit problem.



## EXCHANGE RATE POLICIES

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This chapter, after highlighting the centrality of the exchange rate (ER) as a macro price, presents world developments related to ER and capital flows, with their impacts on developing countries, agriculture, and food security. Then it moves to general aspects of ER policies, discussing ER regimes, ER misalignments, the combination of monetary and ER regimes, and the effects of devaluations. The next section focuses on the implications for agriculture and food security. The chapter also considers a series of special topics such as what have been called commodity currencies, Dutch disease effects, and sudden stops in capital flows. A final section summarizes some of the main policy points related to ER, agriculture, and food security.

### Introduction

The importance for the economy of the ER as a key macro price, particularly in developing countries, has been argued several times in this book. This point can be illustrated visually just by writing the four macroeconomic accounts differentiating clearly the ER variable included in the equations. For instance, the national and income account (Equation A) was written as

$$\text{GDP} = [\text{Pq} * (\text{C} + \text{G} + \text{Ip} + \text{Ig})] + (\text{Pex} * \text{EX}) - (\text{Pim} * \text{IM}).$$

For many of the consistency analyses discussed before, it was more relevant to consider the gross national disposable income (before taxes, GNDI), labeled Y, as

$$\text{GDP} - (\text{R} * \text{FCp}) - (\text{R} * \text{FCg}) + \text{NTrwp} + \text{NTrwg} = \text{GNDI} = \text{Y} = [\text{Pq} * (\text{C} + \text{G} + \text{Ip} + \text{Ig})] + (\text{Pex} * \text{EX}) - (\text{Pim} * \text{IM}) - (\text{R} * \text{FCp}) - (\text{R} * \text{FCg}) + \text{NTrwp} + \text{NTrwg},$$

where, as explained,  $(-\text{R} * \text{FCp}) - (\text{R} * \text{FCg})$  were the payments of interest on external debt and  $(\text{NTrwp} + \text{NTrwg})$  were net transfers from (or to) abroad, all divided into the private (“p”) and public components (“g”).

If the equation for  $Y$  is written highlighting  $ER$  (in gray), it would look like this (where the variables with \$ are measured in dollars):

$$\begin{aligned} \text{GDP} - (R * ER * \text{FCp}\$) - (R * ER * \text{FCg}\$) + (ER * \text{NTrwp}\$) + \\ (ER * \text{NTrwg}\$) = \text{GNDI} = Y = [Pq * (C + G + Ip + Ig)] + \\ (\text{Pex}\$ * ER * \text{EX}) - (\text{Pim}\$ * ER * \text{IM}) - (R * ER * \text{FCp}\$) - \\ (R * ER * \text{FCg}\$) + (ER * \text{NTrwp}\$) + (ER * \text{NTrwg}\$). \end{aligned}$$

We can do the same with the government sector (Equation B), monetary sector (Equation C), and balance of payment (Equation D):

$$\begin{aligned} \text{Equation B: } [(Pq * G) + (Pq * Ig) + (\text{INTR} * B) + (\text{INTR} * \text{DCg}) + \\ (R * ER * \text{FCg}\$) + \text{ST}] - [(\text{Tind} + \text{Tm} + \text{TYp} + \text{TYb}) + \\ (ER * \text{NTrwg}\$) + \text{DEPRg}] = \text{dB} + (\text{dDCg} - \text{dBMg}) + \text{d}(ER * \text{FCg}\$). \end{aligned}$$

$$\begin{aligned} \text{Equation C: } (ER * \text{ONRA}\$) + (ER * \text{NFAb}\$) + \text{DCg} + \text{DCp}(\text{dom}) + \\ (ER * \text{DCp}\$) = \text{BMg} + \text{BMp}(\text{dom}) + (ER * \text{Bmp}\$) + \text{NWb}. \end{aligned}$$

$$\begin{aligned} \text{Equation D: } (\text{Pex}\$ * ER * \text{EX}) - (\text{Pim}\$ * ER * \text{IM}) - (R * ER * \text{FCp}\$) - \\ (R * ER * \text{FCg}\$) + (ER * \text{NTrwp}\$) + (ER * \text{NTrwg}\$) + \text{d}(ER * \text{FCp}\$) + \\ \text{d}(ER * \text{FCg}\$) = \text{d}(ER * \text{ONRA}\$) + \text{d}(ER * \text{NFAb}\$). \end{aligned}$$

The many instances that  $ER$  appears in equations is to show the direct (accounting) impact on the macroeconomic balances. But there are also the adjustments in some of the individual variables, such as exports  $EX$ , imports  $IM$ , the demand for money in domestic currency  $\text{BMp}(\text{dom})$ , and foreign currency  $\text{Bmp}\$$  and several other variables, because  $ER$  is a factor that influences their behavior. In other words, using exports  $(\text{Pex}\$ * ER * \text{EX})$ , there is the direct valuation impact,  $ER$  plus the reaction of exports,  $EX$ , which depends on  $ER$  among other things. Usually, there would not be an impact of  $ER$  on the world price of exports  $(\text{Pex}\$)$  because developing countries are considered small (that is, they cannot influence world prices or other global variables). However, some developing countries may not be small in that sense (at least for some products), and by changing  $ER$  and expanding exports through a devaluation (or reducing them through a revaluation), those countries may influence the world price of those products. In this last case, there would be three effects of changes in the  $ER$  on  $\text{Pex}\$ * ER * \text{EX}$ : the direct (valuation) impact; the effect through exports,  $EX$ ; and the potential impact on  $\text{Pex}\$$ , if the country can affect world prices.

Therefore, it is clear that policymakers, particularly in developing countries, need to pay attention to the  $ER$  as a crucial macro price. The adjustment processes related to changes in  $ER$  and the determination of the value of  $ER$

that allows some form of internal and external equilibrium of the economy were analyzed mainly in Chapters 6 and 7.

## **World Developments in Exchange Rates and Capital Flows**

### **Cycles in Major Currencies**

An important aspect of the global economy is the behavior of the real exchange rates of the US dollar, the euro, and some key currencies such as those of Japan, the United Kingdom, and more recently China. Figure 10.1 shows the real effective exchange rate (REER) calculated by the IMF corresponding to the United States, the euro area,<sup>1</sup> and the median for 50 developing countries using data since the 1980s.<sup>2</sup>

After several years of declining value during the 1970s (not shown in Figure 10.1), the US dollar began a cycle of appreciation in the late 1970s that peaked in March 1985. During the upward trend, various developing countries that had their ER linked to the dollar could not sustain the fixed value and had to devalue. This increased the burden of the US dollar-denominated external debt that had accumulated during the previous period of higher commodity prices during the 1970s. That burden, along with the decline in global growth and the increase in real interest rates, led to the debt crisis that affected many developing countries throughout the 1980s. Agricultural growth declined in those regions compared to the 1960s (Chapter 3). After peaking in 1985, the US dollar then started to decline and reached a bottom in 1995; from peak to bottom, the drop in the US real exchange rate was about 33 percent on a year-to-year basis.

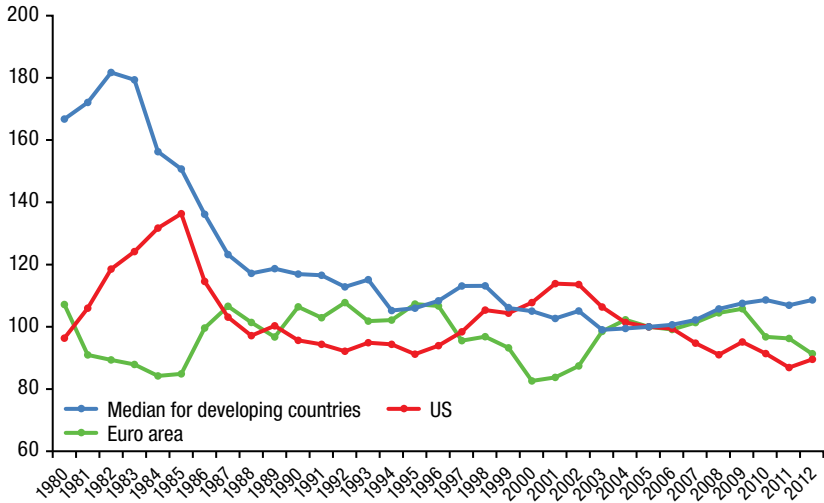
The second cycle of appreciation of the US dollar started in early 1996 and continued up to the first quarter of 2002; from the peak, it declined by 24 percent (on a year-to-year basis), reaching bottom in 2011 (since then there has been a partial recovery). During the upward trend, the previous pattern was repeated, with several developing countries that had exchange rates tied to the

1 The definition of the real effective exchange rate utilized by the IMF corresponds to the inverse of REER1 discussed in Chapter 7. Therefore, an increase (decrease) in the index is an appreciation (depreciation). References to the behavior of the euro in the years before it was formally created correspond to an equivalent basket of currencies projected backwards.

2 The 50 countries were Algeria, Bahamas, Bahrain, Belize, Bolivia, Brazil, Burundi, Cameroon, Central African Republic, Chile, China, Colombia, Congo (Democratic Republic of), Costa Rica, Cote d'Ivoire, Cyprus, Dominican Republic, Ecuador, Equatorial Guinea, Fiji, Gabon, the Gambia, Ghana, Guyana, Hungary, Iran (Islamic Republic of), Lesotho, Malawi, Malaysia, Malta, Mexico, Morocco, Nigeria, Pakistan, Papua New Guinea, Paraguay, Philippines, Samoa, Saudi Arabia, Sierra Leone, Singapore, Solomon Islands, South Africa, Togo, Trinidad and Tobago, Tunisia, Uganda, Uruguay, Venezuela, and Zambia.

US dollar suffering economic and financial crises when they abandoned the pegs: Mexico in 1995, several East Asian countries in 1997, Russia in 1998, Brazil in 1999, and Argentina in 2001.

**FIGURE 10.1** Real effective exchange rates (REER) for the US dollar, the euro, and sample of developing countries (1980–2012; 2005 = 100)



Source: Author based on IMF (2013c).

These currency cycles have had separate impacts on the prices of the commodities, the ERs of developing countries, and capital flows and financial crises, as discussed next.

### Cycles in Commodity Prices

Besides the impact on countries that have pegged their currencies to the US dollar or the euro, with the financial crises of the 1980s and 1990s another effect of the cycle of valuation of the US dollar has been the variation in the prices of commodities, as discussed in Chapters 3 and 9. This inverse correlation has been highlighted by Mundell (2002): commodity prices in nominal US dollars (not only for agricultural products) decline with the strength of the US currency and vice versa. Figure 3.4 in Chapter 3 shows graphically the inverse movement in the nominal index of food prices and the US

effective exchange rate.<sup>3</sup> Díaz-Bonilla and Robinson (2010), using VAR analysis between the price-adjusted broad dollar index of the US Federal Reserve Index and an index of nominal world agricultural prices based on the IMF indexes of world prices for food and agricultural raw materials, showed that there is a persistent negative impact on nominal agricultural prices from the strengthening of the US dollar in real terms, although the impact is not well determined statistically after the first year.

The inverse relation between the US dollar and commodity prices reflects other common factors that affect both variables, such as more expansionary or contractionary monetary policy (as discussed in Chapter 9), which impacts both real interest rates and the exchange rate. Monetary policy was expansionary in the late 1970s and early 1990s, depreciating the dollar against foreign currencies and turning real interest negative, leading to high commodities prices. A somewhat similar configuration took place during the early 2000s. Conversely, with the monetary tightening of the early 1980s, real interest rates increased significantly, the US dollar appreciated, and dollar commodity prices declined. A qualitatively similar cycle, but quantitatively less pronounced, happened in the second half of the 1990s.

### Effects on ERs of Developing Countries

Another issue to consider is the evolution of the counterpart currencies to the US cycle of devaluation and appreciation. For instance, Figure 10.1 shows that the behavior of the euro was opposite that of the dollar until recently (that is, appreciating when the dollar depreciated and vice versa). However, in the aftermath of the late 2000s financial crisis, the euro has been depreciating along with the US dollar. If both of these major currencies are depreciating, then other currencies must be appreciating in relative terms; this is what happens with the exchange rates of the developing countries that are included in the sample.

This is changing the historical pattern of depreciation of developing countries' currencies. Figure 10.1 starts in the 1980s, but Wood (1988), who

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3 In Chapter 3 it was noted that the index used in Figure 3.4 was the effective nominal US exchange against what the Federal Reserve calls "major currencies" (the euro, Canadian dollar, Japanese yen, British pound, Swiss franc, Australian dollar, and Swedish krona). However, the argument is similar if the price-adjusted (or "real") broad index (which considers a total of 26 currencies, including those mentioned earlier) is utilized, as in the estimations by Díaz-Bonilla and Robinson (2010) referred to in the text. This is so because inflation rates were relatively similar across countries issuing major currencies, but when more countries are considered (as in the broad index), inflation rates differ, and therefore it is important to adjust nominal exchange rates for those inflationary divergences.



covers the period from the 1960s to the 1980s, shows that the real exchange rate<sup>4</sup> depreciated in most developing countries (except oil exporters) during that period as well. Certainly, the oil shocks and the debt crises of the 1980s in many developing countries forced those devaluations.<sup>5</sup> Figure 10.1 also shows that the real exchange rate (RER) of the developing countries analyzed declined substantially from the early 1980s until the early 2000s. However, the patterns of decline were not uniform (Díaz-Bonilla and Robinson 2010). LAC countries adjusted their RERs downward in the second half of the 1980s, mostly after the onset of the debt crises in 1982 and the collapse of commodity prices after 1986. Countries in Africa and Asia, on the other hand, declined more or less continuously over the period, although different countries show some appreciation during the mid-1990s (Díaz-Bonilla and Robinson 2010).

The question is whether the recent process of RER appreciation will continue in developing countries or whether governments in those countries will try to counter it (if the latter happens, then it may slow down the necessary global adjustments and put additional pressure on currencies that float more freely).

This is the context of what has been called the currency wars just before and after 2010, which were related to the expansionary monetary policies in the United States (labeled quantitative easing, or QE) and other industrialized countries. Several developing countries complained about the appreciation of their currencies and blamed it on the expansionary monetary policies and devaluations in industrialized countries (for instance, the Brazilian RER appreciated by almost 100 percent in nominal terms between the bottom in 2003 and the peak in 2011, although it has depreciated since then).

A similar debate took place in the 1930s: whether devaluations in a specific country, while expanding output there, may have done so at the expense of output and employment opportunities in the rest of the world (what was called “beggar-your-neighbor” policies). Expansionary monetary policies in some countries and the correlated devaluation of their exchange rates may be

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4 Wood uses  $Pnt/Pt$ , the ratio of nontraded to traded goods (the inverse of the definitions presented before in the text), so that an increase (decrease) is an appreciation (depreciation) of the real exchange rate and implies a decline (increase) in external competitiveness.

5 Wood (1988) reports that the ratio of the 1980–1984 to the 1960–1964 RERs was 0.61 for low-income developing countries (not counting India and China, which had ratios of 0.62 and 0.4, respectively) and 0.85 for middle-income, oil-importing developing countries. Wood argued that the downward adjustment in developing countries was also related to a substantial appreciation of the ratio of nontraded/traded goods in industrialized countries due to a combination of faster technical progress in traded goods, increased trade openness, and an increase in the wage-rental ratios because of overall productivity and real wage growth. It is unclear how all these factors will operate in the future.

begging-your-neighbor or helping-your-neighbor, depending on three factors: the price effect (the devaluation of the exchange rate, which would be a negative factor for trade partners); the income effect (the potential increase in the GDP in the countries with expansionary monetary policies, which helps world demand); and the interest rate effect (a lower interest rate would help financial systems and indebted firms and countries). While the debate on currency wars focused on the relative price effect, the other two effects may be as important for the performance of the world economy. This process will play out in the coming years, with important implications for developing countries and their agricultural sectors (see Eichengreen and Sachs 1984 for an analysis of the 1930s and a shorter discussion of the more recent debate in Díaz-Bonilla 2010a).

### **Capital Flows and Sudden Stops**

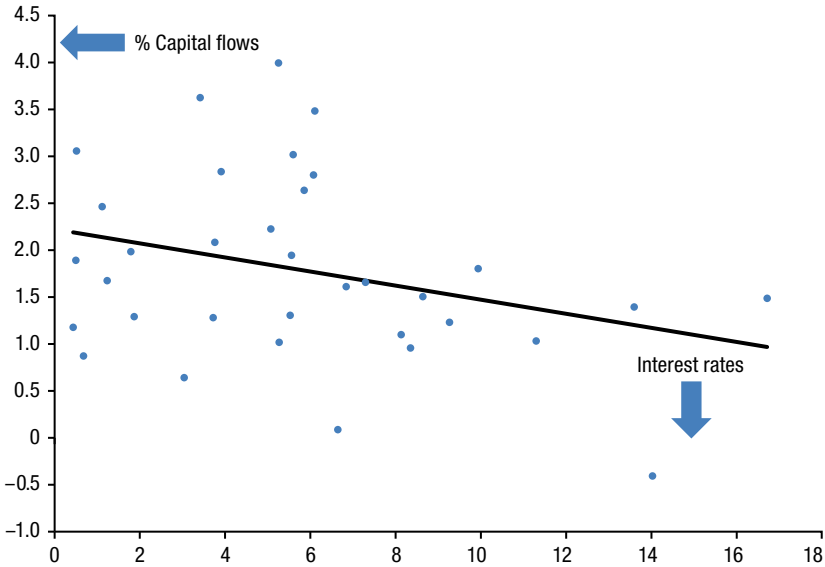
The cycles in monetary policies and exchange rates discussed before were accompanied by gyrations in capital flows in and out of developing countries, with important effects for the economy in general and the agricultural sector in particular.

A relevant question is whether the cycles of capital flows going into developing countries have been mostly driven by internal factors in those countries or whether they were just the result of global forces. Although particular policies in developing countries have some influence, the evidence suggests that global developments have been more relevant. For instance, Fishlow (1986) argued that the United States in the 20th century, like the United Kingdom in the 19th century, had cycles of absorbing savings from and then releasing them to the rest of the world, in line with its own expansionary and recessionary periods, respectively. For the 1990s, Calvo, Leiderman, and Reinhart (1993) show that, at least in the case of LAC, the inflows of capital flows were to a great extent explained by external common factors (the financial conditions in the United States) rather than by the internal situation of the countries in the region. Figure 10.2, which covers the period since the 1980s, presents a simple correlation between capital flows to developing countries and a representative global interest (the LIBOR for six-month deposits in US dollars): although the negative correlation is weak, it suggests that when global interest rates are low (high), capital flows to developing countries are larger (smaller) (as a percentage of their aggregate GDP).

Those capital flows can accelerate growth and help finance additional investments in developing countries, but they also tend to expand the

domestic money supply and consumption and increase the price of nontraded goods and services, appreciating the domestic currency.<sup>6</sup>

**FIGURE 10.2** Capital flows to developing countries (as % GDP) and the LIBOR for six-month deposits in US dollars



**Source:** Author's calculations based on World Bank (2014) and IMF (2013c).

**Note:** LIBOR = London Interbank Offered Rate; data since 1980.

The expansionary phase in developing countries when capital flows were coming in was then followed in several cases by financial crises when capital inflows decreased or reversed direction (as reflected in the already mentioned crises in Mexico, Asia, Russia, Brazil, and Argentina during the second part of the 1990s and in the early 2000s).

6 Of course, it makes a difference whether capital flows end up financing consumption or investment (Calvo, Leiderman, and Reinhart 1993). Also, different classes of capital flows appear to have different impacts on growth and crises: Prasad et al. (2003) estimate that foreign direct investment has a more positive impact on the economy than portfolio investments of different types (such as bonds, equity shares, and so on).

Table 10.1 shows the large magnitude of some of these episodes of reversals in capital flows during the 1980s and 1990s.<sup>7</sup>

**TABLE 10.1** Episodes of sudden stops by country, 1982–1997

Country	Years	GDP (%)
Argentina	1982–1983	20
Argentina	1994–1995	4
Chile	1981–1983	7
Chile	1990–1991	8
Ecuador	1995–1996	19
Hungary	1995–1996	7
Indonesia	1996–1997	5
Malaysia	1993–1994	15
Mexico	1981–1983	12
Mexico	1993–1995	6
Philippines	1996–1997	7
Venezuela	1992–1994	9
Korea	1996–1997	11
Thailand	1996–1997	26
Turkey	1993–1994	10
Average		11
Mean		9

Source: Calvo (2003).

These events (labeled sudden stops: Calvo 2003; Calvo, Izquierdo, and Mejia 2004; 2008) led to depreciation of the domestic currency, banking and fiscal crises (particularly when the economy showed an important presence of domestic private and public debt in dollars), and sharp declines in growth in the countries affected (see also the discussion in Chapter 9). Further implications of sudden stops for domestic and world agriculture will be discussed below.

### **Exchange Rate Policies: General Aspects**

The evolution of world exchange rates and capital flows discussed in the previous section posed an important macroeconomic policy challenge for developing countries, including what should be the adequate exchange rate policy to maintain growth and stability given those multiple shocks. A perennial policy debate in this regard has been the costs and benefits of fixed and flexible ER regimes. This section looks at different classifications of ER regimes,

7 The percentage reported is the absolute value of the reversal in the current account of the balance of payment relative to the GDP of the country; for instance, if the country had a deficit in the current account of 5 percent of the GDP before the crisis and had a surplus of 3 percent after that event, the reversal was 8 percent of GDP.

their performance, the importance of considering ER and monetary regimes together, the issue of misalignment of the ER, and the impact of devaluations.

### **Fixed or Flexible Exchange Rates**

Theoretical studies generate a variety of results regarding whether fixed or flexible exchange rates are better for developing countries (or for any country, for that matter). These results depend on

1. what the meaning of “better” is: answers may differ if the policymaker is concerned more about inflation, or growth, or the probability of crises, or, in more sophisticated analyses, some general welfare function is postulated (and this approach would then lead to the additional debate on what variables should enter that function and with what weights);
2. how rigid are prices and wages and whether there may be some other nominal rigidities in the economy;
3. how ER policy is coordinated with the whole macroeconomic policy framework, in particular the type of monetary policy implemented and the fiscal position;
4. whether the capital account is open, closed, or something in between (that is, the type of constraints that can affect transactions in asset markets, segmenting the country from world markets); and
5. what the nature of the shocks is: whether they come from the real economy (say, a drought) or whether they are nominal disturbances (such as increased inflationary pressures in a trading partner).

Table 10.2, adjusted from Rogoff et al. (2004), summarizes some theoretical effects of flexible and fixed regimes on several economic dimensions (growth, inflation, volatility, and crises), mostly assuming economies with some level of rigidity in prices and wages. The framework, however, does not say anything about what the rest of the policy framework is or the presence or absence of restrictions in asset markets.

Given the variety of theoretical views, many empirical studies tried to estimate the impact of different ER regimes on various aspects of economic performance (Dubas, Lee, and Mark 2005; Levy-Yeyati and Sturzenegger 2003; Rogoff et al. 2004; Bleaney and Francisco 2007). But those empirical studies have also reached very different results, particularly regarding growth (Rogoff et al. 2004 and Frankel 2011, among others).

**TABLE 10.2** Economic performance across exchange rate regimes

ER	Inflation	Growth and volatility	Crisis
Fixed	It may enhance monetary policy credibility and lower inflation if the fixed ER is expected to last. But individual emerging markets are less likely to be able to import credibility only through a fixed ER (except by becoming members of a monetary union, such as the European Union). Moreover, inflation may be just repressed temporarily, but then reappear and lead to overvalued domestic currencies and sudden devaluation.	It may reduce transactions costs and help increase trade. More trade may lead to improved productivity and higher growth. It may also reduce domestic interest rates and uncertainty, also raising investment and growth. In general, it works better when shocks are nominal. On the other hand, it may increase volatility in the presence of real shocks and nominal rigidities, which negatively affects growth.	Higher risk of speculative attacks against currency, especially when exposed to volatile capital flows. Susceptibility to generalized debt and banking crises when the fixed ER has to be sharply adjusted in the face of shocks and macroeconomic imbalances.
Flexible	May lead to higher average inflation if the macroeconomic and institutional frameworks are weak. However, with stronger institutions and financial sectors, the inflationary performance can be adequate.	It may facilitate smoother adjustment and fewer distortions following real shocks (as opposed to nominal ones), therefore increasing growth.  On the other hand, real exchange rate volatility may reduce trade and investments, reducing growth.	Lower risk of currency and banking crises.

**Source:** Adapted from Rogoff et al. (2004).

Therefore this chapter takes a rather eclectic view of the issue, just presenting different pieces of analysis that hopefully will allow policymakers and practitioners to structure their own ideas.

### Classification of Exchange Rate Regimes

A first point to be noticed in the debate about fixed/flexible ER is that such a simple dichotomy would not clarify much: in the real world, there are varieties of intermediate regimes between fixed and flexible ER. Therefore, we need a more detailed disaggregation of ER regimes before discussing the economic performance across regimes.

The classification of ER regimes can be separated into two broad groups. On the one hand, the IMF, as part of its mandate, has been monitoring ER policies and practices and has produced official classifications, called *de jure* (or “according to the law”), mostly based on governmental declarations, as opposed to *de facto* classifications (or what is “in fact” happening). In what

follows, the evolution of the IMF classification is discussed, and then some de facto classifications are mentioned.

The original classification, which lasted from mid-1944 to mid-1971, distinguished between par values (fixed exchange rates regarding the US or gold standard of certain weight and fineness) and fluctuating values. The original classification was subsequently revised several times because of dissatisfaction with the fact that the de jure classification did not necessarily coincide with how the ER was in fact behaving: for instance, a country would say that the ER was floating, but statistical analysis showed that it was fairly stable, suggesting that it was following a policy of fixed ER.

At the end of the 1990s, the IMF began to consider a de facto classification, which was updated in 2009. The ER regimes identified by the IMF appear in the Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) (IMF 2013a). For instance, the AREAER presents ten de facto categories, based in part on the de jure arrangement as declared by the country authorities, plus statistical characterization of the behavior of the ER. The definitions of the ten categories of exchange rate arrangements are given in Box 10.1, starting with fixed schemes and moving down toward greater flexibility.

### **BOX 10.1 De facto categories of exchange rate arrangements**

#### **No separate legal tender**

The currency of *another country* circulates as the sole legal tender (formal dollarization). Adopting such an arrangement implies complete surrender by the monetary authorities of control over domestic monetary policy (it excludes exchange arrangements of countries that belong to a monetary or currency union in which the same legal tender is shared by the members).

#### **Currency board**

The country has an explicit legislative commitment to exchange domestic currency for a specified foreign currency at a fixed exchange rate, combined with restrictions on the issuance authority to ensure the fulfillment of its legal obligation. This implies that domestic currency is usually fully backed by foreign assets, eliminating traditional central bank functions such as monetary control and lender of last resort and leaving little room for discretionary monetary policy. Some flexibility may still be afforded, depending on the strictness of the banking rules of the currency board arrangement.

**BOX 10.1** (continued)**Conventional peg**

The country formally (*de jure*) pegs its currency at a fixed rate to another currency or a basket of currencies, where the basket is formed, for example, from the currencies of major trading or financial partners and weights reflect the geographic distribution of trade, services, or capital flows. The anchor currency or basket weights are public or notified to the IMF. The country authorities stand ready to maintain the fixed parity through direct intervention (i.e., via sale or purchase of foreign exchange in the market) or indirect intervention (e.g., via exchange-rate-related use of interest rate policy, imposition of foreign exchange regulations, exercise of moral suasion that constrains foreign exchange activity, or intervention by other public institutions). There is no commitment to irrevocably keep the parity, but the formal arrangement must be confirmed empirically: the exchange rate may fluctuate within narrow margins of less than  $\pm 1$  percent around a central rate or the maximum and minimum values of the spot market exchange rate must remain within a narrow margin of 2 percent for at least six months.

**Stabilized arrangement**

The *de facto* classification as a stabilized arrangement entails a spot market exchange rate that remains within a margin of 2 percent for six months or more (with the exception of a specified number of outliers or step adjustments) and is not floating. The required margin of stability can be met either with respect to a single currency or a basket of currencies, where the anchor currency or the basket is ascertained or confirmed using statistical techniques. Classification as a stabilized arrangement requires that the statistical criteria are met and that the exchange rate remains stable as a result of official action (including structural market rigidities). The classification does not imply a policy commitment on the part of the country authorities.

**Crawling peg**

Classification as a crawling peg involves confirmation of the country authorities that such is the “*de jure*” exchange rate arrangement. The currency is adjusted in small amounts at a fixed rate or in response to changes in selected quantitative indicators, such as past inflation differentials vis-à-vis major trading partners or differentials between the inflation target and expected inflation in major trading partners. The rate of crawl can be set to generate inflation-adjusted changes in the exchange rate (backward looking) or set at a predetermined fixed rate and/or below the projected inflation differentials (forward looking). The rules and parameters of the arrangement are public or notified to the IMF. Usually all this means is that in a crawl the ER shows a trend according to the rules and parameters of the arrangement.



**BOX 10.1** (continued)**Crawl-like arrangement**

The exchange rate must remain within a narrow margin of 2 percent relative to a statistically identified trend for six months or more (with the exception of a specified number of outliers), and the exchange rate arrangement cannot be considered as floating. Usually, a minimum rate of change greater than allowed under a stabilized (peg-like) arrangement is required. However, an arrangement is considered crawl-like with an annualized rate of change of at least 1 percent, provided the exchange rate appreciates or depreciates in a sufficiently monotonic and continuous manner.

**Pegged exchange rate within horizontal bands**

Classification as a pegged exchange rate within horizontal bands involves confirmation of the country authorities' de jure exchange rate arrangement. The value of the currency is maintained within certain margins of fluctuation of at least  $\pm 1$  percent around a fixed central rate, or a margin between the maximum and minimum value of the exchange rate that exceeds 2 percent. The central rate and width of the band are public or notified to the IMF.

**Other managed arrangement**

This category is a residual and is used when the exchange rate arrangement does not meet the criteria for any of the other categories. Arrangements characterized by frequent shifts in policy may fall into this category.

**Floating**

A floating exchange rate is largely market determined, without an ascertainable or predictable path for the rate. In particular, an exchange rate that satisfies the statistical criteria for a stabilized or a crawl-like arrangement is classified as such unless it is clear that the stability of the exchange rate is not the result of official actions. Interventions in foreign exchange markets may be either direct or indirect and serves to moderate the rate of change and prevent undue fluctuations in the exchange rate, but policies targeting a specific level of the exchange rate are incompatible with floating. Indicators for managing the rate are broadly judgmental (e.g., balance of payments position, international reserves, parallel market developments). Floating arrangements may exhibit more or less exchange rate volatility, depending on the size of the shocks affecting the economy.

**Free floating**

A floating exchange rate can be classified as free floating if intervention occurs only exceptionally and aims to address disorderly market conditions and if the authorities have provided information or data confirming that intervention has been limited to at most three instances in the previous six

**BOX 10.1** (continued)

months, each lasting no more than three business days. If the information or data required are not available to the IMF staff, the arrangement is classified as floating. Detailed data on intervention or official foreign exchange transactions will not be requested routinely of member countries, but only when other information available to the IMF staff is not sufficient to resolve uncertainties about the appropriate classification (IMF 2013a).

Table 10.3 shows the percentage of countries grouped by exchange rate arrangement types: (1) hard pegs (that is, where ERs are irrevocably fixed), (2) soft pegs (ERs that may be fixed for some time but are periodically adjusted under different criteria), (3) floating (ERs that move up or down relatively freely), and (4) residual (other arrangements that are difficult to classify).

**TABLE 10.3** Exchange rate arrangements (% of IMF members as of April 30 each year)

Exchange rate arrangements	2008	2009	2010	2011	2012	2013
<b>Hard pegs</b>	12.2	12.2	13.2	13.2	13.2	13.1
1. No separate legal tender	5.3	5.3	6.3	6.8	6.8	6.8
2. Currency board	6.9	6.9	6.9	6.3	6.3	6.3
<b>Soft pegs</b>	39.9	34.6	39.7	43.2	39.5	42.9
3. Conventional peg	22.3	22.3	23.3	22.6	22.6	23.9
4. Stabilized arrangements	12.8	6.9	12.7	12.1	8.4	9.9
5. Crawling peg	2.7	2.7	1.6	1.6	1.6	1.0
6. Crawl-like arrangements	1.1	0.5	1.1	6.3	6.3	7.9
7. Pegged exchange rate within horizontal bands	1.1	2.1	1.1	0.5	0.5	0.5
<b>Floating</b>	39.9	42	36	34.7	34.7	34.0
8. Floating	20.2	24.5	20.1	18.9	18.4	18.3
9. Free floating	19.7	17.6	15.9	15.8	16.3	15.7
<b>Residual</b>	8.0	11.2	11.1	8.9	12.6	9.9
10. Other managed arrangement	8.0	11.2	11.1	8.9	12.6	9.9

Source: IMF (2013a).

What the IMF labels as soft pegs represents almost 43 percent of the members of the IMF in 2013; within that number, conventional pegs are the preeminent individual category, with 23.9 percent of the total. Floating (18.3 percent) and free-floating (15.7 percent) arrangements comprise the next two most important individual categories. The last two categories differ in

the level of eventual intervention in foreign currency markets, which should be small in floating and practically nonexistent in free floating. It must be noted that the countries within the euro zone are in the free-floating category; however, although this may be true for the region as a whole, it is not true for the individual countries with respect to each other. Another point is that the residual category has been increasing somewhat since the world financial crisis of 2008, indicating that a number of countries may be changing categories while trying to adjust to the evolving global financial scenario.

There have been other attempts at a better economic classification of ER regimes and policies, based not on official declarations (*de jure* classifications) but on the actual behavior of the ER (*de facto* classifications). They were done before the latest reclassification by the IMF that combines both *de jure* and *de facto* criteria, and some of those studies influenced the change in the IMF approach in 2009.

For instance, Reinhart and Rogoff (2004) use a statistical-based algorithm and a chronology to classify ER into 14 categories they call “natural” (or 15 categories including countries with data missing for parallel markets). For some analyses, they aggregate the categories into six groups, as shown in Table 10.4.

**TABLE 10.4** “Natural” ER classifications

Aggregated classification	Detailed classification
Peg	1. No separate legal tender 2. Preannounced peg or currency board arrangement 3. Preannounced horizontal band that is narrower than or equal to $\pm 2\%$ 4. <i>De facto</i> peg
Limited Flexibility	5. Preannounced crawling peg 6. Preannounced crawling band that is narrower than or equal to $\pm 2\%$ 7. <i>De facto</i> crawling peg 8. <i>De facto</i> crawling band that is narrower than or equal to $\pm 2\%$
Managed Float	9. Preannounced crawling band that is wider than or equal to $\pm 2\%$ 10. <i>De facto</i> crawling band that is narrower than or equal to $\pm 5\%$ 11. Moving band that is narrower than or equal to $\pm 2\%$ (i.e., allows for both appreciation and depreciation over time) 12. Managed floating
Freely floating	13. Freely floating
Freely falling	14. Freely falling
Dual market in which parallel market data are missing	15. Dual market in which parallel market data are missing

**Source:** Reinhart and Rogoff (2004).

Several points may be highlighted. First, while the IMF work focuses on the official ER, Reinhart and Rogoff (2004) show the importance of nonofficial parallel markets, legal or illegal, in many countries.<sup>8</sup> Their statistical analysis to determine the type of ER regime is based on the market-determined ER, which may not be the official rate. Second, they distinguish a “freely falling” category of ER, which suffers from high inflation and/or currency crises, as separate from just floating or freely floating arrangements.<sup>9</sup> The argument to separate freely falling currencies is that they are subject to large depreciations on a routine and sustained basis (a product of generalized macroeconomic problems) and therefore should not be mixed with the general floating category utilized by the IMF (Reinhart and Rogoff 2004).

Table 10.5 shows the evolution over time of the aggregate categories identified by Reinhart and Rogoff (2004) as a percentage of the countries with data for every decade.

**TABLE 10.5** “Natural” classification of Reinhart and Rogoff

Decade	Number of countries	Peg	Limited flexibility	Managed float	Freely floating	Freely falling	Dual market in which parallel market data are missing	Total %
1950s	120	71.6	5.6	17.0	0.0	2.4	3.4	100
1960s	122	75.8	8.1	11.1	0.0	1.3	3.7	100
1970s	124	54.4	17.9	19.6	1.0	5.2	2.0	100
1980s	127	36.1	24.0	22.6	4.4	11.0	1.9	100
1990s	158	37.5	26.6	15.7	4.2	13.9	2.1	100
2000s	169	44.0	30.8	18.0	4.4	1.3	1.5	100

**Source:** Reinhart and Rogoff (2004).

- 8 The Reinhart and Rogoff (2004) classification of multiple rates includes official and unofficial or parallel-market rates. Therefore it is different from the IMF definition of multiple rates, which refers to countries that use several *official* ERs.
- 9 An ER arrangement falls under “free falling” according to two criteria: the 12-month rate of inflation equals or exceeds 40 percent (and the country is not using some form of preannounced peg or narrow band), or there has been a currency crisis in which the country moved from a fixed or quasi-fixed regime to a managed or independently floating regime (the free-falling category applies to the currency for the six months after the crisis). Reinhart and Rogoff (2004) also distinguish a subcategory called “hyperfloats,” which occur when the country meets the definition of hyperinflation (50 percent or higher inflation per month).

Table 10.5 suggests several observations. First, countries have been moving their exchange rate regimes away from the fixed pegs of the 1950s and 1960s (this reduction in the percentage of fixed pegs is also, with nuances, reflected in other classifications). The collapse of the Bretton Woods system in the first half of the 1970s resulted in industrialized countries, as well as a variety of developing countries, moving away from hard pegs in the second part of the 1970s and the 1980s. Still, compared to the IMF classification, the “natural” classification shows that during the early 2000s there were more countries with pegs (44 percent) than in the other categories. This is in part the result of the fact that the authors classify the countries within the euro zone as a hard peg (no legal tender), even though the euro as such is a floating currency (it was noted earlier that the IMF classifies those countries as belonging to a floating regime).

Second, contrary to the view prevalent in the 1990s that developing countries were moving to the polar extremes (the “hollowing middle hypothesis”) of either hard pegs (including dollarization and currency boards) or free floats, the classification shows a movement toward the middle of limited flexibility and managed floats (almost 50 percent of all countries in the early 2000s). Third, the economic problems of the 1980s and 1990s in developing countries led to an increase in the free-falling category (that is, rapidly devaluating currencies), usually associated with extensive macroeconomic turmoil reflected by very high inflation and low growth (Reinhart and Rogoff 2004).

There are other *de facto* classifications, such as Dubas, Lee, and Mark (2005) and Levy-Yeyati and Sturzenegger (2003). They use different variables and methods and therefore arrive at country groupings that differ, at times significantly, not only from the *de jure* classifications but also among themselves. One difference, already mentioned, is whether to use only official rates (the IMF classification) or also parallel nonofficial rates (as in the case of Reinhart and Rogoff 2004 because they consider that their valuation reflects market forces better).

Other classifications, such as Dubas, Lee, and Mark (2005), use effective (or multilateral) ER (the effective nominal exchange rate, EER, in the definitions discussed in Chapter 7). They argue that it is more appropriate to use the EER because while a country may be fixing its currency against, say, the US dollar (and therefore be classified by those studies using bilateral ERs as a fixed ER regime), the US currency in turn floats against other currencies, which may make the effective or multilateral ER volatile. Therefore, considering that countries trade not only with the United States but with many different trading partners, classifying the country as a “fixer” because of a stable bilateral ER with the US dollar would paint a distorted picture of the ER regime because the multilateral ER may in fact be going up or down.

Furthermore, some studies argue that looking only at the ER may provide a limited view of the regime. For instance, Dubas, Lee, and Mark (2005) and Levy-Yeyati and Sturzenegger (2003) consider the behavior of official net foreign reserves (ONRA in our previous discussions): their argument is that if a country is fixing the ER, then ONRA has to be more volatile, increasing when there is an excess supply of dollars and decreasing when there is excess demand for them. Therefore, additional useful information to classify ER regimes can be obtained from the behavior of official reserves.<sup>10</sup>

In summary, there are significant differences within the de facto classifications: Dubas, Lee, and Mark (2005) find a cross-correlation across the IMF, Levy-Yeyati and Sturzenegger (2003), Reinhart and Rogoff (2004), and their own classification that goes from 0.184 (between IMF and Reinhart and Rogoff 2004; that is, only 18.4 percent of the countries are classified similarly by both methods) to 0.527 (between Dubas, Lee, and Mark 2005 and Reinhart and Rogoff 2004).

Notwithstanding this variety of classifications and methods, these studies suggest some conclusions for a policymaker or practitioner interested in understanding the behavior of the ER in a specific country and in evaluating possible consequences. First, looking only at a bilateral ER (say, pesos per US dollar) may be misleading, particularly in the case of trade,<sup>11</sup> when a multilateral ER including the main trading partners may be more relevant. Second, if there are parallel, unofficial markets for ERs, it is important to consider their behavior and the reasons for their existence. Third, it is also relevant to monitor the level and behavior of official foreign reserves. As mentioned in Chapter 9, it helps to calculate ratios of ONRA with respect to other variables such as broad money, dollarized deposits and short-term external debt, value of imports, and so on.

### Performance of Different ER Regimes

An economically meaningful identification of the exchange rate regime is important when considering whether some exchange rate arrangements are

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10 There are also other differences across classifications, such as in methodologies utilized: Levy-Yeyati and Sturzenegger (2003) apply cluster analysis, while Dubas, Lee, and Mark (2005) use econometric analysis and Reinhart and Rogoff (2004) utilize a decision-tree algorithm that includes cut-off points and statistical analysis. There may be differences as well in the way the classifications consider the case of periodic devaluations and the period for which the regime is defined.

11 For asset transactions, however, considering the bilateral rate with the US dollar (or the euro, or some other main currency for financial transactions) may suffice, taking into account the financial arbitrage across main international currencies.

associated with better economic performance. However, as there are many de facto classifications, the evaluation of the economic performance based on those classifications also varies. In what follows, some general results are discussed.

A first consideration is the comparison of unified ER systems (where, even if there is a parallel market, the official and nonofficial ERs are close together) with dual or multiple ER systems (where valuations differ between the official and unofficial markets) (Rogoff et al. 2004).<sup>12</sup> There has been a decline in the number of countries with dual or multiple foreign exchange markets from 50 percent of all countries (developed and developing) in the early 1970s to between about 30 and 40 percent during the late 1970s and the 1980s and to below 10 percent by about 2005 (Rogoff et al. 2004). This suggests the prevalence of a more orderly macroeconomic framework and less distorted relative prices. However, more relevant than the number of countries with dual/multiple ERs is the gap (in percentage terms) between the official and nonofficial ERs. Table 10.6 (from Reinhart and Rogoff 2004) shows those gaps (or market premiums) in percentage terms (unfortunately, the data do not cover the 2000s).

**TABLE 10.6** Monthly average parallel market premium (in %)

Region	1950s	1960s	1970s	1980s	1990s
North Africa	9.9	35.7	30.7	108.6	62.0
CFA*	—	—	0.0	1.2	1.8
Rest of Africa	6.9	33.7	113.7	112.7	107.7
Middle East and Turkey	81.0	26.0	21.4	146.5	193.2
Developing Asia and Pacific	60.9	168.9	44.7	43.1	12.1
Caribbean	—	29.6	30.2	56.8	53.6
Central and South America	133.0	16.4	18.6	74.8	8.4
Industrialized Asia	43.0	12.0	3.6	1.3	1.5
Western Europe	17.0	1.2	2.0	1.7	1.2
North America	0.5	0.0	1.1	1.4	1.6

**Source:** Reinhart and Rogoff (2004).

**Notes:** \* "CFA" is the French abbreviation for African Financial Community. Table excludes freely falling episodes.

<sup>12</sup> Again, the focus here is on multiple exchange rates that include official and nonofficial (even illegal) ones. The case of multiple official ERs is a different one. Although this line of thinking is no longer being actively pursued, in the past there was a serious consideration of the possibility of having a more heavily managed ER for trade and a freely floating one for financial transactions. In fact, Dornbusch and Tellez (1993) recommended such a dual arrangement for developing countries that cannot or will not impose capital controls, arguing that it led to better economic results overall than unified floating or fixed regimes.

For developing countries, the decade of the 1980s appears to have been the period of the largest gaps. In that decade, free-falling currencies and high market premiums appeared together. On the other hand, note the narrowing gap between Central and South America and developing Asia and Pacific from the 1980s to the 1990s. However, for some developing regions, such as Africa (excluding CFA, the Franc zone) and the Middle East, dual/parallel systems persisted into the 1990s, with percentage premiums over 100 percent.

Table 10.7 compares averages and medians of annual inflation and GDP per capita growth for unified and dual/multiple rates (from Rogoff et al. 2004).

**TABLE 10.7** Inflation and GDP growth by unified or dual (multiple) ER systems (1970–1999)

ER system	Annual inflation rate	Per capita GDP growth
Unified exchange rate		
Average	22.0	1.8
Median	7.7	2.1
Dual (or multiple) exchange rates		
Average	175.6	0.6
Median	15.1	1.4

Source: Rogoff et al. (2004).

Dual/multiple ERs, which usually indicate troubled macroeconomic and balance-of-payment conditions, are associated with substantially more inflation. However, it cannot be inferred that dual/multiple ERs generate more inflation; rather, the causality may go in the opposite direction: countries with high inflation that are unwilling to adjust the official rate usually show large gaps between official and parallel ERs. Those large gaps also appear to be associated with lower growth: countries with dual/multiple ER show annual rates that are smaller by between 0.7 and 1.2 percentage points per year (depending on whether the averages of the medians are used).

A second point to be noticed is how the effects on economic variables under diverse ER regimes appear to vary with the categories of countries considered. Rogoff et al. (2004) analyze the impact of ER regimes on growth, inflation, volatility, and banking crises in three categories of countries: emerging markets (which, using the categories of agricultural countries discussed earlier, would correspond mostly to urbanized and some transition countries



in the World Bank agricultural classification discussed in Chapter 3), the rest of the developing countries (agriculture-based and transition countries), and a third group of industrialized countries.<sup>13</sup>

These categories differ in their level of integration with private international financial markets and the strength of the domestic institutions and policies, particularly those related to monetary and fiscal issues and to the domestic financial system. The nonemerging developing countries (that is, the agriculture-based and transition countries), with fewer linkages to the private international financial markets due to capital controls or other reasons, appear to have a larger incidence of fixed pegs. This seems to have helped them achieve lower inflation rates without reducing growth or increasing volatility. Fixed pegs also did not result in more currency or banking crises in these countries (whose more conspicuous cases include China and India).

Emerging markets (urbanized countries), in turn, appear more integrated with private international capital markets than the other developing countries; at the same time, they suffer from different monetary, fiscal, and financial weaknesses that, although perhaps not different from the rest of the developing economies, when combined with international financial integration yield different results in terms of the impact of exchange rate regimes. For instance, pegs appear associated with somewhat less growth, more inflation, and more banking and currency crises than managed floats. Regarding the latter, the probability of dual banking and currency crises (resulting from strong devaluations that affect debtors holding dollar liabilities) appear more than three times more likely under a peg compared to under the limited flexibility arrangements seen during the 1990s; on the other hand, there have not been dual crises under managed floating (Rogoff et al. 2004).

Both in emerging economies and in developing countries, freely floating regimes appear to yield worse results in terms of inflation and growth than the other, more stable ER regimes. Only in advanced economies does floating seem to function best, due to these countries' stronger policy and institutional settings. Freely falling currencies clearly show the worst performance in terms of growth and inflation.

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13 Emerging markets include Argentina, Brazil, Chile, China, Colombia, Czech Republic, Egypt, Hungary, India, Indonesia, Israel, Jordan, Korea, Malaysia, Mexico, Morocco, Pakistan, Peru, the Philippines, Poland, Russia, South Africa, Thailand, Turkey, and Venezuela. The rest of the developing countries include all those under the low- and middle-income categories of the World Bank. All other countries are considered advanced.

Therefore, it seems that the links between more fixed ER and lower inflation appear to be a more established result, particularly for the lower-income category of developing countries, while for emerging economies (higher-income developing countries), the statistical significance is very low (Rogoff et al. 2004).

The results are less conclusive for growth; the relatively strongest statistical significance (but still weak in Rogoff et al. 2004) appears between faster growth under managed floats in emerging countries. However, other studies reach inconclusive or contradictory results regarding the links between growth and ER regimes. Dubas, Lee, and Mark (2005), for instance, find that higher growth is associated with fixed exchange rate regimes, while Levy-Yeyati and Sturzenegger (2003) report higher growth for more flexible ER regimes. Perhaps a more robust result is the link between rigid pegs and banking crises in emerging markets, particularly in the context of dollarization of the economy.<sup>14</sup>

### **Combination of ER and Monetary Regimes**

The empirical studies mentioned in the previous section showed different effects of ER regimes depending on the categories of countries: advanced, emerging, and lower income. Those country categories, however, may just serve as an imperfect proxy for the combination of several key characteristics, such as the ER regime, the monetary regime, the extent of capital controls, and the level of dollarization in the economy. In that sense, it would be more relevant to classify countries using those dimensions rather than simply using the more general country categories mentioned (for instance, utilizing indicators of capital account openness such as the one discussed in Chinn and Ito 2008, dollarization in Reinhart, Rogoff, and Savastano 2003, or other similar indexes).<sup>15</sup>

Table 10.8 shows a cross-classification of ER and monetary regimes using the data from the IMF's Annual Report on Exchange Rate Arrangements and Exchange Restrictions (IMF 2013a).

14 The world financial crisis of 2007–2008 has shown that a fixed ER within the euro zone and, therefore, the “eurization” of the financial system in those economies may also lead to banking fragility in smaller members. In this case, it is not the devaluation of the euro as a whole that has affected those economies but rather the depth of the recession and the ups and downs in the confidence that specific countries will be able to stay in the euro zone. This may apply to other monetary unions.

15 For instance, the econometric estimations in Rogoff et al. 2004 do not seem to use capital controls or the degree of dollarization as additional control variables in the estimation of the different results across ER regimes and types of countries.

**TABLE 10.8** Exchange rate and monetary policy regimes

Exchange rate	ER anchor	Monetary	Inflation targeting	Other	Total
Hard peg	25				25
Conventional peg and stabilized arrangements	54	4	1	6	65
Crawling pegs, crawling-like pegs, pegged ER with horizontal bands, and other managed approaches	14	10	3	10	37
Floating		12	19	4	35
Pure floating			11	19	30
Total	93	26	34	39	192

Source: IMF (2013a).

Considering the number of developing countries in the different cells, it would seem relevant to distinguish at least four types of situations to discuss macroeconomic policies in greater detail. The four types are presented in the following paragraphs.

#### **TYPE 1**

This type includes countries with ER as monetary anchor and using hard ER pegs linked to the use of a foreign currency as the domestic money or currency boards. There are 25 countries in this category, which include, for example, Ecuador, El Salvador, Panama, Zimbabwe, and Bulgaria, as well as several small island countries. Their ERs may be linked to the US dollar, the euro, or some other currency. Basically, there is no independent role for the monetary and exchange policies. They need to work with the other instruments of macroeconomic policy, particularly fiscal, trade, and income policies.

#### **TYPE 2**

These countries use the ER as the monetary anchor and have what the IMF calls conventional pegs or stabilized arrangements (that is, the ER stays close to a stable central rate). There are more than 50 countries in this group, of which about 40 percent are agriculture-based economies from SSA, but including a variety of low-income countries in LAC (such as Honduras) and Asia (Vietnam), several oil-producing countries, and just one industrialized

country, Denmark. Several of these countries have capital controls and low or no dollarization and therefore have more room to pursue independent monetary policies, even with a fixed ER.<sup>16</sup> Still, they need to articulate fiscal, monetary, ER, and other policies affecting nominal variables so that the levels of inflation do not lead to overvaluation of their currencies. Devaluations, however, will not trigger the same type of debt and banking crises as in countries with more open capital accounts and dollarized economies (with the caveats mentioned in note 16).

### TYPE 3

These countries use money targets (or the “other” category, which uses multiple instruments) and crawling pegs/softer pegs. They include about 20 countries (such as China, Malawi, Nigeria, Bangladesh, and Argentina), but this general type may encompass part of the countries with money targets and ER classified as floating (where there are 12 countries, including Egypt, Malaysia, Haiti, and Sudan), plus 4 countries in the combination floating ER regimes and other monetary regimes (which includes India and Pakistan).

This group is very heterogeneous, and it would be necessary to distinguish at least those countries with capital and other controls on international transactions, and low or no dollarization (Type 3a, such as China, Bangladesh, and Malawi, for instance), and those with low or no controls on capital and external transactions and high dollarization (Type 3b, such as Haiti). Countries in Type 3a can expand money supply and manage the ER peg tightly at the same time, while those with open current and capital accounts and dollarization (Type 3b) are more restricted in their choices. The latter would need to utilize a monetary framework that maintains inflation aligned with their trading partners (or adjust the ER frequently), while using regulatory and other measures to try to “de-dollarize” the economy.

### TYPE 4

These countries use an IT monetary regime and have a floating or free-floating ER regime. There are 19 countries in the floating ER, mainly higher-

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16 This characterization does not apply uniformly. For instance, some of the SSA countries in this group, such as the Republic of Congo, had a percentage of foreign deposits over total deposits of 57 percent in the early 2000s. On the other hand, the percentage for Guinea-Bissau was 0 percent and Comoros 0.7 percent. Vietnam had in the early 2000s more than 40 percent of the deposits denominated in foreign currencies. SSA countries in other groups also show differences, such as Kenya with about 15 percent, Malawi about 20 percent, Zambia 43 percent, and Angola 81 percent (De Nicolo, Honohan, and Ize 2003; Reinhart, Rogoff, and Savastano 2003—both studies end in the early 2000s and more information may be needed on the current extent of dollarization in developing countries).

middle-income developing countries (emerging markets in IMF categories, or urbanized economies in the agrarian classification of the World Bank 2007) but also SSA countries such as Uganda and Zambia. On the other hand, most of the 11 countries with free-floating ER regimes and IT monetary frameworks are industrialized countries. As discussed in Chapter 9 on monetary policies, many of the developing countries in this category have resorted to a variety of monetary instruments and not only the short-term interest rates as monetary instruments, and they have paid attention to the behavior of the ER. Therefore, the IT framework, as utilized in practice, has been more eclectic than in the original and more theoretical formulations. At the same time, as discussed in Chapter 9, countries in Type 3 may be moving to a convergence toward more explicit inflation targets.

In that sense, an approach to ER policies has been suggested called “managed floating plus” (Goldstein 2002), which is supposed to allow greater independence in a country’s monetary policy and strengthen the resilience to large external shocks, while also addressing the dollarization issues in the banking system that limit adjustments in the ER. The components of this approach would include

- maintaining an adequate monetary framework to keep inflation under control;
- allowing exchange rates to move enough so that market participants are aware of currency risk (and therefore they would not enter into excessive dollar debts);
- monitoring data on currency mismatches (debtors who borrow in dollars but whose incomes are in pesos) at both the economywide and sectoral levels;
- strengthening and enforcing prudent measures to limit currency mismatches in the banking and financial sector (with fewer currency mismatches, it is easier for the ER to fluctuate as needed); and
- encouraging the development of hedging instruments and bond markets in domestic currency (with lower inflation rates, it would be easier to develop local currency markets and, therefore, to reduce currency mismatches). (Goldstein 2002)

It should be added that there is a need to monitor the emergence of excessive valuations (bubbles) in assets such as land, houses, and stocks and/or the

rapid expansions of credit and indebtedness, as well as the need to curb these excesses when they are identified.

In summary, the empirical results about whether fixed or flexible regimes are more adequate for a country seem to vary with the different classifications of ER regimes. Furthermore, those evaluations depend as well on what economic dimensions are selected to define “adequate” behavior (say, growth versus inflation), on the nature of possible economic shocks, structural production and trade issues, the combination with other macroeconomic policies, and the flexibility of other nominal variables in the economy, among other things. In fact, Frankel (2011) has argued that there is no exchange regime that can be considered most adequate all of the time, even for the same country; rather, different regimes may perform best at different periods in a country’s history.

### **Equilibrium and Misaligned ER**

The previous sections focused on ER regimes. However, those regimes (even if properly identified) represent just one aspect of the policy decisions related to exchange rates. Arguably, a more important consideration is the analysis of the levels of nominal and real exchange rates: whether those levels reflect equilibrium ERs (however defined), or whether they are otherwise misaligned ERs (that is, a currency would be under- or overvalued with respect to some notion of equilibrium ER). The lack of correlation between ER regimes and growth, for example, may well be related to the fact that currencies could become misaligned under different ER regimes; what counts then would not be the regime per se but whether the currency is close to or further away from some notion of equilibrium. For instance, if a country has a fixed ER that is not consistent with inflationary monetary and fiscal policies, the domestic currency will get overvalued, and eventually there will be a devaluation to correct the overvaluation. If we look only at the ER regimes, it would seem that all the macroeconomic turmoil happened under a floating ER as the economy adjusts to the new parity, when in fact the causes were planted during the period of the fixed ER when the misalignment was allowed to develop.<sup>17</sup>

Problems of misalignments of the exchange rate are typically related to the dual policy role of ER mentioned earlier as a real price in the real exchange rate approach (which emphasizes the balance between tradable and nontradable goods and the influence of the real exchange rate on production, trade, and employment; Balassa 1977a, 1985) and as a financial variable in the

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17 In fact, Rogoff et al. (2004) find indications that pegged ER is associated with higher inflation and volatility in subsequent years.

nominal anchor approach (which highlights the role of the nominal exchange rate in the inflationary process and its relationship with interest rates and capital flows; Corden 1990).

In Chapter 7 there was a more detailed discussion of what would be an equilibrium level in the real ER (ERER), which has been defined as one that attains both internal equilibrium (meaning that nontradable markets clear in the current period and are expected to do so in the future with a reasonable price stability) and external equilibrium (when current account balances, now and in the future, are compatible with long-run sustainable capital inflows; see Edwards 1989; Isard 2007). Empirical estimations of ERER vary significantly, as discussed in Chapter 7 (see Isard 2007; IMF 2006; Chudik and Mongardini 2007; and Di Bella, Lewis, and Martin 2007, among others). Presumably, once the ERER has been estimated, it can then be compared with the actual real exchange rate to determine whether there are important deviations (such as significant under- or overvaluation) that require correction.

If the estimated value of an equilibrium ER has been determined, should policymakers be equally concerned about the direction of a potential misalignment with respect to that value? In other words, are overvaluations or undervaluations similarly worrying as a policy matter?

The impact of the level and changes in the real exchange rate on net trade of tradable goods and services has been documented empirically (see, among others, Balassa 1988): in general, an appreciated RER would reduce exports and increase imports (and vice versa for a depreciated RER). This result also applies to agricultural products, both in developed countries (Orden 1986) and developing ones (for instance, Lamb 2000, in a panel of 14 African countries, finds a positive impact of devaluations on export crop production).

A separate question is the impact of over- and undervaluation on economic growth, as well as on other indicators of economic performance. The empirical evidence strongly suggests that overvaluation of the domestic currency beyond levels suggested by fundamentals has negative effects for the economy, while undervaluation appears to be associated with better economic performance, particularly in developing countries.

Various studies have shown that the overvaluation of the real exchange tends to depress economic growth in general (Dollar 1992; Rajan and Subramanian 2009). If a currency is overvalued (for example, pesos can buy more dollars than with a properly valued domestic currency), then several things seem to happen. First, both wages in dollars and the general costs of investing and producing will increase, reducing domestic and foreign investment in the economy; therefore, growth will decline. Second, increased

domestic costs will impact the tradable sector, and the country will end up importing more and exporting less (from agricultural goods to tourism to traded services such as call centers), which will lead to a growing trade deficit. Third, the economy will tend to become more dollarized because informed economic actors will purchase cheap dollars, which end up as deposits in banks (inducing the latter to lend in the same currency). The dollars bought with the strong pesos may also leave the economy as capital flight. Fourth, because trade deficits and capital flight reduce the supply of dollars while demand is high (because the dollar is cheap in pesos), there is an excess demand for dollars, which usually leads governments to impose ER and trade controls and ration the allocation of dollars. This in turn affects the normal functioning of the economy (when, for example, productive activities have to wait for special permits to access the imported inputs needed to operate normally) and generates rent-seeking activities and corruption.

In general, periods of sustained overvaluation result in sharp devaluations of the ER at a point in time when the government reaches a very low level of official reserves and no one else is willing to lend dollars to that country. As discussed before, those devaluations usually generate deep and widespread banking and debt crises, depending on the level of dollarization and the external debt accumulated during the period of overvaluation.<sup>18</sup>

While misaligned ERs in the direction of overvaluation appear to be bad for the economy in general, it has been argued that undervalued exchange rates are associated with higher growth, particularly for developing countries (Rodrik 2008; Levy-Yeyati and Sturzenegger 2007; Korinek and Servén 2010; Haddad and Pancaro 2010; Berg and Miao 2010). The reasons given for this result vary.

Some would argue that the reason is not that the ER is undervalued but that an undervalued ER, by definition, is not overvalued. Therefore, the country avoids the problems linked to overvalued ERs that reduce growth, including the uncertainty as to how a consistent external balance will be achieved (Fischer

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18 It should also be noted that (debt/GDP) ratios before the devaluation may be very misleading as a measure of debt sustainability over time. For instance, before the devaluation of early 2002, Argentina had a public debt in dollars that represented about 50 percent of the GDP measured in dollars at the ER of 1 peso = 1 dollar (about 150 billion dollars in public debt over a GDP of 300 billion pesos, or dollars). When the 1:1 parity was unsustainable and the ER was allowed to float, it shot to almost 3 pesos per 1 dollar, and the public debt became 150 percent of the GDP (that is, the debt remained at the same level of 150 billion dollars, but now the GDP of 300 billion in pesos was valued at 100 billion dollars with the new ER). The debt that previously appeared sustainable was very difficult to be repaid afterward and had to be renegotiated. Therefore, it is always more appropriate to measure external debt as a percentage of exports or of the tradable component of the GDP (such as agriculture, mining, and industry).



1993), the avoidance of dollarization (the second effect of an overvalued ER mentioned above), and of ER controls (the third effect). But while these arguments show again the importance of avoiding overvaluation, they may not necessarily answer why undervaluation per se is important for growth.

An argument in that direction has been advanced by Rodrik (2008), who emphasizes the importance of the tradable sector for productivity and structural transformation (the two key elements for growth) in developing countries. He considers the tradable sector in developing countries to be smaller than what would be needed to generate additional productivity and structural transformation because this sector suffers more than the nontradable sector from institutional and market failures. Therefore, undervaluation is a way to compensate for those failures and allow the tradable sector to achieve the larger size needed to fully attain all of the positive effects of productivity and structural transformation, including the learning-by-doing and technological externalities associated with exports. His estimations show that undervaluation of the ER is associated with higher growth.

Other explanations go beyond a trade-focused approach. For instance, Levy-Yeyati and Sturzenegger (2007) find that an undervalued real exchange rate increases domestic savings and capital accumulation, which supports output and productivity growth. Undervalued ERs also appear to be associated with accumulation of foreign reserves, which helps to stabilize macroeconomic variables in the presence of financial and real external shocks (Durdu, Mendoza, and Terrones 2007).

The explanations may not be mutually exclusive; in fact, Berg and Miao (2010), who also find that undervaluation is associated with more growth, cannot distinguish the trade channel (related mainly to Rodrik's interpretation) from broader factors (using estimates of the real exchange rate that also consider financial variables).

But can a policy of undervaluation of the domestic currency be maintained over time? As discussed before, a sustained undervaluation will generate a trade surplus, but this will also lead to an accumulation of foreign reserves, which, if not sterilized, will expand the domestic money supply, increasing domestic absorption and prices and eventually reducing the trade surplus. A country with strong capital controls may reduce or avoid the domestic monetization of the accumulation of foreign reserves at the cost of accumulating ever-increasing foreign reserves (which end up as loans to foreigners) while compressing potential consumption at home. Such accumulation of foreign reserves may be socially inefficient to the extent that those assets yield low returns and could instead be used for domestic consumption or investments

with higher social returns. But if reserves are utilized domestically, the economy will expand because of rapid consumption and investments, which would push domestic prices up, reducing or eliminating the undervaluation and the trade surplus.

Another option to avoid the previous effect is to target an undervalued RER with an aggressive crawling peg that devalues the nominal ER in line with inflation. However, this targeting of the RER will lead to higher inflation, as the experiences of Brazil, Chile, and Colombia in the 1980s and 1990s show (Calvo, Reinhart, and Vegh 1995). The monetary expansion and inflation associated with the trade surplus would have to be countered by an increasingly restrictive fiscal policy in order to sustain the targeted RER over time (Calvo, Reinhart, and Vegh 1995).

An artificially undervalued real exchange rate also represents an implicit tax on consumers; but the export sectors benefiting from such a policy may lobby hard to maintain it, making it more difficult to unwind unsustainable policies (Haddad and Pancaro 2010). As Haddad and Pancaro note, while a stable and undervalued real exchange rate appears to be important for jump-starting economic growth, the costs of such an approach may overcome the benefits in the medium to long term; therefore, policymakers need to be prepared to ease out of such a policy.

More generally, current account surpluses and the accumulation of reserves, if done on a global level by a number of systemically important countries, will lead to global imbalances because those surpluses must be matched at the global level by current account deficits in other countries. These global imbalances have been at the center of the financial crisis that started in 2007–2008.

### **Effects of Devaluations: Contractionary or Not?**

From the 1960s forward, there has been a debate in developing countries about the potentially negative impacts of devaluations as a one-time event (that is, a step adjustment in the ER, as opposed to smooth crawling-peg systems). These traumatic adjustments usually took place after a period of overvaluation of the domestic currencies, trade deficits, and loss of official reserves in the central bank. In the context of capital controls, that loss of reserves would be a slow-moving event linked to the trade deficit, until the level of official reserves at the central bank is so low that the government, usually as part of an IMF stabilization program, has to devalue the currency. Devaluations were expected to expand the production of tradable goods, both exports and import substitutes, which would eliminate the trade deficit and help restore growth on a more sustainable path. On the other hand, there were several

criticisms that focused on the potentially contractionary (decline in growth) or, more generally, stagflationary (decline in growth and increase in inflation) effects of those devaluations.

Those arguing the contractionary/stagflationary effects of devaluation policy postulated a combination of demand- and supply-side effects. On the demand side, the distribution of income resulting from the devaluation would affect workers, who receive salaries relatively fixed in nominal terms and who have a larger propensity to consume, while favoring other social groups whose incomes would not be affected by the devaluation (and may even increase) and who have smaller marginal propensities to consume. Also, monetary balances would decline in real value (because of the increase of prices linked to the devaluation), and people would try to rebuild those balances by cutting other expenditures. The decline in demand through both effects would negatively affect GDP. On the supply side, it was argued that developing countries depended on a certain amount of nonsubstitutable imports that were a necessary part of production costs; devaluation would lead to higher costs and, in the context of oligopolistic markup policies followed by the industrial sector, to higher prices (Taylor 1979, 1984; Krugman and Taylor 1978; opposite views can be found in Cline and Weintraub 1981; Hanson 1983). The combination of all these effects could add up to recession with inflation, at least in the short run.

Later, with the lifting of capital controls and the advance of dollarization in the banking system and the economy in general, other channels were added that could also lead to the contractionary effects of devaluations; for instance, the impact on the private and public sector indebted in dollars (a balance-sheet effect), which may generate bankruptcies and defaults, eventually leading to banking and financial crises (and sometimes the banks were indebted abroad in dollars as well). As noted before, once the banks are affected, the crucial functions they perform as providers of liquidity for the functioning of the economy are impaired and economic activity may grind to a halt, with a sharp contraction of the GDP.

It is then an empirical matter whether the several contractionary channels of devaluations are more important than the expansionary ones, such as the increased employment and incomes in tradables. And even if the negative effects prevail, the question is for how long: perhaps the negative impact is just short term, and afterward the devaluations might place the economy on a higher and more sustainable growth path in the medium and long term.

There have been several empirical studies trying to sort out these effects across countries, as well as individual case studies. For instance, Kamin and Klau (1998) analyze a sample of 27 countries, both industrialized and

developing, during the period 1970–1996. They find a small contractionary effect in the short run (which does not appear different in both categories of countries) but no long-run effect.

Gupta, Mishra, and Sahay (2003) analyze the impact on GDP of currency crashes (a special type of sharp devaluation) during 1970–1998, using a sample of 195 episodes in 91 developing countries. They find that in general, GDP growth slows down before the crisis year (by between 2 and 3 percentage points), and it may drop further during the currency crisis, but then it resumes growth by about the second year. Moreover, in about 30 percent of the cases for large developing countries (defined as those that received at least US\$100 million of capital flows per year during the period) and in some 50 percent of the cases in smaller ones (those with capital inflows of less than US\$100 million per year), the crises were not contractionary. On the other hand, this obviously means that devaluations were indeed contractionary in 70 percent of the cases in large countries and 50 percent in smaller ones (or about 60 percent in the whole sample). Countries more affected were those with small trade shares as a percentage of the GDP, with more open capital accounts, and those that had received large capital inflows before the crisis. The international context also influenced the depth of the contraction: the drop in GDP was more pronounced if it coincided with oil price shocks and if trade competitors also devalued their currencies.

The difference in impacts between the old crises (with capital controls) and the new (when capital controls have been eliminated) can be seen in the case of Argentina. Díaz-Bonilla and Schamis (2001) find differential effects of devaluations before and after 1978, when the capital account of the balance of payments was open. During the period 1955–1977, with the capital account closed, the government maintained a fixed exchange regime and the ER was adjusted from time to time. Those devaluations had a small (and statistically not very significant) negative impact on total GDP growth. However, the econometric estimations after 1978, once the capital account was open, suggest that the recessionary impacts of devaluations on the GDP and industry are larger and statistically significant. The reasons for the differential impacts are several. Devaluations before 1978 did not lead to widespread financial crises, and real wages were more flexible. However, after 1978 real wages appear to have become more rigid, limiting the positive supply-side impact that upward adjustments of the nominal exchange rate might have had on external competitiveness. The only channels left for the impact of devaluations on GDP growth were negative: the increase in costs of imported intermediate inputs and the banking crisis linked to dollarization of the financial system,

which led to sharp declines in deposits and credit and affected the whole economy. It should be noted that these are short-term effects; no longer-term effects are discussed in the study. For instance, after the 2001–2002 crisis in Argentina, which also led to a sharp devaluation and a deep economic crisis, the country started a period of high growth that lasted almost a decade (Cicowicz, Díaz-Bonilla, and Díaz-Bonilla 2008).

A different issue is what the point of comparison should be: whether it is before and after a devaluation (as it was basically the case in the studies mentioned), or whether it should consider the counterfactual without devaluation. This point is illustrated by the recent case of Malawi (Pauw, Dorosh, and Mazunda 2013), which also serves to consider ER policies when a country is hit by negative shocks. Malawi had, according to the IMF's ARERAER (2012b), a "stabilized arrangement" (that is, a stable ER peg) during the years before and after 2010. In late 2011 and early in 2012, Malawi's economy was affected by a severe foreign exchange crisis, resulting mainly from sharp declines in tobacco export prices, the suspension of foreign aid, and increased costs of fertilizer imports (distributed at subsidized prices to farmers; see Chapter 8). The government refused to devalue for several months, and a parallel market developed with a gap of about 100 percent with respect to the official ER, generating all sorts of distortions and rent-seeking opportunities in the economy. A situation observed in other cases was that although importers may have had access to the official ER, products sold domestically were often priced using the parallel exchange rate, with a disproportionate impact on domestic inflation. Pauw, Dorosh, and Mazunda (2013) use an economy-wide model for Malawi to simulate several scenarios, including maintaining the misaligned ER and several scenarios of progressive flexibility in allowing the ER adjust to the harmful shocks. Obviously, given the nature of the shocks, all simulations show negative impacts on GDP, including agricultural production; but the declines are far smaller (by about 5 percentage points of the GDP), with a flexible exchange rate compared to a fixed one. Eventually, a new government adjusted the ER in April 2012 (the IMF classified Malawi in 2013 under "Other Managed Arrangements").

In summary, devaluations seem to have negative impacts in the short term, particularly for countries with open capital accounts and dollarized banking systems. The policy lesson, however, is not to reject devaluations but to avoid being placed in the situation where there is not much else that can be done to restore macroeconomic balances, and the resulting devaluation ends up being sharper and more disruptive than if the ER had been allowed to move earlier in order to stay closer to equilibrium values. Also, when a country is hit by

negative shocks, it is better to correct the ER earlier rather than to let imbalances accumulate.

## Exchange Rate and Agriculture

### General Considerations

Early analyses of exchange rate policies and their possible impacts on the agricultural sector, such as Krueger, Schiff, and Valdés (1988), emphasized two main indicators: real exchange rate, RER, and the internal terms of trade between agricultural and nonagricultural sectors,  $P_a/P_n$  (where  $P_a$  and  $P_n$  represent, respectively, the price of the aggregate agricultural and the aggregate nonagricultural good produced in the economy). It was usually assumed that agricultural products were mainly tradable and the possibility that they had a sizable import component in the inputs of the production function was not discussed. However, as argued in Chapter 2, it is necessary to take a broader view of the links of the ER and agriculture, including costs.

Let's start by considering the agricultural margin per unit of product:

$$\text{Net margin (nominal)} = P_a - \text{UCP},$$

where  $P_a$  is the agricultural price (in domestic currency) of a specific product at the farm level and where UCP means unitary costs of production and includes both fixed and variable costs per unit of product.

In real terms, deflated by an appropriate domestic price index PD, we have

$$\text{Net margin (real)} = (P_a/\text{PD}) - (\text{UCP}/\text{PD}).$$

If the product is tradable,  $(P_a/\text{PD})$  can be disaggregated as follows:

$$\begin{aligned} P_a/\text{PD} &= (P_a/\text{PD}) * [(ER * \text{mrg} * P_{aw})/(ER * \text{mrg} * P_{aw})] * (\text{PD}_w/ \\ \text{PD}_w)^{19} &= [P_a/(ER * \text{mrg} * P_{aw})] * [(ER * \text{PD}_w)/\text{PD}] * \\ &[(\text{mrg} * P_{aw})/\text{PD}_w], \end{aligned}$$

where  $P_{aw}$  is the world price of the agricultural product considered,  $\text{mrg}$  is the coefficient of commercialization margins and other costs between farm level and world price at the border, and  $\text{PD}_w$  is a price index for the basket of goods and services produced by the rest of the world.

The formula after the second equality includes different components. First,  $[P_a/(ER * \text{mrg} * P_{aw})]$  shows the potential discrepancy between the domestic

<sup>19</sup> The first term after the equality is simply  $(P_a/\text{PD})$  multiplied by two versions of the number 1 (such as  $\text{PD}_w/\text{PD}_w$ ), and therefore the equality is maintained. Rearranging the terms, we have the formulation after the second equality.

price and the equivalent world price,  $P_{aw}$ , converted into the domestic equivalent through the multiplication by the nominal exchange rate  $ER$  and the consideration of the marketing margins and related costs. That ratio is sometimes called the coefficient of nominal protection (if the domestic price  $P_a$  is larger than  $ER * mrg * P_{aw}$ ) or the coefficient of nominal taxation (if  $P_a$  is smaller than  $ER * mrg * P_{aw}$ ). Second,  $[(ER * PD_w)/PD]$  is the first definition of the real exchange rate (RER1) discussed in Chapter 7. Finally,  $[(mrg * P_{aw})/PD_w]$  is the real world price of the agricultural product at the farm level (that is, the nominal world price deflated by some foreign index, such as the US Consumer Price Index and adjusted by  $mrg$ , the commercialization margins, and other similar costs).

The equation shows that the real price of the agricultural good depends on the real exchange rate  $[(ER * PD_w)/PD]$  as well as on three additional factors: the coefficient of nominal protection (or taxation), the world-level real price for agricultural goods, and the commercialization margins. Therefore, several things need to happen for the real price of the agricultural good to increase with a nominal devaluation. First, for the real exchange rate to devalue, the domestic prices ( $PD$ ) should not adjust upward so much that they compensate the devaluation of the nominal exchange rate. Second, even if the real  $ER$  is devalued, that would be translated into higher real prices for the producer only if there are no compensating movements in the other three factors mentioned.

The gap between the domestic price for a commodity ( $P_a$ ) and the border price ( $ER * mrg * P_{aw}$ ) may be caused by trade and trade-related government policies (such as constraining quotas and strict sanitary and phytosanitary regulations), but it may also be due to incomplete transmission of devaluations to domestic prices because of market imperfections, such as deficient market infrastructure (roads, communications, and storage) and the abuse of market power by large market operators (Liefert and Persaud 2009).<sup>20</sup> In developing countries, it is not uncommon to find very low transmission of exchange rate changes to domestic producer prices: Liefert and Persaud analyze studies over three decades that show that for 56 developing countries, about a third had almost no exchange rate change transmission even after an adjustment period of five to seven years; another 23 countries had transmissions of no more than half of the change in border prices after five years.<sup>21</sup>

20 At least part of these market influences will be reflected in the marketing margins ( $mrg$ ), which also may change with the devaluation.

21 They argue, however, that the price transmissions may be asymmetrical, with a larger transmission to consumer prices.

Another element to consider in analyzing the net margin for an agricultural product is the evolution of world agricultural prices. On the one hand, higher (lower) world prices would increase (decrease)  $P_a$ . But on the other hand, higher (lower) world prices may lead to more appreciated (depreciated) real exchange rates, as the theory of the commodity currencies would suggest (see below). Also, if the country is a significant exporter, then the world price can fall with the devaluation, considering that this will lead to more supply from that country to world markets. Both of those countervailing effects, though, may mitigate but would normally not fully compensate the first positive impact of higher world prices on  $P_a$ .

Devaluations can also change the unitary costs of production (UCP). An obvious example is the cost of agricultural inputs and machinery, if they are mostly imported or if their domestic prices are linked to the world prices of those items. Another less obvious impact is related to the effect of more or less production on the average fixed costs per unit of product (for instance, if the devaluation reduces demand, as in some stagflationary scenarios, fixed costs may have to be absorbed over a smaller marketed amount, increasing the fixed unitary cost of sold production). Finally, devaluations could affect the commercialization costs and margins (mgr).

Therefore, the level and change of the ER can influence the net margin of the producer through a variety of channels.

So far, we have considered the case of a purely traded product. However, not all agricultural products are completely tradable. The implications of this fact can be seen by using the definition of the real exchange rate as  $P_{tr}/P_{ntr}$  (that is, the price of tradable goods divided by the price of nontradables; RER2 in Chapter 7) and separating it into the tradable/nontradable and agricultural/nonagricultural components.

The price of tradable products as a whole is an aggregate index of the prices of exports ( $P_{xa}$ ) and imports ( $P_{ma}$ ) of agricultural products and of the prices of exports ( $P_{xna}$ ) and imports ( $P_{mna}$ ) of nonagricultural products, as follows:

$$P_{tr} = f(P_{xa}, P_{ma}, P_{xna}, P_{mna}).$$

In turn, the price of nontradable products is an index that includes the prices of nontradables from the agricultural ( $P_{ntra}$ ) and nonagricultural sectors ( $P_{ntrna}$ ), as follows:



$$P_{ntr} = g(P_{ntra}, P_{ntrna}),$$

where “f” and “g” indicate functional forms in which the specific mathematical forms are left undefined.<sup>22</sup>

Defining RER2 as functions of the respective prices, we get

$$RER2 = P_{tr}/P_{ntr} = [f(P_{xa}, P_{ma}, P_{xna}, P_{mna})]/[g(P_{ntra}, P_{ntrna})].$$

This equation can be disaggregated further by recognizing that the prices of tradables ( $P_{xa}$ ,  $P_{ma}$ ,  $P_{xna}$ ,  $P_{mna}$ ) are a function of world prices ( $P_{wxa}$ ,  $P_{wma}$ ,  $P_{wxna}$ ,  $P_{wmna}$ ), the exchange rate (ER), and trade tax/subsidies ( $t_{xa}$ ,  $t_{ma}$ ,  $t_{xna}$ ,  $t_{mna}$ ).<sup>23</sup> Also, the prices of nontradable goods, both from the agricultural ( $P_{nta}$ ) and nonagricultural ( $P_{ntna}$ ) sectors, depend on domestic supply and demand  $Q_{nta}(\dots)$ ,  $D_{nta}(\dots)$ ,  $Q_{ntna}(\dots)$ ,  $D_{ntna}(\dots)$ , which in turn depend on a series of variables (left unspecified in the formula, as indicated by the dots in the expression). Therefore, RER2 can be written as follows:

$$RER2 = \frac{f[P_{wxa} * ER * (1 + t_{xa}), P_{wma} * ER * (1 + t_{ma}), P_{wxna} * ER * (1 + t_{xna}), P_{wmna} * ER * (1 + t_{mna})]}{g\{h_1[Q_{nta}(\dots), D_{nta}(\dots)], h_2[Q_{ntna}(\dots), D_{ntna}(\dots)]\}}$$

which indicates that the index of the price of tradables is a function (f) of world prices, the nominal exchange rate, and taxes on and/or subsidies to exports and imports; and the index of nontradable products depends on  $P_{ntra}$  and  $P_{ntrna}$ , which in turn are functions ( $h_1$  and  $h_2$ , respectively) of the internal supply and demand functions  $Q_{nta}(\dots)$ ,  $D_{nta}(\dots)$ ,  $Q_{ntna}(\dots)$ , and  $D_{ntna}(\dots)$ .<sup>24</sup>

The equation suggests three observations. First, although the government could manage the nominal exchange rate (ER) (particularly with a closed capital account), the real exchange rate (as discussed extensively in Chapter 7 and elsewhere) is an endogenous variable that depends on how the whole economy adapts to macroeconomic changes, including how

22 The price equations (but not the other equations) are assumed to have the property that if all the prices inside the function increase (or decrease) by a certain percentage (say 10 percent), the aggregate price also increases (or decreases) by the same percentage. In mathematical terms, this type of equation is said to be “homogeneous of degree one.”

23 The coefficient for the commercialization margin and other costs,  $mrg$ , is ignored here to simplify the exposition.

24 It is assumed that the country is “small” in terms of the exportable and the importable products and that the domestic product and the world product are homogeneous. The price of the nontradables is determined by internal supply and demand. Of course, if there are no pure tradables or pure nontradables, the equations must be adjusted accordingly (Chapters 6 and 7). But the points made in the text would be even more valid with those adjustments.

supplies and demands of the nontradable goods adjust. If the government devalues the domestic currency, the real exchange rate is going to turn more favorably to tradables only if the impact of the devaluation on the supply and demand of nontradables is such that the change in the prices of those goods (and the aggregate index defined by the function  $g$ ) is smaller than the increase in the prices of the tradables (reflected in the aggregate index calculated by the function  $f$ ).

Second, looking at the impact of macroeconomic measures on the agricultural sector, it is clear that the concept of the real exchange rate as  $P_{tr}/P_{ntr}$  is different from the domestic terms of trade between the agricultural and non-agricultural sectors ( $P_a/P_{na}$ ), which would be defined as follows:

$$P_a/P_{na} = [u(P_{xa}, P_{ma}, P_{ntra})]/[v(P_{xna}, P_{mna}, P_{ntrna})],$$

where  $u$  and  $v$  are functions that generate agricultural and nonagricultural price indexes, respectively. Therefore, changes in  $P_{tr}/P_{ntr}$  do not translate one-to-one to changes in the relative profitability of the agricultural sector with respect to the rest of the economy ( $P_a/P_{na}$ ). Furthermore (as discussed in Chapters 1 and 2), changes in the real exchange rate or in the internal terms of trade between agriculture and nonagriculture ( $P_a/P_{na}$ ) may only be proxy indicators of the possible profitability of the agricultural sector in relation to other sectors, considering that the price indexes of final products are not adjusted by costs. In general, it would also be necessary to consider not only the internal terms of trade for total production but also, and perhaps more importantly, how different macroeconomic variables affect the costs of the sector, the availability of inputs, the levels of activity and demand, and the productive response of the agricultural sector.

Third, an effective devaluation—that is, a nominal devaluation not negated by compensatory increases of the prices of the nontradable goods and services—favors not only exports but also activities that substitute imports, which can be of agricultural origin or from other sectors such as industry. In the analyses of the 1970s and 1980s, an overvalued ER was interpreted as part of an industrialization strategy that discriminated against agriculture in general. However, the equation for  $P_a/P_{na}$  shows that the dichotomy of agriculture versus industry (or the rest of the sectors) must be subject to important caveats, because there are agricultural activities that substitute imports and are protected by tariffs (and other restrictions to international trade; see Chapter 11 on trade) and because the industrial sector (and other nonagricultural activities) could be important net exporters.

Finally, the various definitions utilized show that the RER depends on world prices and trade and exchange rate policies, as well as on other macroeconomic or sectoral policies that affect the supply and demand of tradable and nontradable goods and services. Consequently, for all the reasons indicated, the effect of changes in the nominal exchange rate will depend on the whole economic program and the general equilibrium rebalancing of the entire economy (Chapters 2, 6, and 7).

The next section reviews some of the studies that analyze the links between the nominal and real exchange rates and the agricultural sector. Following that, some special topics with relevance for the conduct of ER policies are discussed.

### **Empirical Studies on ER and Agriculture**

Schuh (1974), in his seminal work on exchange rates and agriculture in the United States, argued that the overvaluation of the RER would increase production because the reduced profit margins would force farmers to innovate and increase productivity to survive (a variation of Willard Cochrane's "treadmill effect," which basically postulates that farmers need to innovate permanently to defend a declining level of profit [Cochrane 1958]). This response in the United States was facilitated by the fact that there were productivity-enhancement technologies available for the use of the farmers. Of course, in developing countries, where the availability of adequate technologies may be more limited and/or the capital to implement those available may be lacking, the farmers' response to an overvaluation of the ER that reduces incomes and profits in agriculture may well be to abandon production and migrate out of the rural areas. Therefore, it is necessary to look at empirical analyses to evaluate what may be the agricultural response to ER policies.

In what follows, and without claiming a full review, several studies are highlighted. Some of them are based on various econometric analyses, while others are simulations in multisectoral, economywide models. They are clearly different approaches, and this fact also implies that there are different interpretations of the notion of empirical analysis.

### **RER APPRECIATION AND MISALIGNMENTS**

Mendoza Bellido (1994) finds that Peru's stabilization program in the early 1990s, which led to the appreciation of the real exchange rate and declines in real wages, among other things, explained to a great extent the crisis of Peruvian agriculture at that time. Lamb (2000), in a panel estimation of

supply functions for 14 African countries during the period 1975–1990, also finds that the appreciation of the RER leads to lower total agricultural output<sup>25</sup> after controlling for other factors such as rainfall. The coefficients, which are statistically significant, suggest that each 1 percent of appreciation in the RER is associated with total output decreases of between 0.17 percent and 0.29 percent.

A more nuanced impact is found by Homem de Melo (1999) in the case of Brazil. The appreciation of the exchange rate during the period 1989–1997, particularly during the economic program that started in 1994 (the Real Plan), indeed decreased relative prices received by producers; however, despite this fact, total production increased somewhat because other factors compensated for the negative impact of the overvaluation of the exchange rate, such as increases in the international prices of primary products during 1994–1997, reductions in the prices of inputs used in the agricultural sector (in part related to the appreciation of the Brazilian currency), and, in an echo of Schuh's hypothesis, considerable improvements in productivity.

Those analyses compared levels or changes of some definition of the real exchange rate, but without reference to what would have been an equilibrium ER. A different approach is to determine first the equilibrium exchange rate and, second, to evaluate the impact of the misalignment (that is, the difference between the equilibrium ER and the actual ER) on agriculture.

This is done by Thiele (2002a and 2002b). Those studies utilize two measures of misalignment for several SSA countries over the period 1975–1998: first, the ratio between the parallel market exchange rate and the official exchange rate, and second, an econometric estimate of the misalignment. Both indicators suggest reductions in misalignments over the period analyzed. Those indicators are used in single-country equations where agricultural production is the dependent variable and the measures of misalignment are included among the explanatory variables, along with measures utilized to control for other factors (for instance, the share of irrigated land in the total devoted to annual and permanent crops). Five countries (Cameroon, Ghana, Kenya, Malawi, and Tanzania) passed the statistical tests needed to evaluate the relationship between production and misalignment of the ER. The equations for Cameroon, Ghana, and Tanzania showed that reductions in the misalignment, in one or both definitions, increased agricultural production. In the case of Malawi, only the reduction of the black-market premium was associated with increased production; the other test was inconclusive.

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25 It should be noted that the negative association is not with growth but with total production.

**DEVALUATIONS**

While appreciation of the real exchange rates may develop over some time, nominal devaluations in developing countries have been, in many cases, relatively sudden events. In this case, as discussed for the economy in general, it is important to differentiate the short-term impact of the devaluation from its longer-term effects. There will be effects both on production and demand of agricultural and food products that need to be considered.

Jensen, Robinson, and Tarp (2002) discuss devaluations of the RER in the medium to long term, utilizing a general equilibrium framework for a number of developing countries. They find that modifications in RERs have diverse effects on relative agricultural price incentives (compared to other productive sectors) depending on specific country circumstances. In their simulations, exchange rate depreciations improve relative agricultural incentives significantly in five countries—Argentina, Brazil, Costa Rica, Malawi, and Zimbabwe—all countries with relatively large agricultural trade shares; on the other hand, the same adjustment worsens relative agricultural price incentives in five other countries with small agricultural trade shares, including poorer southern African countries with underdeveloped agricultural sectors (Mozambique, Tanzania, and Zambia), as well as Indonesia and Tunisia. For two other countries (Morocco and Mexico), relative agricultural price incentives appear to have been little affected. This is an example of the point made earlier that a devaluation of the RER does not necessarily imply an improvement in the domestic terms of trade between the agricultural and nonagricultural sectors ( $P_a/P_n$ ).

The differing impacts depend on the relative trade shares of the agricultural versus nonagricultural sectors, the import composition of those sectors, and relative elasticities of import demand and export supply. An exchange rate appreciation leads to (1) lower internal terms of trade for export goods, (2) lower protection for import-competing goods, and (3) lower input costs for production sectors using imported inputs. Then the question is whether or not the combined impact of the terms of trade and protection channels (points 1 and 2) dominate the input cost channel (point 3).

The appreciation of the exchange rate generally worsens relative price incentives for the most intensively traded sector, whereas exchange rate depreciations usually improve those relative price incentives. However, agriculture may or may not be the most intensively traded sector and could be affected by the cost-push effect; therefore devaluation of the ER may not turn the domestic relative incentives in favor of agriculture.

Bilginsoy (1997) also finds, in a two-sector model of terms-of-trade determination for Turkey, that devaluation turns the domestic terms of trade against the agricultural sector mainly because of cost-push factors in the industrial sector.

The studies mentioned analyzed the impact of devaluations basically in the medium to long term, and they were simulated in a framework of full employment of productive factors.

On the other hand, Díaz-Bonilla and Schamis (2001) analyze the impact of devaluations on a shorter horizon and consider potential impacts on employment and GDP, which also affect agriculture through the income effect of demand. As noted, the impacts of the devaluations were different before and after 1978, when the capital account of the balance of payments was open. During the period 1955–1977 (the traditional period of import substitution industrialization in that country), devaluations had a small negative impact on total GDP growth, a negative impact on industrial production (for about two or three years), and a positive impact on agriculture. Devaluations could be utilized to restore relative prices in favor of tradables, and after the initial negative impact, the economy began to grow again. However, the econometric estimations after 1978, once the capital account was open, suggest that the recessionary impacts of devaluations on the GDP and industry are larger and statistically significant, also affecting the agricultural sector, which showed declines during the first year: with the capital account open, devaluations, although improving the incentives for the tradable agricultural sector (exports and import substitutes), also affected overall GDP growth and domestic real wages and incomes (at least in the short run), depressing demand for agricultural goods (especially nontradables) and also constraining the agricultural supply, at least in the short term.

The case of Malawi in the early 2010s (see the previous discussion of Malawi based on Pauw, Dorosh, and Mazunda 2013) shows that when a country is hit by harmful shocks, it is better to let the exchange rate adjust instead of clinging to a misaligned fixed ER: the simulations show that the devaluation will cushion the overall negative impact of those shocks on total and agricultural GDP and rural incomes, compared to the counterfactual of a fixed exchange rate.

Ethiopia during the 2008 price shocks offers another example of macroeconomic factors being more determinant than world price jumps and of the costs of foreign exchange rationing, a policy response that governments sometimes utilize to avoid a devaluation. Before 2008, Ethiopia was receiving capital flows that helped to finance investments. Those capital inflows also increased money supply and exacerbated inflationary pressures. The domestic currency began to appreciate, affecting exportables and increasing imports. The increase

in world prices of food and fuel led to further balance-of-payment problems. Then the government of Ethiopia started rationing foreign exchange and limiting imports of a variety of products, including food items. The result was that the domestic price of some staples, such as wheat, went above world prices (Rashid and Lemma 2011; Dorosh, Robinson, and Ahmed 2009). Rashid and Lemma (2011, 9) note that “domestic prices started increasing before the global food crisis, did not follow world prices during the global food crisis, and started increasing sharply long after world prices took a nosedive.”

The rationing of foreign exchange, resulting from the government’s desire to avoid a depreciation of the domestic currency, exacerbated the effects of the negative external shocks. Other estimations by Dorosh, Robinson, and Ahmed (2009) in a computable general equilibrium model for Ethiopia showed that the ER appreciation and the policy response to ration foreign exchange negatively affected growth (through reduced incentives for production of tradables) and also contributed to worsening Ethiopia’s income distribution because the large rents of rationing were received by the nonpoor. The country would have fared better in terms of growth, exports, and equity with a managed ER that was allowed to depreciate and with a redesign and phasing out of controls in foreign capital markets to gradually reduce economic rents.

So far we have been discussing the impacts from the supply (production) side. But devaluations also affect the demand (consumption) side, with potentially negative impacts on poverty and food security, particularly if changes in the ER lead to a generalized economic crisis (Chapter 3). Again, the conclusion is the need to avoid the overvaluation of the ER, which then leads to abrupt and damaging adjustments in the parity. Concerns about the poor and vulnerable should make avoiding macroeconomic crises the first policy priority, given the devastating effects they may have. But, once the ER is overvalued, delaying the adjustment because of concerns about the poor and vulnerable tends to increase the imbalances and force even more damaging adjustments later. Therefore it is better to correct the ER earlier than later. In any case, it is crucial to implement safety nets for the poor and vulnerable, including food stamps, food-for-work, school lunches, and supplementary feeding for mothers and infants. Those programs should be designed and deployed during calmer times, so they can then be expanded during periods of economic distress.

#### **VOLATILITY IN ER**

So far we have discussed the link between levels of exchange rates and agricultural production. A related issue is the impact of exchange rate variability. Various studies have shown the negative impact of exchange rate variability on production and

exports in general. Bleaney and Greenaway (2001) analyze the impact of the level and volatility of the terms of trade and the real effective exchange rate on investment and growth in 14 SSA countries during 1980–1995. They find that growth is negatively affected by terms-of-trade instability and that investment is negatively affected by real exchange rate instability. In the case of agriculture, Cho, Sheldon, and McCorrison (2002) analyze bilateral trade flows across ten developed countries between 1974 and 1995 and find that after controlling for other factors, real exchange rate uncertainty had a significant negative effect on agricultural trade during this period and that the negative impact of uncertainty has been more significant for agricultural trade than for other sectors.

Mundlak, Cavallo, and Domenech's (1989) work on Argentina, although usually mentioned in the context of the study of biases of macroeconomic policies against agriculture, can be more adequately interpreted as showing that avoidance of macroeconomic instability and crises, linked, among other things, to sharp adjustments in ER to correct overvaluations, facilitates a stronger growth performance for the whole economy, not only agriculture.

Table 10.9 shows the volatility of the real exchange rate (measured as the standard deviation for the period divided by the average for the same period) for the same sample of 50 developing countries whose levels appear in Figure 10.1.

Volatility was high during the 1980s but declined visibly during the 1990s, and it declined further in the 2000s. This should have had a positive effect for both overall growth and agricultural production.<sup>26</sup>

**TABLE 10.9** Volatility of REER, 1980–early 2010s

Decade	Average	Median
1980s	0.242	0.181
1990s	0.124	0.092
2000s	0.115	0.088

**Source:** Author's calculations based on IMF (2013c).

<sup>26</sup> A related topic is the volatility of export earnings and the impact on investment and growth. Dawe (1996) estimated a properly specified measure of export volatility for 85 countries during 1965–1985 and found that instability seems to increase domestic savings and lead to more investments, but the efficiency of that investment is impaired by the uncertainty. Given that the second effect seems to dominate, export volatility tends to have a negative influence on economic growth.



### COMMODITY CURRENCIES

So far the discussion has focused on the impact of exchange rate regimes and policy actions on several variables. A different line of inquiry examines the impact that world commodity prices—which affect the terms of trade of developing countries—have on the behavior of the real exchange rate in those countries.

In Chapter 7, it was shown that the most commonly utilized definition of the real exchange rate (which was called RER1) could be broken down into three parts, one of which was the terms of trade (TOT) faced by a country expressed in its domestic currency. In that deconstruction, a negative impact on TOT (prices of exports declining or prices of imports rising) led to a devaluation of the RER. But does this happen in reality?

Cashin, Céspedes, and Sahay (2002) looked at the relation between commodity prices and ER in 58 commodity-exporting countries (including five industrial countries) for the period January 1980–March 2002. These countries (including the industrialized ones) depend on commodities for more than 50 percent of their exports (in several developing countries, particularly those in SSA, the share exceeds 80 percent). In many cases, a single product dominates those exports. The authors asked two main questions: first, whether real commodity prices and real exchange rates move together, and second, whether the exchange regime (more rigid pegs, limited flexibility and managed regimes, or flexible floats) affects a country's ability to cope with commodity price swings.

The authors found a stable, long-run relationship between a country's real exchange rate and the real price of its commodity exports (that is, both variables were cointegrated in technical terms) in 22 of the 58 countries, with SSA countries representing half of these. They refer to those countries as having commodity currencies: more than 80 percent of the variation in the real exchange rate is explained, on average, by changes in real commodity prices. In their estimation, a 10 percent drop in the real price of the exported commodity was associated with a median depreciation of 3.8 percent of the real exchange rate of the country considered (the range of depreciation was between 2 and 4 percent) (Cashin, Céspedes, and Sahay 2002).

Furthermore, they found that for the commodity-currency countries, the variability of the real exchange rate was similar across the various nominal exchange rate regimes (which they categorized using the Reinhart and Rogoff (2004) classification and the IMF *de jure* classification). In other words, the type of real shocks to the economy determined the behavior of real exchange rates, rather than which exchange rate regime was utilized.

Therefore, they recommended that commodity-exporting developing countries should analyze the effects of commodity price movements on exchange rates and use that information as a guide for the conduct of monetary and exchange rate policies. This means considering commodity prices in the design of inflation-targeting arrangements and evaluating whether exchange rates have deviated excessively from their equilibrium value.

In Chapter 9 the idea (suggested in Frankel 2005) was discussed that, as normative policy, countries specializing in commodities exports should peg their currency to the prices of those commodities. This policy, labeled pegging to the export price index (PEPI), would target a representative basket of export commodities for that country (which is different from a generic world commodity standard). As mentioned in Chapter 9, this approach was considered to provide both adjustment to trade shocks and a nominal anchor, with benefits over policies that utilize the Consumer Price Index (CPI) for inflation targeting (Frankel 2005). The reasoning is that when export prices fall, the local currency should depreciate against the dollar; PEPI achieves this result, whereas CPI targeting does not. On the other hand, if import prices rise, CPI inflation targeting leads to a tightening of monetary policy, which would appreciate the currency further. This is the wrong reaction to a deterioration of the terms of trade and would most likely exacerbate movements in trade and output. Frankel (2005) argues that monetary policy should tighten when export prices go up (as PEPI would do) and not when import prices increase (as would be the case under CPI inflation targeting).

#### **DUTCH DISEASE**

There is an extensive literature on the so-called Dutch disease, beginning with Corden and Neary (1982). Initially, this phenomenon was linked to developments in the Netherlands during the 1960s and 1970s, at which time the discovery of large deposits of gas led to increased energy exports that put upward pressure on the Dutch currency and wage rates and appeared to have resulted in declines in the production of other tradable sectors, particularly in the manufacturing industries. Later, the idea was generalized to refer to the general phenomenon of a booming productive sector that leads to larger exports and appreciated domestic currencies, which negatively affects other tradable sectors and, in some cases, even the whole economy. The latter may happen if the contracting sectors were important sources of productivity growth (perhaps through learning-by-doing; Van Wijnbergen 1984) and the expanding one was mainly a resource-based activity with limited positive spillover effects on growth, employment, and technological development.

The impact of the Dutch disease on agriculture has been documented in the case of oil in Indonesia (Timmer 1994) or copper in Zambia (Lofgren, Robinson, and Thurlow 2002). The booming sector associated with Dutch disease, which in many cases has been mineral or energy production, could be in fact any product, including a subsector of the agricultural sector. The latter was the case of coffee in Colombia studied by Kamas (1986). By extension, the concept has also been utilized to refer to the effect of various capital inflows (such as official aid, foreign direct investment, remittances, etc.) on the appreciation of the real exchange rate and the decline of tradable sectors (IMF 2005b).

Policy reactions to Dutch disease have also been extensively discussed. When determining the appropriate policy reaction, the main question to be answered is whether the boom is considered temporary or permanent. If it is temporary, the best approach is to try to stabilize incomes and the exchange rate through a public stabilization fund created through some form of taxation of excess revenues. If the boom is permanent, governmental policies will be needed to help manage the structural transformation—for example, by investing part of the additional revenues in various productivity-enhancing measures such as infrastructure, technology, and human capital (see a related discussion in Chapter 8 on fiscal policies).

It is clear that countries have managed episodes of newly acquired wealth differently, with diverse impacts on agriculture. For instance, Usui (1997) argues that there were important differences between Indonesia and Mexico in their policy adjustments to the oil boom of the 1970s, especially in their fiscal, foreign debt, and exchange rate policies, as well as in the use of oil revenues to invest in strengthening the affected tradable sectors. Indonesia appears to have managed its wealth more conservatively and invested more heavily in nonbooming tradable sectors, avoiding the “resource curse” better than Mexico at the time.

These findings lead to another point: if the newly acquired riches are managed properly, then the notion of additional wealth as a “disease” does not seem appropriate. In fact, Raju and Melo (2003), focusing on Colombia, show that coffee price shocks have exerted an important influence on money growth, inflation, and real exchange rates, in line with the predictions of traditional Dutch disease models, but also that coffee booms have resulted in positive long-run output effects, which reduce both current account and government deficits. They conclude that the term “Dutch disease” is a misnomer and that, at least in the case of Colombia, coffee booms helped strengthen internal and external balances in the long run.

At least as relevant for low-income developing countries as the management of potential commodity booms is the issue of foreign aid and remittances. Rajan and Subramanian (2006) find that foreign aid is associated with overvaluation of the real exchange rate in their sample of developing countries, with negative effects on the growth rate of exporting industries, particularly those that are in labor-intensive sectors. Remittances, on the other hand, do not seem to lead to the same effects: they conjecture that this is so in part because of the nature of the goods and factors on which remittances are spent and in part because countries that already have appreciated exchange rates appear to receive fewer remittances. In agriculture-based and transition countries, which receive the largest amounts of foreign aid as percentages of their GDPs, it is thus crucial to ensure that those flows are invested in areas such as productive infrastructure, technology, and human capital, all of which raise the productivity of tradable sectors and help to outweigh the negative impact of the potential overvaluation that foreign aid may generate.

#### **CAPITAL FLOWS AND SUDDEN STOPS**

As noted at the beginning of this chapter, the cycles in world monetary policies and exchange rates were accompanied by changes in capital flows in and out of developing countries, with important effects for the economy in general and the agricultural sector in particular.

Capital inflows could have a positive growth and investment effect on agriculture in general, particularly for those products such as livestock and dairy that are more linked to the evolution of income and demand in the domestic market in many countries. On the other hand, the overvaluation of the domestic currency will hurt tradable sectors, including agricultural exportable and import-competing products. For instance, Reca and Parellada (2001) show that the important boom in dairy products (mainly nontradables) in Argentina during the early 1990s, fueled by strong domestic growth, was linked to capital inflows, whereas at the same time, crop production (a tradable good) stagnated due to the appreciation of the Argentine peso (and lower world prices during that period). In the case of several LAC countries that reduced tariffs and other trade barriers protecting import-substitution products during the 1990s (again including several agricultural products), the appreciation of the domestic currency due to capital flows added to the pressure of trade liberalization on domestic producers.

The expansionary phase, however, was then followed in many developing countries by a contractionary phase when capital inflows stopped or reverted direction: the sudden stops shown in Table 10.1. Although the devaluation

associated with the capital outflow improves relative prices for tradable products, such as is the case of many agricultural goods, declines in economic activity affect products that depend on domestic market incomes; similarly, banking and fiscal crises can negatively impact both the supply side of various products (through credit constraints and cuts in public investments) and consumer demand for those products. Moreover, domestic production could be affected by increases in the prices of imported inputs.

Capital flight also raised domestic interest rates in crisis-affected countries, which reduced the availability of credit, lowered capital investment in agriculture, and raised the financial component of input costs. In addition to the price effects, the decline in incomes resulting from a crisis would negatively affect products with higher income elasticity, such as beef or fresh fruits, while others with less elastic demand may not be affected (and, in some cases, income declines may lead to more demand for staples of an inferior quality).

For instance, capital outflows and devaluations during the debt crises in LAC in the 1980s and the correlated strong decline in overall growth during what has been called the “lost decade” affected livestock and dairy products and the supply of raw materials for nonfood manufacturing products, whereas food crop production (which tends to be more tradable) fared relatively better (López-Cordovez 1987).

Another previously mentioned example is the sequence of financial crises occurring since the mid-1990s, which disrupted the economies of many Asian and South American countries. Shane and Liefert (2000) analyze the impacts of currency depreciation on countries affected by the crises as well as in nonaffected countries. For many but not all of the agricultural producers in crisis-affected countries, currency depreciation improved domestic relative prices in their favor. For some other agricultural producers, however, the domestic relative prices worsened, especially for those that import a large share of inputs and whose input prices rose more than prices for output, such as poultry farmers who import the bulk of their feed in Indonesia (another example was the soybean-processing industry in Korea).

Bresciani et al. (2002) studied the impact of the East Asian financial crisis on farmers in Indonesia and Thailand using household surveys and found differentiated impacts on farmers' incomes and distribution, even though shocks to both countries looked roughly similar. For instance, poor farmers in Thailand were more affected by the crisis than were those in Indonesia, in part because Thai farmers relied more on urban activities, which suffered more

from the financial crisis, to supplement their incomes.<sup>27</sup> On the other hand, farmers in both countries who specialized in export crops benefited from the currency devaluation.

Financial crises linked to gyrations in capital flows to developing countries have also had important effects on world commodity markets. The 1997 devaluations in Asia led to the contraction of demand for agricultural products in world markets, whereas subsequent devaluations in Brazil and Argentina expanded world supplies, leading to the decline of world agricultural prices at the end of the 1990s and the beginning of the 2000s (IMF 1999; Langley et al. 2000; Shane and Liefert 2000). The impact was not limited to commodity markets. Most of the capital flowing out of crisis-affected countries went to developed countries, mainly the United States. Those capital flows placed downward pressures on US interest rates, which stimulated investment in agriculture (Diao and Roe 2002). At the same time, that capital inflow appreciated the dollar, affecting US agriculture through a different channel. Real prices of many commodities at the end of the 1990s and early 2000s reached the lowest levels recorded.

### **Closing Observations on Exchange Rate Policies**

Given the importance of the exchange rate as one of a country's most important macro prices and the multiple factors affecting and being affected by it, then a crucial question is: What is the monetary and ER policy framework that would align growth, inflation, and competitiveness in ways that support agricultural development and that, vice versa, will allow the economy to maintain growth and relatively stable prices when the economy and agricultural sector suffers external or internal shocks?

Although a precise policy blueprint may be impossible, several main points should be noted regarding exchange rate policies in developing countries.

First, overvalued exchange rates tend to end in widespread economic, financial, and balance-of-payment crises. Usually, those crises are accompanied by increases in poverty and deterioration of food security. Therefore, the best way of sustaining growth, alleviating poverty, and improving food security is to avoid the overvaluation of the ER and the related imbalances, which lead to sharp devaluations and economic and financial crises. Also, when negative shocks happen that require adjustments in the ER, it is better to do it

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<sup>27</sup> A greater impact on those rural populations that were more dependent on urban employment was also observed in the 1980s crisis in LAC, where migration to the cities was stopped and even reversed in several countries.

early rather than let imbalances grow, which will need more drastic measures later. The best way to protect the poor and vulnerable is through social safety nets that can be expanded during emergencies.

Second, a crucial issue then is how to measure what would be an adequate or equilibrium level of the real ER, defined as the one that attains both internal equilibrium (meaning that nontradable markets clear in the current period and are expected to do so in the future with a reasonable price stability) and external equilibrium (meaning that current account balances, now and in the future, are compatible with long-run sustainable capital inflows). That equilibrium real exchange rate (ERER) may change with different conditions in global markets, such as commodity prices, capital flows, and monetary and exchange rate policies in systemically important countries (which now include more than just industrialized countries). Therefore, it is essential to monitor different indicators of potential misalignments and to try to correct deviations as early as possible.

Third, dual/multiple exchange rates, with a large gap between the official/controlled exchange rate and the parallel market, indicate problems with the consistency of macroeconomic policies and negatively affect price stability, banking and fiscal solvency, and growth. They also lead to rent-seeking and corruption.

Fourth, problems of misalignments of the exchange rate are typically related to the dual policy role of ER, already mentioned, as a real price in the real exchange rate approach, which emphasizes trade and competitiveness issues, and as a financial variable in the nominal anchor approach, which uses the nominal exchange rate to control inflation and/or is concerned about the assets and liabilities of domestic actors, particularly the banking system. Many economic crises in developing countries have resulted from failed economic programs that did not properly articulate that dual role. Policymakers need to have one instrument for each goal; it would be very difficult for a government to attain two objectives (external competitiveness, as in the real exchange approach, and low inflation, as in the nominal anchor approach) with just one instrument such as the ER. Therefore, it is necessary to define the exchange rate, monetary, fiscal, and trade policies through a consistent economic program.

Fifth, while overvaluation is clearly bad for the economy, it seems that some undervaluation may be associated with better economic performance in developing countries. However, permanent and significant undervaluation is very difficult to maintain, even with extensive controls on external financial transactions, and it may impose additional costs on the economy (such as reducing domestic consumption in developing countries following this

approach, compared to the levels of consumption that would have prevailed under a properly valued ER).

Sixth, in the recurrent debate about fixed and flexible exchange rate regimes, empirical studies have reached different results, particularly regarding average growth. These widely divergent results are likely caused by the fact that the studies have utilized different definitions of fixed/flexible regimes and the fact that the results depend on other factors, such as the existence of capital controls, different types of domestic monetary regimes, and so on. The same exchange rate regimes seem to have different effects in different types of countries, depending on their level of integration with private international financial markets and the quality of their domestic institutions and policies, particularly those related to monetary and fiscal issues and to the domestic financial system. Those developing countries with fewer linkages to private international financial markets, due to capital controls or a lack of interest among private investors, appear to have a larger incidence of fixed pegs. This seems to have helped them achieve lower inflation rates without slowing growth or increasing volatility. These countries also suffered fewer currency and banking crises under pegs than did those countries more integrated into global financial markets. On the other hand, for those countries more integrated into private international capital markets, pegs appear associated with somewhat less growth, more inflation, and more banking and currency crises than managed floats.

Seventh, the empirical results about whether fixed or flexible regimes are more adequate for a country depend not only on what economic dimensions are selected to define “adequate” behavior (say, growth versus inflation) but also on the nature of possible economic shocks, structural production and trade issues, and the flexibility of other nominal variables in the economy, among other things. In fact, it has been argued that there is no exchange regime that can be considered most adequate all the time, even for the same country; rather, different regimes may perform best at different times in a country’s history.

Eighth, as a guide for the conduct of monetary and exchange rate policies, developing countries must monitor the impact of Dutch disease effects linked to booming tradable sectors, capital flows (including foreign aid and remittances), the possibility of sudden reversals in those flows, and the evolution of commodity prices in the case of commodity-exporting developing countries. This means considering commodity prices in the design of inflation-targeting arrangements and evaluating whether exchange rates have deviated excessively from their equilibrium value.



Ninth, in low-income developing countries with controlled capital accounts, the most beneficial exchange rate arrangement for agricultural development seems to be stable ERs, provided that the monetary policy regime and fiscal position control inflation and prevent the domestic currency from being overvalued. In the case of more advanced developing countries with greater openness in the capital accounts and deeper integration with world financial markets, both fixed and freely floating regimes do not seem to help either growth or price stability; therefore, agricultural development might benefit from a managed float combined with a monetary framework that keeps inflation under control and regulatory measures that eliminate currency mismatches in the banking system and excesses in credit growth and appreciation of certain assets such as land, houses, and the stock market. A sustainable fiscal position is also crucial to avoid pressures on the central bank to print money to finance the public sector, which may lead to an excess supply of domestic currency.

The different categories of countries regarding monetary and ER policies, capital controls, and dollarization (types 1 to 4 discussed earlier in this chapter) may serve as a guide to the applicable macroeconomic approach.

## TRADE POLICIES

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This chapter first discusses different meanings of trade policies. Then it looks at the evolution of global trade and general trade policies, including those related to agricultural and food products. In a third section, some of the general equilibrium results from Part 2 are recapitulated. Then, the chapter moves to the discussion of different trade policy instruments, highlighting their uses in agriculture. A separate section is devoted to trade, WTO disciplines, and food security. There is another block devoted to special topics, including the debate about the trade policy bias against agriculture in developing countries, tariff escalation and export tax differentials, export restrictions, and the operation of state trading enterprises. A final section summarizes some of the main points discussed in the chapter.

### Introduction

In economic terms, trade policies usually refer to measures at the border: that is, those applied when goods and services are crossing a country's frontier coming from or going to the rest of the world. However, the notion of trade policies has been expanded to a series of *domestic* measures as part of world legal agreements. That legal interpretation of trade policies, which was more limited in the General Agreement on Tariffs and Trade (GATT) signed in 1947, has greatly expanded since the World Trade Organization (WTO) was created in 1995.

This expanded interpretation results from the idea that GATT first, and the WTO later, embodied a series of reciprocal legal obligations on trade matters for the signatory countries. Those obligations are based on two basic principles of the multilateral system of trade rules: one is the most favored nation (MFN), which grants all WTO members the best trade access offered to any one of them; and the other is domestic treatment, which does not allow WTO members to discriminate between domestic (national) and foreign producers. Together they constitute a double commitment under the WTO agreements to avoid discrimination between different foreign countries or producers on the one hand and between domestic and foreign entities engaged in trade on the other.

Considering that during the different rounds of trade negotiations, countries exchanged concessions<sup>1</sup> (such as reduction of tariffs for some products), then it is assumed that, if countries agreed to the full package negotiated, there is a balance of rights and obligations, ultimately reflected in reciprocal market access opportunities. Accepting that, then there may be not only border measures but also domestic policies that could affect the balance of rights and obligations and reciprocal market access opportunities. Therefore, GATT included since the beginning some regulations related to domestic measures (such as subsidies to production) that could affect market access opportunities. The Uruguay Round negotiations, which began in 1986 and led to the creation of the WTO, expanded the range of legal agreements covering trade and trade-related issues, including some legal texts, such as those on intellectual property rights, which many observers and developing countries have argued are not really related to trade. However, the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) and the Agreement on Trade-Related Investment Measures (TRIMs), for example, are now part of the legal framework to which WTO members are committed.

Furthermore, WTO members in the Uruguay Round expanded the legal WTO coverage from goods to services when they approved the General Agreement on Trade in Services (GATS). This Agreement covers different ways in which firms and people from country A provide different services in country B, defining four different modalities,<sup>2</sup> including by individuals going physically from country A to country B to provide those services.

Therefore, the current international legal framework for trade policies includes more than border measures.

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1 It has been widely noted that the diplomatic/legal view of trade negotiations usually takes the perspective of producers; therefore, reducing a tariff, for example, is a concession, a cost for the country, which has to be compensated by some concession offered by the trade partner. This is in many cases also the view of organizations of civil society following trade negotiations and, of course, of the associations representing producers. On the other hand, the economic view focuses mainly on consumers and would see tariff reductions and, in general, any other measure that increases trade as a benefit for the country. The differences in these two visions continue to complicate diplomatic, legal, and economic debates around trade negotiations.

2 Mode 1 or cross-border supply: “services supplied from one country to another (e.g. international telephone calls).” Mode 2 or consumption abroad: “consumers or firms making use of a service in another country (e.g. tourism).” Mode 3 or commercial presence: “a foreign company setting up subsidiaries or branches to provide services in another country (e.g. foreign banks setting up operations in a country).” Mode 4 or presence of natural persons: “individuals traveling from their own country to supply services in another (e.g. fashion models or consultants)” (quoting directly from WTO website, accessed on November 24, 2014: [http://www.wto.org/english/thewto\\_e/whatis\\_e/tif\\_e/agrm6\\_e.htm](http://www.wto.org/english/thewto_e/whatis_e/tif_e/agrm6_e.htm)).

As an example of the coverage of trade policies in the expanded WTO framework, Table 11.1 lists all those items that are usually considered in the country trade reviews conducted within that organization (this is a simplified example taking several countries' reviews; specific cases can be found online at [http://www.wto.org/english/tratop\\_e/tptr\\_e/tp\\_rep\\_e.htm#bycountry](http://www.wto.org/english/tratop_e/tptr_e/tp_rep_e.htm#bycountry)).<sup>3</sup>

**TABLE 11.1** Example of topics covered by WTO trade policy reviews

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1. Economic environment
2. Trade and investment regime
2.1 General framework
2.2 Trade policy objectives
2.3 Trade agreements and arrangements
2.4 Investment regime
3. Trade policies and practices by measure
3.1 Measures directly affecting imports
(customs procedures and requirements, customs valuation, rules of origin, tariffs, other charges affecting imports, import prohibitions, restrictions, and licensing; anti-dumping, countervailing, and safeguard measures; standards and other technical requirements; sanitary and phytosanitary requirements)
3.2 Measures directly affecting exports
(export procedures and requirements, export taxes, charges, and levies; export prohibitions, restrictions, and licensing; export support and promotion, export promotion, and marketing assistance; export finance, insurance, and guarantees)
3.3 Measures affecting production and trade
(incentives, competition policy and price controls, state trading, state-owned enterprises, and privatization; government procurement, intellectual property rights)
4. Trade policies by sector
4.1 Agriculture
(market access, export measures, domestic support)
4.2 Services
(telecommunication services, financial services, architecture and construction services, education, transport services, movements of natural persons)
4.3 Other sectors
(industry, energy, etc.)

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**Source:** Author, based on the topics considered in WTO trade policy reviews in different countries.

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3 Among the agreements reached in the Uruguay Round, one referred to the obligation to conduct trade policy reviews by countries for transparency purposes. The periodicity of those reviews depends on the importance of the country in global trade: the most important ones are reviewed every two years; the next group is reviewed each four years; then others are reviewed every six years, with the possibility that UN-defined least-developed countries may be reviewed at even longer intervals. It must be noted that although the studies are prepared by the WTO Secretariat, the substantive review is done by representatives of the WTO members. Therefore, it is not an assessment of a country's trade policies by international bureaucrats but a peer review and transparency exercise conducted by WTO members.

In summary, there are two potential notions of trade policies: one is narrower, focusing on border measures, and the other is the expansive view embedded in the WTO legal texts. This book takes an intermediate view, using both the usual economic perspective (as in Chapters 4 to 7) but also including in this chapter topics related to agriculture that are part of the broader WTO definition. This is the case for the topics embedded in the Agreement on Agriculture, which are classified into three pillars of the negotiations: market access (mainly but not only border measures related to imports), export competition (also largely border measures related to exports but also including credits, international food aid, and the operation of state enterprises), and domestic support (which covers a series of domestic government programs inside the borders). In the next sections of this chapter, there are also some references to other trade-related measures with implications for agriculture, such as sanitary and phytosanitary measures and other technical regulations, as well as a brief mention of intellectual property rights.

## **Global Trends in Trade and Trade Policies**

### **Overall Trends in World Trade**

A first point to be noted is that, as shown in Chapter 3 as well (see Figure 3.7), global trade has been growing faster than global GDP since after the end of World War II. Therefore, the ratio of merchandise trade to GDP has increased almost constantly during these decades from less than 20 percent of the GDP during the 1960s to close to 50 percent in the early 2010s (Table 11.2 shows the trade shares by different groups of developing and developed countries).<sup>4</sup> If services are also included, the ratio goes from about 25 percent of the world GDP in the earlier periods to 60 percent now.

In general, for most regions there was a jump in the 1970s and then a second one in the 1990s and early 2000s, reaching a peak just before the global crisis that started in 2008. Afterward, there was a sharp decline in 2009 due to the collapse in trade associated with the world financial crisis. Since then, the ratio has not yet recovered to the previous levels (this is shown in Table 11.2 in the column “Difference with Maximum Level”; it compares the peak value with the latest data, in this case the year 2012; see also Chapter 3, Figure 3.7).

Although all developing regions have increased their levels of trade integration, some differences do appear. Europe and Central Asia, East Asia, and Africa south of the Sahara (SSA) are substantially more integrated into

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<sup>4</sup> Trade is the sum of world exports and imports of merchandise goods measured as a share of gross world domestic product.

world trade than are Latin America and South Asia, as measured by the trade/GDP ratio.<sup>5</sup>

**TABLE 11.2** World merchandise trade (% of GDP)

Region/income	1960s	1970s	1980s	1990s	2000–2009	Early 2010s	Difference with maximum level
East Asia & Pacific	13.1	19.9	35.8	52.1	64.0	56.0	–19.7
Europe & Central Asia	11.5	30.1	53.0	49.1	64.7	70.0	–0.8
Latin America & Caribbean	19.1	20.7	24.3	24.3	36.4	35.5	–2.0
Middle East & North Africa	38.3	36.6	33.3	43.0	52.4	52.3	–10.0
South Asia	11.4	11.7	14.5	20.2	29.2	39.1	–0.7
Africa south of the Sahara	36.2	42.0	43.2	45.1	54.7	52.4	–12.9
Low and middle income	18.4	23.6	30.3	35.6	50.3	49.7	–6.4
High income	17.3	25.9	29.0	30.1	38.6	44.7	–1.2
World	18.0	26.7	31.2	33.4	44.1	49.9	–2.0

**Source:** Author's calculations based on World Bank (2014).

The significant increase in trade in goods and services (which since the 1980s and until recently has been growing at 7–8 percent annually) has contributed to the growth of world GDP during the same period (WTO 2013a). Therefore, a question is whether the slowdown in trade growth since 2009 implies that world GDP also will grow less going forward.

A second point to be noticed is the advance of developing countries in world trade in the last decades and the increase in trade among themselves. Developing economies moved from about 34 percent of world exports in 1980 to some 47 percent in the early 2010s, although this jump is explained in good measure by China, which represents about a quarter of the share of developing countries now (WTO 2013a). Developing countries are also trading more with each other: the share of “South-South” trade in total global trade increased from 8 percent in 1990 to 24 percent in the early 2010s (WTO 2013a). Another trend, in part related to the advance of developing countries,

5 Some people have argued that the high ratios for SSA show that excessive globalization leads to poor economic performance (Mazur 2000). However, with higher levels of openness, developed East Asian countries have done better (the average GDP growth for the period since 1960 to the early 2010s has been 7.3 percent for East Asia and the Pacific and 3.5 percent for SSA). On the other hand, a commonly quoted study in support of globalization by Dollar and Kraay (2001) has compared *changes* in openness rather than absolute *levels* and concluded that countries that are more globalized (in changes) have done better. However, judging by levels instead of changes in levels, either of trade/GDP ratios or import tariffs, countries identified as “non-globalizers” in that study have larger ratios of trade to GDP and lower tariffs than countries labeled “globalizers” (see Figures 1 and 2 in Dollar and Kraay 2001).

is the increased regionalization of trade. In particular, the share of intra-regional trade in Asian exports moved from 42 percent in 1990 to 52 percent in early 2010s, and in the case of North America (basically Canada, USA, and Mexico) the share increased from 41 to 48 percent in the same period (WTO 2013a).

A third point is related to the greater complexity of trade within value chains and the diversification of exports across many countries. Complex value chains pose a problem to calculate the net trade across countries: for instance, there is trade in components that then are transformed into a final product (say an automobile or an electronic device), which in turn are exported and imported. Adding all these transactions (as is the case with the figures mentioned above) would exaggerate the volume of final trade.<sup>6</sup> It may also give the wrong impression about trade deficits; therefore, there are some statistical efforts to calculate trade in value-added terms (that is, discounting intermediate inputs) to have a more precise view of trade flows (WTO 2013a). An implication of using value-added is that the contribution of services to total world trade increases significantly (from 23 percent of total trade in 2008 to 45 percent if only value added trade is considered; WTO 2013a).

Another policy issue raised by complex value chains (helped by improvements in transport, telecommunications, and information technology) is that, different from the paradigm of trade analysis based on final products, now comparative advantages may refer to the ability of firms to insert themselves in those international networks that generate a final product sourcing from different places and using a variety of goods and services (WTO 2013a). A related point is that countries are becoming less specialized in their export profiles, and differences in relative efficiency of production across products have been declining (WTO 2013a).

### **Trends in Trade Policies**

During recent decades, developing countries have been reducing their tariff levels and reducing or eliminating other measures that limit trade, including,

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<sup>6</sup> In the case of agriculture, the issue of double counting may be also present in some processed products, but overall it is clearly less relevant than for industrial products in general.

as discussed before, export taxes. Table 11.3 shows changes in unweighted import tariffs for a selection of developing countries in different regions.<sup>7</sup>

**TABLE 11.3 Unweighted import tariffs (median for a sample of countries)**

Region	1980s	1990s	Early 2000s
SSA			
Average	28.3	21.5	16.4
Median	29.5	21.3	15.6
LAC			
Average	25.5	13.5	10.3
Median	20.4	13.3	11.2
East Asia Pacific			
Average	27.0	19.5	10.2
Median	29.2	17.8	8.6
South Asia			
Average	62.3	34.8	19.1
Median	72.2	37.8	18.6
MENA			
Average	24.5	25.5	25.7
Median	23.5	28.3	27.5

Source: Díaz-Bonilla and Robinson (2010).

Except for Middle East and North Africa, which have somewhat increased their levels of protection, tariffs in the early 2000s were 40–70 percent lower than during the 1980s. LAC and East Asia and Pacific show lower tariff levels (around 10 percent). The largest cut has been in South Asia, which reduced tariffs from 60–70 percent to somewhat less than 20 percent.

Another way of gauging this decline in protection is to look at import tax revenues as a percentage of the value of total imports. Díaz-Bonilla and Robinson 2010 looked at a group of large developing countries<sup>8</sup> and found

7 East Asia Pacific includes China, Indonesia, Korea, Malaysia, Papua New Guinea, Philippines, and Thailand. South Asia includes Bangladesh, India, Nepal, Pakistan, and Sri Lanka. Middle East and North Africa (MENA) includes Algeria, Egypt, Iran, Jordan, Morocco, Syria, Tunisia, and Yemen. Latin America and the Caribbean includes Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Jamaica, Mexico, Nicaragua, Paraguay, Peru, Suriname, Trinidad and Tobago, Uruguay, and Venezuela. Africa south of the Sahara includes Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Democratic Republic of Congo, Republic of Congo, Côte d'Ivoire, Ethiopia, Ghana, Guinea, Kenya, Madagascar, Malawi, Mauritania, Mauritius, Mozambique, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, South Africa, Sudan, Tanzania, Uganda, Zambia, and Zimbabwe.

8 The countries were Brazil, China, Chinese Taipei, India, Indonesia, Malaysia, Mexico, Republic of Korea, South Africa, and Thailand.



that import tax receipts dropped from an average of 12 percent (median 8 percent) in the mid-1980s to about 6 percent (median 4 percent) in the early 2000s. In some countries—such as India, which in the 1980s collected import taxes equivalent to about 50 percent of the value of imports—the percentage declined to about 6 percent in the 2010s.

However, with the decline in tariffs there has been a parallel increase in nontariff measures (NTMs), such as sanitary and phytosanitary measures, technical regulations, different regulations related to services, preshipment inspections, customs operations, price control measures, anticompetitive measures, distribution restrictions, and so on. This process of increases in NTMs (which has developed in parallel with the decline in tariffs and a greater expansion of trade) has been taking place both in developed and developing countries (WTO 2012). Although in many cases these NTMs address legitimate societal concerns about health, safety, environmental, and similar issues, they may be designed and applied (unintentionally or as a result of protectionist pressures) in ways that discriminate against foreign producers. WTO (2012) reports studies that convert NTMs into ad valorem tariff equivalent (AVE) values: they suggest that, averaging across countries and tariff lines, NTMs may represent almost double the level of trade restrictiveness generated by tariffs, and that while tariffs have fallen, the contribution of NTMs to overall trade restrictiveness has probably been increasing. The same source also points out that the trade restrictiveness of NTMs relative to tariffs increases as WTO members become richer, and those NTMs seem to affect more agricultural products than manufactured ones.

### **Trends in Agricultural Trade**

Now moving to agriculture, several facts can be noted (Table 11.4).

First, world agricultural products have been losing share in world merchandise exports and imports, from around 20 percent of total trade in the 1970s to about 10 percent in the early 2010s. Second, agricultural products exported and imported by developing countries have also been declining as a percentage of their own merchandise trade. But, third, agricultural products exported and imported by developing countries have increased as a percentage of world agricultural trade (26.9 percent for exports and 16.9 percent for imports in the 1970s to 36.9 percent and 32.3 percent, respectively, in the early 2010s). In other words, while agricultural products are less important in total trade, both at the world level and for developing countries, the latter are becoming more important in world agricultural trade, both on exports and imports.

**TABLE 11.4** Share of agricultural trade in world trade

Region		1970s	1980s	1990s	2000s	Early 2010s
World	Agricultural Exports (% Total Merchandise Exports)	20.9	16.0	11.9	8.8	10.0
World	Agricultural Imports (% Total Merchandise Imports)	19.1	14.0	11.5	8.8	9.1
Developing Countries	Agricultural Exports (% World Agricultural Exports)	n/a	26.9	23.2	30.5	36.9
Developing Countries	Agricultural Imports (% World Agricultural Imports)	n/a	16.9	17.0	23.8	32.3
Developing Countries	Agricultural Exports (% Total World Merchandise Exports)	n/a	4.1	2.7	2.7	3.7
Developing Countries	Agricultural Imports (% Total World Merchandise Imports)	n/a	2.3	1.9	2.1	3.0
Developing Countries	Agricultural Exports (% Total Developing Countries Merchandise Exports)	n/a	24.9	17.3	11.5	12.2
Developing Countries	Agricultural Imports (% Total Developing Countries Merchandise Imports)	n/a	14.2	11.6	9.4	9.8

**Source:** Author's calculations based on FAO (2014).

**TABLE 11.5** Agriculture trade ratios (% agricultural production)

	1960s	1970s	1980s	1990s	Early 2000s
<b>Export/production</b>					
LAC	23.6	24.7	24.5	26.7	31.4
SSA <sup>a</sup>	28.5	23.0	17.2	15.3	13.2
Asia, developing <sup>b</sup>	5.4	5.7	6.4	6.4	6.4
All three regions	12.1	11.8	11.3	11.0	11.6
<b>Import/production</b>					
LAC	6.7	8.6	11.2	14.0	15.7
SSA <sup>a</sup>	8.1	9.4	12.6	12.3	13.5
Asia, developing <sup>b</sup>	7.1	7.7	9.2	8.9	8.8
All three regions	7.1	8.0	10.0	10.1	10.5

**Source:** Díaz-Bonilla and Robinson (2010).

**Notes:** a. Does not include South Africa; b. Does not include China.

While Table 11.4 shows agricultural trade in relation to total trade, Table 11.5 looks at agricultural trade ratios vis-à-vis agricultural production.

Several points should be noted. First, although agricultural integration in the world markets (at least measured by these simple trade ratios) appears to have increased on the whole since the 1960s, domestic production for domestic utilization is the dominant characteristic for the agricultural sector of developing countries as a whole<sup>9</sup> (the percentages of imports over production range from about 9 percent in Asia to 16 percent in LAC). Second, the levels and trends of import and export ratios differ among developing regions. SSA had the largest export/production percentage during the 1960s (28.5 percent), but it declined since then, standing in the 2000s at less than half the initial value (13.2 percent). SSA's import/production percentage, on the other hand, climbed from 8 percent at the beginning of the period to almost 14 percent in the 2000s. Asia has the lowest agricultural export and import ratios, although both have been trending upward slowly. LAC has become, by the indicators used here, the more integrated region in world agricultural markets, surpassing SSA on both the export and import ratios.

**TABLE 11.6** Developing countries: Exports and imports over production (metric tons)

Product		1960s	1970s	1980s	1990s	2000–2005
Meat	Imports	1.4	2.4	4.1	4.1	5.4
	Exports	4.9	4.6	3.8	3.7	4.4
Dairy products (excluding butter)	Imports	7.7	11.1	15.1	11.5	10.2
	Exports	0.3	0.6	0.5	1.2	1.9
Cereals	Imports	9.3	10.5	14.2	14.7	17.3
	Exports	4.7	4.0	4.3	4.7	6.1
Vegetable oils	Imports	11.4	16.8	27.4	32.0	33.9
	Exports	20.4	25.0	33.2	40.1	46.1

**Source:** Díaz-Bonilla and Robinson (2010).

Obviously, these import and export ratios differ by product: crops and byproducts tend to have larger trade ratios than livestock products. Table 11.6 shows the ratio of imports and exports over production; all variables are measured in tons (from FAOSTAT).

Meat products, for which imports and exports represent only about 4 percent of production, appear less integrated with world markets than cereals and, particularly, vegetable oils.<sup>10</sup> In the case of meat and dairy products, other

<sup>9</sup> There are exceptions, as noted later.

<sup>10</sup> For a comparison of export and import ratios for developed and developing countries and various products, see Díaz-Bonilla (2001a).

issues such as perishability (shelf life), sanitary measures, and trade protection tend to isolate domestic markets in many countries, making these products behave more like nontradables. The different levels of integration in world trade have implications for the adjustment process of agricultural products to changes in policies that depends, among other things, on the assumptions about the tradability of such products. Many analyses of price biases and price distortions in agriculture have focused on crops (which are more tradable in general) rather than livestock products (which tend to be less tradable). These distinctions are important for a proper analysis of the impacts of various macroeconomic conditions and policies.

### **Some General Equilibrium Effects of Trade Policies**

Specific trade measures must be placed within a general equilibrium perspective of macroeconomic balances, as discussed in Chapters 5, 6, and 7. For instance, we have previously looked at what is called Absorption Equation 1, derived from national accounts. Here it is written in real terms as

$$\text{GDP}_r = C + G + I_p + I_g + \text{EX} - \text{IM}$$

or

$$\text{GDP}_r - (C + G + I_p + I_g) = \text{GDP}_r - A_r = \text{EX} - \text{IM},$$

where the sum  $(C + G + I_p + I_g)$  is the total expenditure by residents of a country, called absorption, now presented in real terms ( $A_r = C + G + I_p + I_g$ ).

The main point to emphasize is that if the country has a trade deficit ( $\text{EX} - \text{IM} < 0$ ), then the country is absorbing ( $A_r$ ) more than it is producing ( $\text{GDP}_r$ ) (that is,  $\text{GDP}_r - A_r < 0$ ). Trade policies that try to expand exports  $\text{EX}$  or restrict imports  $\text{IM}$  but do not change the relation between production  $\text{GDP}_r$  and absorption  $A_r$  will not change the trade balance. Furthermore, with the balance between  $\text{GDP}_r$  and  $A_r$  unchanged, further reductions in  $\text{IM}$  (trying to increase the number of goods produced internally, in what has been called import substitution) will lead to parallel declines in  $\text{EX}$ , at an unchanged trade deficit. This process implies that the economy ends up limiting the range of export goods and services only to those in which the country is extremely competitive and importing just those goods absolutely crucial for the operation of the economy, making the economy even more vulnerable to changes in external conditions for its exports. These general equilibrium effects were part of the problem with extreme policies of import substitution industrialization (ISI) that some developing countries followed in the 1960s

and 1970s (see Box 11.1 on the trade issues involved). But they are important to bear in mind when discussing proposals for food self-sufficiency and protection as a way of achieving food security (this issue will be discussed later in this chapter).

### **BOX 11.1** Import substitution industrialization versus export promotion

Different studies during the 1970s (Little, Scitovsky, and Scott 1970; Balassa 1971; Krueger 1978) criticized the strategy of development based on inward-oriented, import-substituting industrialization in terms of growth and equity. The exclusively inward orientation failed to take advantage of the commercial opportunities offered by the international economy and discriminated against exports. The costs of inefficiency and lack of competitive incentives to increase productivity growth due to protection were higher than the possible costs of openness (such as the volatility associated with a greater integration in international trade) that the ISI strategy wanted to avoid. Protected industries appeared to require (and strongly lobbied for) protection long after the intended period of support as “infant industries.”<sup>1</sup>

It was also argued that pervasive state intervention into capital markets made investment funds available only to the large, favored firms and discouraged technical advance in other sectors. On the other hand, developing countries following an export-oriented strategy benefited from greater flexibility, efficient allocation of resources, technological development, economies of scale, and dynamic effects that could not be attained through reliance on the internal market alone (Balassa 1986b).

It was also claimed that industrialization fostered through protectionism had generated an industrial structure that was more capital intensive, and that therefore employed less labor, than the resource endowment of developing countries would have required. Therefore, poverty alleviation was impaired by policies that protected capital-intensive industrialization and discriminated against agriculture, generating less employment and a distribution of income less equal than what outward development strategies would have allowed. Inward industrialization was also criticized for having been accompanied by a chaotic process of urbanization and the continuation and even deepening of poverty in rural areas.

At the macroeconomic level, it was said that import-substitution protectionism had increased inflationary pressures (Krueger 1980, 1984) and fostered unsustainable fiscal deficits associated with state interventions, leading

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1 As noted in Chapter 7, the notion of “infant industries” is one of the oldest arguments for protection of productive activities. The idea is that certain activities, like infants, need some protection to have the opportunity to start, get established, and achieve the needed economies of scale.

**BOX 11.1** (continued)

to recurrent macroeconomic crises. Also, contrary to the expectations of the proponents of ISI, it was argued that the countries following inward-oriented policies appeared more vulnerable to external shocks and more prone to balance-of-payment crises, which, when they occurred, tended to have a stronger negative impact on the economy (Balassa 1984, 1986a). The reason suggested for such economic instability was that the ISI strategy created a stop-and-go dynamic in economic activity: the acceleration of the economy usually led to fewer exports (because a larger percentage of the goods was consumed internally due to growing incomes) and more imported inputs and capital goods (demanded by the expanding industry), generating balance-of-payment crises when official external reserves reached very low levels. In addition, compressing imports through import substitution meant that, because of general equilibrium effects, exports also declined. The result was that these economies ended up with very little diversification on the export side (that is, the country ended up selling a small range of goods) and were also very dependent on the import side, buying a narrow group of nonsubstitutable imports that were crucial for the operation of the economy. All this, rather than achieving the desired reduction in vulnerability to any external shock on the export, import, or financial side, appeared to have increased external vulnerabilities. On the other hand, those countries following outward-orientation policies had better results not only in terms of efficiency but also in terms of their economic flexibility and adaptability to external events (Balassa 1986a).

## Trade Policy Instruments and Agriculture

Trade measures affect both prices (received by producers and paid by consumers) and quantities of a product in domestic production and trade. Some policies affect the relative price level between the domestic and the world prices but allow the transmission of changes from world prices to the domestic market. Other measures, however, are more restrictive, not only opening a gap between the level of world and domestic prices but also blocking to different degrees the transmission of changes between world and domestic markets (see Liefert and Persaud 2009). Finally, there are several trade-related policies that have implications for agriculture and are discussed briefly, such as sanitary and phytosanitary measures.

### Tariffs

A common trade policy instrument on the import side is the imposition of import taxes (also called import tariffs, custom duties, and so on). These may

be calculated as a percentage of the border price (that is, 15 percent of the world price in foreign currency multiplied by the exchange rate) or as a fixed amount of money per unit of import (US\$50 per ton of rice). The first type is called an ad valorem tariff and the second is a specific tariff. Import tariffs create a gap between domestic and world prices but allow the transmission of changes between both markets. The specific tariff allows less transmission of movements in world prices than the ad valorem tariff: being a fixed dollar tax per physical unit of import, it will help maintain higher domestic prices when world prices are low (Liefert and Persaud 2009).<sup>11</sup>

Other distinctions can be made between (1) bound tariffs (the maximum value a country can charge on imports according to the commitments within the WTO) and applied tariffs (which may be lower than a bound tariff); and (2) most favored nation (MFN) tariffs (which, as noted, and contrary to what the name may suggest, apply to all countries that are WTO members) and preferential tariffs (usually lower tariffs that apply to bilateral and regional agreements according to some WTO rules).

### Nominal Rates of Protection and Effective Rate of Protection

Tariffs change the relative prices of final products as well as the relative prices of inputs, machinery, and equipment utilized for such production. Therefore, the impact of tariffs can be seen not only on the domestic price of the product on which the import tariff is applied but also on the whole economic equation for the producer. This is the difference in what is called the nominal rate of protection and the effective rate of protection.

Nominal rate of protection (NRP) (in this example, of an agricultural good) is usually calculated as the ratio of the domestic price ( $P_a$ ) divided by the world price ( $P_w$ ) multiplied by the exchange rate (ER) to express the values in the domestic currency (and after adjustments for quality, transport, and related costs); we assume that there is an import tariff on the agricultural good “ $ta$ ”:

$$NRP = [P_a / (ER * P_w)] = \{[P_w * ER * (1 + ta)] / (ER * P_w)\}.$$

11 As an example, assume a world price of 100 dollars and an exchange rate of 1 peso per dollar, an ad valorem tariff of 20 percent, and a specific tariff of 20 dollars. In both cases, the domestic price will be 120 pesos. Assume now that the world price declines to 50 dollars. With an ad valorem tariff, the domestic price is 60 (50 multiplied by 1.2) pesos; the 50 percent cut in world prices (from 100 to 50 dollars) was transmitted to a 50 percent cut in the domestic price (from 120 pesos to 60 pesos). With a specific tariff, the domestic price is 70 pesos (50 plus 20). Therefore, while the cut in world prices is still 50 percent (from 100 to 50 dollars), now the reduction in domestic currency is only 50 pesos (from 120 to 70 pesos), or a cut of about 41.7 percent.

If the exchange rate (ER) is market determined and equal for all products, then ER can be eliminated in the equation. But if there is an official rate (ERof) utilized for the agricultural product that is different from the market rate ER, then this is another factor in addition to the import tariff or import tax that may create a gap between the domestic and world markets. Most of the studies about the bias against agriculture have used various estimates of the differences in exchange rates, calculating a trade gap (the import tariff) and a macroeconomic gap (the exchange rate).

The effective rate of protection (ERP), on the other hand, also considers tradable inputs (Balassa 1965; Corden 1966). Let's assume just one tradable input INP that has a domestic price (PdINP) and a world price (PwINP). The import tariff on the agricultural product is "ta," as before, and the import tariff on the input is "tinp." We can then calculate the margin left after paying for inputs in domestic and world prices, as follows:

$$\text{Margin at domestic prices} = (P_a - P_{dINP}) = [P_{aw} * ER * (1 + ta)] - [P_{wINP} * ER * (1 + tinp)].$$

$$\text{Margin at world prices (measured in domestic currency)} = (ER * P_{aw}) - (ER * P_{wINP}).$$

The effective rate of protection (ERP) is the ratio of the margin at domestic prices divided by the margin at world prices (but measured in domestic currency), or

$$\frac{\{[P_{aw} * ER * (1 + ta)] - [P_{wINP} * ER * (1 + tinp)]\}}{\{(ER * P_{aw}) - (ER * P_{wINP})\}}$$

As before, there may be an adjustment for exchange rates if there are several exchange rates depending on the products exported and imported.

If a product has a positive NRP but inputs have an even larger NRP, looking only at the first number will give a distorted view: the NRP would suggest that the product is protected, while the ERP would show that it is, in fact, taxed (Balassa 1965).

Finally, from an economic point of view, what counts are relative incentives: that is, whether the trade protection (nominal or effective) for a specific product is larger than for other items. This idea can be generalized to the whole economy, looking at whether the agricultural sector has more or less effective protection compared to nonagricultural sectors.



### Other Price-Based Measures

So far we have discussed only one trade policy instrument: tariffs. But there are other trade instruments. When those import taxes change depending on world prices, they are sometimes called *variable levies*. These are related to tariffs but are much more restrictive; they go up (in certain predetermined fashion) when world prices go down and vice versa. *Price bands* have a similar operation. These trade measures not only maintain the price gap between domestic and world prices but can also eliminate all transmission between both markets. While this type of practice was prohibited in the 1994 Uruguay Round when the WTO was created, such practices tend to reappear in different forms during periods of higher price volatility in world markets. In the case of developing countries with applied tariffs below bound tariffs, one practice is to move the former up<sup>12</sup> or down to try to smooth domestic prices. These practices, although they may not breach the bound tariff, may fall under the WTO prohibitions related to variable levies and related practices, depending on how they are operated.

### Quantity-Based and Other Measures

Tariffs are price-based policies. There are also quantity-based measures, which are used to impose restrictions on imports. The most common practice is the establishment of quotas, but there are also practices such as import licenses, voluntary export restraints, orderly marketing arrangements, and similar import measures (referred to as “gray area” measures). These practices not only generate a price gap between domestic and world prices but also remove the link between both markets (domestic prices will move independently of world markets). The original GATT regulations, through Article XI, General Elimination of Quantitative Restrictions, prohibited quantitative restrictions for goods in general but included an exception for agricultural and fisheries products. With the 1994 Uruguay Round agreements, gray area measures were prohibited in general for nonagricultural products, and it was agreed that those existing had to be phased out (these affected mostly industrial goods). For agriculture, however, many quotas were converted into tariffs (this was called “tariffication”), but the conversion was not complete.

A variation of the normal quota is the tariff-rate quota (TRQ). This quota was implemented during the Uruguay Round agreements to increase market access in countries that had closed domestic markets for specific agricultural products. A TRQ includes two components: (1) a certain amount of product

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12 The applied tariff cannot go above the bound tariff without violating WTO commitments.

is allowed to be imported with a very low or zero tariff, and (2) any quantity of imports that exceeds that level is subject to a higher, out-of-quota tariff. In principle, if world prices go low enough and the out-of-quota tariff is not excessively high, then there may be imports both at the low and the high tariff, in which case the predetermined volume would not be binding. In that sense, TRQs may be less restrictive than ordinary quotas. In practice, though, the out-of-quota tariffs are typically very high so that no additional imports take place outside the volume allowed within the TRQ. On the other hand, it was argued that as tariffs are reduced in successive negotiations, the quota component of a TRQ may become less binding and tariffs will then be the main trade instrument, as it was the intent of the tariffication process implemented during the Uruguay Round.

Several developing countries that are producers and exporters of agricultural products have raised concerns within the WTO about TRQs remaining substantially underfilled, and they have argued that it was mainly because of manipulations in the way TRQs are administered by importing countries and not as a result of valid market reasons. Some of the more common practices that an importing country may use to limit the use of TRQs include the following: opening a TRQ to imports with very short notice; asking applicants to apply to several bodies; taking a long time to process applications to TRQ licenses; granting the licenses on time but in quantities that do not make economic sense; discouraging applicants with burdensome administrative procedures; issuing licenses to weak and/or phantom operators so that TRQs may not be fully utilized; not revealing the rate of utilization of the TRQs; not revealing who may be the holder of the TRQs, so exporters do not know whom to contact to export the product; and so on.

These concerns have led to the negotiation at the WTO Bali Ministerial Conference in December 2013,<sup>13</sup> of the Understanding on Tariff Rate Quota Administration Provisions of Agricultural Products (WT/MIN(13)/W/11), which works mainly as modifications/clarifications of

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13 The Bali agreement has been part of the process initiated by the Doha Round launched in Doha, Qatar, in 2001, during the 4th WTO Ministerial Conference. The highest decisionmaking body of the WTO is the Ministerial Conference. The Conference usually meets every two years, bringing together all members (countries or custom unions) of the WTO. The Ministerial Conference can take decisions on all matters under any of the multilateral trade agreements (see [https://www.wto.org/english/thewto\\_e/minist\\_e/minist\\_e.htm](https://www.wto.org/english/thewto_e/minist_e/minist_e.htm)). The list from the latest to the earliest WTO Ministerial Conferences is as follows: Bali, December 3–6, 2013 (9th); Geneva, December 15–17, 2011 (8th); Geneva, November 30–December 2, 2009 (7th); Hong Kong, December 15–17, 2005 (6th); Cancún, September 10–14, 2003 (5th); Doha, November 9–13, 2001 (4th); Seattle, November 30–December 3, 1999 (3rd); Geneva, May 18–20, 1998 (2nd); and Singapore, December 9–13, 1996 (1st).

the Agreement on Import Licensing Procedures (AILP). That text includes language that limits some of the practices mentioned previously and establishes procedures that require explanation for the underfilling of TRQs, as well as remedies when underfilling, not related to market conditions, has been identified.

Other measures related to imports include safeguards, which are trade constraints (under some specific restrictions and compensations) that countries can use to protect any productive sector when it is threatened by an unexpected surge in imports that can cause injury to that sector. This instrument is regulated by the Agreement on Safeguards of the WTO, which has general application. However, the Uruguay Round created another exception for agricultural products: a “special safeguard” for agricultural products that have complied with the tariffication of previous nontariff barriers.<sup>14</sup>

Other policy interventions on the import side include antidumping import duties and countervailing duties. These are meant to counter specific practices not allowed in the WTO agreements that may affect production and trade in the complaining country. Dumping takes place when an exporter charges prices below production costs or uses different prices in different markets (domestic or not) compared with the foreign market of the affected country (presumably it would be a higher price in some markets, which allows the exporter to sell at lower prices in another foreign market or in markets affecting the complaining country). Countervailing duties are applied not because of price differentiation (as in dumping) but due to the existence of production or export subsidies by the exporting country that are believed to displace production and trade in the complaining country.

A trade-related intervention that, depending on the country, may be utilized as import protection or as export subsidy is the operation of state trading enterprises (STEs). These may buy or sell products in ways that function as import tariffs or import quotas (for the domestic market) or as export

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14 This trade remedy is different from the normal safeguard of Article XIX of GATT. The latter requires proof of injury to the domestic producers from imports and the granting of compensations (that is, opportunities for market access in other products that are equivalent in trade value to the trade reduced due to the safeguard). The special safeguard for agriculture, however, does not require either proof of injury or compensations: it allows the application of additional duties based on a price trigger (that is, shipments at prices denominated in domestic currencies below a certain reference level) or a quantity trigger (imports surging above certain levels depending on the current levels of imports as a proportion of consumption). On the other hand, the special safeguard can be maintained only until the end of the year in which it has been imposed and places some limits on the levels of tariffs to be imposed. The normal safeguard has more latitude in terms of the time period of application and the levels of tariffs or quantitative restrictions utilized (see Agreement on Safeguards of the WTO).

subsidies, export taxes, and export quotas (in external markets). For instance, an STE may determine the volume of a commodity to be imported, which acts as a trade quota, insulating domestic prices from border prices (Liefert and Persaud 2009) (this topic is discussed further below).

### Export Subsidies

Moving to the export side, the main trade instrument is export subsidies. The world trade legal framework presents a peculiar situation: export subsidies for industrial products are prohibited under the WTO agreements (and previously under GATT), while for agricultural products (several of which, such as dairy and meat products, are in fact manufactured products) export subsidies were allowed under GATT and then only partially disciplined under the Agreement on Agriculture (AoA) of the WTO.<sup>15</sup>

In the GATT framework (Article VI, Anti-dumping and Countervailing Duties, and Article XVI, Subsidies, Section B), industrial export subsidies were prohibited but agricultural product subsidies were not. Although it was recognized that export subsidies have harmful effects on other countries (Art. XVI, Section B, paragraph 2), GATT contracting parties were only exhorted to “seek to avoid the use of subsidies on the export of primary products”; however, if they chose to utilize those subsidies, countries should not apply them in a manner that “results in that contracting party having more than an equitable share of world export trade in that product” (the meaning of this was left undefined and led to many discussions within GATT; see Josling, Tangerman, and Warley 1996).

During the Uruguay Round, export subsidies in general were considered in greater detail in the Agreement on Subsidies and Countervailing Measures (ASCM). Export subsidies for agriculture, on the other hand, were allowed to be used by countries that were already using them, although they had to be cut in both value and volume. While countries can apply countervailing duties to industrial goods, agricultural subsidies were given a different treatment (which limited somewhat the possibility of imposing countervailing duties until 2003 if the exporting country operated within the quantity limits agreed to in the Uruguay Round).

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15 Díaz-Bonilla and Tin (2006) analyze the differential treatment of industrial and agricultural goods in what some people have called “special and differential treatment” (SDT) for industrialized countries’ agriculture. Of course, this is an irony, considering that SDT refers to the notion that only *developing* countries may need special treatment under WTO trade rules, differentiated from the general legal obligations.

Although it is true that there are several developing countries among those WTO members that notified export subsidies (14 out of the 25 WTO members with such notifications) and therefore they can use export subsidies for agricultural products, industrialized countries represent 84 percent of the values still allowed under the current AoA (only the European Union amounts to 62 percent of the total value of allowed agricultural export subsidies) (FAO 2000).

After the creation of the WTO, agricultural negotiations continued on several topics (as agreed in Article 20 of the AoA, including placing agricultural export subsidies on the same level as nonagricultural subsidies (that is, as prohibited practices under the WTO legal framework). During the 2005 Hong Kong WTO Ministerial meeting, the Ministerial Declaration (“Doha Work Programme,” WT/MIN(05)/DEC, December 22, 2005) stipulated in paragraph 6 that ministers “agree to ensure the parallel elimination of all forms of export subsidies and disciplines on all export measures with equivalent effect to be completed by the end of 2013.” But it added immediately that “this will be achieved in a progressive and parallel manner, to be specified in the modalities, so that a substantial part is realized by the end of the first half of the implementation period.” Therefore, while the first part appeared to define a clear deadline for the exports subsidies in agriculture, the second part seemed to link that end date to the completion of the Doha Round (the idea of an “implementation period” implies a concluded agreement).

During the process leading to the 2013 Bali Ministerial meeting, several developing countries that are agricultural exporters asked for specific steps to comply with the 2005 Hong Kong Ministerial Declaration, but developed countries with allowances to use export subsidies opposed it, arguing that they were not ready to make firm commitments in the absence of a more comprehensive reform of all agricultural issues in a finished Doha Round.

In the end, the Bali Ministerial meeting adopted a Ministerial Decision on Export Competition (WT/MIN(13)/W/12), which only commits WTO members to apply “utmost restraint” when using export subsidies, to maintain them at the lower levels of the early 2010s (when, because of high world prices, they were less utilized), and to improve information about their use. Therefore, the exceptional treatment of export subsidies under the WTO legal framework continues.<sup>16</sup>

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16 It must be noted, however, that those export subsidies, with the expiration of a related standstill agreement (the “peace clause” of Article 13 of the AoA), can be challenged under the ASCM.

## Domestic Subsidies

The GATT framework originally, and the WTO agreements now, have considered the possibility that domestic subsidies could cause what is called “serious prejudice to the interests” of another country in export or import markets (Article XVI of GATT). The ASCM, negotiated during the Uruguay Round, considered in detail the possibility that domestic subsidies affect other countries’ trade rights for goods in general and included possible countermeasures that the countries affected could use to protect those rights.<sup>17</sup>

Agriculture, however, had a separate treatment for domestic subsidies, as in the case of export subsidies.

The AoA defined four categories of domestic support.<sup>18</sup> The first three are exempted from cuts and other disciplines under certain conditions. All other measures of domestic support not included in the three categories discussed must be added in an Aggregate Measurement of Support (AMS) and then capped and cut by certain percentages (Brink 2011).

First, there are the measures included in Annex 2 of the AoA, the so-called Green Box (although no colored boxes are mentioned in the AoA). They are exempted from cuts and other disciplines if they comply with “the fundamental requirement that they have no, or at most minimal, trade-distorting effects or effects on production,” and they also “conform to the following basic criteria: (a) the support in question shall be provided through a publicly-funded government program (including government revenue foregone) not involving transfers from consumers; and, (b) the support in question shall not have the effect of providing price support” (Annex 2, paragraph 1).

They include government services and investments (such as agricultural R&D, pest and disease control, and infrastructure), the use of public stocks for food security reasons, the provision of domestic food aid to consumers, and different types of direct payments to farmers that do not stimulate production

17 The ASCM identified three types of subsidies: export subsidies, which were prohibited (with the exception for agriculture), subsidies that were actionable, and those that were nonactionable. In the actionable case, the ASCM indicates that “no Member, should cause, through the use of any subsidy . . . adverse effects to the interests of other Members, i.e.: (a) injury to the domestic industry of another Member . . . ; (b) nullification or impairment of benefits accruing directly or indirectly to other Members; and (c) serious prejudice to the interests of another Member.” (Article 5 of ASCM.) But that article immediately adds that it “does not apply to subsidies maintained on agricultural products as provided in Article 13 of the Agreement on Agriculture.” Actionable subsidies may lead to the imposition of countervailing duties on subsidized imports, the withdrawal of the subsidies, or some compensation when the subsidy displaces exports of the complaining country in a third market.

18 For a detailed discussion of these topics, see Brink 2011, particularly Figure 2.1; see also the explanations in WTO (2003), [http://www.wto.org/english/res\\_e/booksp\\_e/agrmtntseries3\\_ag\\_2008\\_e.pdf](http://www.wto.org/english/res_e/booksp_e/agrmtntseries3_ag_2008_e.pdf).

(such as some cases of direct income support, direct payments under environmental programs, and so on). These types of domestic support must also comply with additional conditions detailed in Annex 2 of the AoA for each one of those interventions.

A second type of domestic support exempted, also known as the Blue Box, is defined in Article 6.4 of the AoA. This article allows certain payments directly linked to area or animal numbers, but operating under mechanisms that also limit production, to be exempted from the general rule that all subsidies linked to production must be maintained below a “de minimis” level or counted in the AMS and then reduced. Mostly developed countries have been using this article to maintain domestic support.

A third type of exemption is in Article 6.2: it applies only to developing countries and allows exempting from potential reductions certain “government measures of assistance, whether direct or indirect, to encourage agricultural and rural development” and that “are an integral part of the development programs of developing countries.” This encourages developing countries to design specific programs for rural development or alleviation of rural poverty, instead of resorting to general and nontransparent subsidy schemes that may benefit richer farmers or be wasted in corruption. The enumerated policies are: “investment subsidies which are generally available to agriculture in developing country Members,” “agricultural input subsidies generally available to low-income or resource-poor producers in developing country Members,” and “domestic support to producers in developing country Members to encourage diversification from growing illicit narcotic crops.”

Article 6.2 raises at least two issues when it refers to “investment subsidies” that are “generally available” to “low-income or resource-poor producers” (LIRP). The first point to be considered is whether “generally available” means only for LIRPs or whether other producers may also receive it. The second issue is the definition of “low-income or resource-poor producers.” Using “or” instead of “and” extends the criteria that may be used to define the coverage of the LIRP category. If it were only income, one possible way of identifying the farmers who would qualify for assistance is to apply the usual poverty line used for international comparisons of one dollar (or two dollars) a day, or to use a relative measure of poverty within the country (for instance, producers with less than 40 percent of national income per capita; Díaz-Bonilla, Thomas, and Robinson 2003). In practice, the use of the LIRP category in WTO notifications seems to have been relatively elastic and variable over time, even for the same country. For instance, India has moved from declaring about 80 percent of its producers as LIRP in the WTO notifications for

1995–1997 (based on a survey that showed that 80 percent of the farmers had less than two hectares) to considering nearly all of its producers in that category (based on a subsequent survey that calculated that close to 99 percent of Indian producers were LIRPs; Gopinath 2012). Such an extension of the concept of LIRP may test the limits of a notion that is supposed to offer help only to a specific type of producer.

Those three types of measures of support are exempted from countermeasures by other WTO members that may consider themselves affected by them.<sup>19</sup>

As mentioned, all other measures of domestic support not included in the three categories discussed above are a residual category, usually called the Amber Box. These measures must be added in the AMS, both for each product (product-specific AMS) and for agricultural producers in general (nonproduct-specific AMS) (Brink 2011).

Product-specific support includes an estimation of market price support (MPS) that “shall be calculated using the gap between a fixed external reference price and the applied administered price multiplied by the quantity of production eligible to receive the applied administered price” (Annex 3, paragraph 8). The fixed external reference price (FERP) was defined for the period 1986–1988.<sup>20</sup> Subsequently it was clarified in a legal dispute over Korea’s policies related to beef domestic support that “production eligible” does not mean only what the government may buy at administered prices if the eligible production is more than the amount purchased. But it does not mean all production either, if the government has defined a clear limit for the purchase that is less than total production (see the discussion in Díaz-Bonilla 2014).

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19 Article 13b of the AoA indicates that measures in the Green Box are (1) nonactionable for purposes of countervailing duties, (2) exempt from actions based on claims of injury, nullification, impairment of concessions, and serious prejudice, and (3) also exempt from actions based on nonviolation nullification or impairment of the benefits of tariff concessions (this is a special claim that a country can make against other country, arguing that even though the latter did not violate any specific WTO rule, it is doing something that the first country claims is reducing or eliminating the value of trade concessions). Further, Article 13c also exempts measures under Article 6 of the AoA (which includes the Blue Box, the de minimis levels of support, and subsidies to LIRPs and other subsidies permitted for developing countries) from (1) the imposition of countervailing duties unless there is injury (and due restraint shall be shown in initiating any countervailing duty investigations; (2) actions based on claims of injury, nullification, and impairment of concessions, and serious prejudice if the subsidies on a commodity basis did not exceed those budgeted for the 1992 marketing year; and (3) actions based on nonviolation nullification or impairment of the benefits of tariff concessions with, again, the limit of 1992 by commodity.

20 Annex 3, paragraph 9, indicates that “the fixed external reference price shall be based on the years 1986 to 1988 and shall generally be the average f.o.b. unit value for the basic agricultural product concerned in a net exporting country and the average c.i.f. unit value for the basic agricultural product concerned in a net importing country in the base period.”



Product-specific AMS also has to include other nonexempt production-related payments and support to producers. The sum of MPS and other nonexempt payments is then compared to the value of production, and if the sum is more than a *de minimis* level (5 percent for developed countries and 10 percent for developing countries),<sup>21</sup> the value is computed in its entirety (that is, not only the excess over the *de minimis*) in the Current Total Aggregate Measurement of Support (CTAMS). The nonproduct-specific support (usually measured through budgetary data) also needs to be compared to the entire agricultural production, and if it exceeds the *de minimis* value, it must be added to the CTAMS. Finally, the CTAMS is compared to and cannot exceed the ceiling commitment (sometimes called the Final Bound Total AMS, FBTAMS) negotiated during the Uruguay Round or defined later during the accession process for the new WTO members (Brink 2011).

A specific problem for some WTO members, particularly developing countries, relates to the fact that the FERP has been defined for 1986–1988, and now market prices are clearly above those levels in US dollars (and even using a basket of currencies such as the Special Drawing Rights [SDRs] issued by the IMF) (Díaz-Bonilla 2014). Therefore, if a government is buying from producers at an administered price that follows market values, even though it may not be providing price support in an economic sense, it would have to count the gap between that price (presumably at current market values) and the 1986–1988 FERP and then multiply the gap by the eligible production. Some developing countries have argued within the WTO that such a calculation might place them above the allowed *de minimis* (10 percent) and therefore make them subject to trade complaints by other WTO members,<sup>22</sup> when in fact they would not be providing price support in the meaning of the AoA (if buying at market prices).

The problem would be worse for those countries that declared the FERP originally in domestic currency, where, in addition to the problem of higher prices in foreign currency, there is the gap between the 1986–1988 FERP in domestic currency and current market prices due to inflation. Obviously, it makes a big difference whether the nominal variables for the commitments on domestic support, FERP, and the relevant parameters have been originally notified to the WTO in the domestic currency of the reporting country or

21 Countries such as China have accepted a different *de minimis* (in China's case, 8.5 percent) as part of the accession agreement to the WTO. China also agreed not to use Article 6.2.

22 The relevant text in Article 7(b) reads, "Where no Total AMS commitment exists . . . the Member shall not provide support to agricultural producers in excess of the relevant *de minimis* level set out in paragraph 4 of Article 6."

in a foreign currency. In the latter case, there is an automatic adjustment for domestic inflation, to the extent that the devaluation of the exchange rate follows the evolution of internal prices. This is why some developing countries switched the original 1986–1988 FERPs from domestic currency to US dollars. The FERP is still fixed (in US dollars), external, and refers to the 1986–1988 base period, but now it is no longer affected by devaluations, although the issue of high commodity prices in nominal US dollars compared to 1986–1988 FERP still remains. Another option would be to define the FERPs in SDRs for the base period (which would be fixed, external, and from 1986 to 1988), which would smooth out the impact of changes in the value of the US dollar on the dollar price of commodities.

A more definite solution would be to change the language in the AoA to make it clear that if a developing country is using administrative prices that are in line with market prices, the country would be considered in compliance under certain conditions (see Díaz-Bonilla 2014 and other options discussed there).<sup>23</sup>

In closing, some points should be noted. First, subsidization and protection for the agricultural sector is permitted under the WTO agreements to an extent not allowed for industrial products,<sup>24</sup> while at the same time the possible actions to counter those practices by the countries affected are more limited. Second, most developing countries have not declared domestic support in the negotiations that should be counted in the FBTAMS, and therefore for these countries the level of WTO-limited domestic support cannot exceed the *de minimis* limits of 10 percent of production. Third, although there is a small number of developing countries that have declared Amber Box measures and therefore have the possibility of offering WTO-limited domestic support above the *de minimis*, the value of that domestic support is small compared to the allowances for Amber support negotiated by developed countries

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23 One option debated has been to change the 1986–1988 base period for FERPs to more recent values, for a fixed period or for rolling averages (say, 3–5 years). Although from an economic point of view the need to update the external reference prices may seem obvious, developing countries should be very careful with this option in legal/negotiating terms. The reason is that industrialized countries currently have a large legal allowance to grant domestic support under the levels of AMS permitted. If reference prices are updated to the current values (and that will most likely apply to all WTO members), then the difference to be charged against the AMS is reduced, but the overall allowed AMS does not change. This could potentially expand developed countries' margin to offer distortive domestic support.

24 Again, it should be noted that the definition of "agricultural products" in the WTO includes several important agroindustrial products, such as meat, vegetable oils, and different dairy products.

during the Uruguay Round.<sup>25</sup> Fourth, the fact that developing countries may offer domestic support using a variety of instruments allowed under the AoA (Green Box measures, Article 6.2, Article 6.4, or Blue Box, and the 10 percent *de minimis*) does not mean that those instruments make sense in economic terms (this issue will be discussed again below).

### **Sanitary, Phytosanitary, and Other Technical Measures**

Sanitary and phytosanitary measures, as well as other technical, quality, and environmental standards, can be and have been used as barriers to trade. Measures such as regulations and testing mandates may increase the cost of the imported good to foreign suppliers, acting as a tariff. Other measures, such as a complete ban on imports (perhaps because the exporting country allegedly suffers from a pest or disease or, more generally, because it does not comply with some regulations or testing requirements) completely prevent trade, cutting the links between world prices and the domestic market (Liefert and Persaud 2009).

Concerns about the possibility that the liberalization of trade expected under the new WTO framework could be negated by manipulation of these regulations led to the negotiation of two separate documents during the Uruguay Round that addressed these issues. The first was the Agreement on Sanitary and Phytosanitary (SPS) measures, which was directly related to human, plant, and animal health issues linked to trade in agricultural products. The second was the Agreement on Technical Barriers to Trade (TBT), which covered technical regulations and standards and conformity assessment procedures.

The SPS Agreement acknowledges that WTO members have “the right to take sanitary and phytosanitary measures necessary for the protection of human, animal or plant life or health.” But those measures must be applied “only to the extent necessary to protect human, animal or plant life or health” and must be “based on scientific principles.” The agreement also states that WTO members must “ensure that their SPS measures do not arbitrarily or unjustifiably discriminate between Members where identical or similar conditions prevail, including between their own territory and that of other Members” and, furthermore, that those measures “shall not be applied in a manner which would constitute a disguised restriction on international trade.”

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25 There are 33 countries with FBTAMS, but the European Union, Japan, the United States, Canada, Switzerland, and Norway represent 87 percent of the total value (the European Union alone represents about 49 percent of the total).

In addition, the agreement recommends the use of international standards when possible, but WTO members are allowed to use higher standards if there is scientific justification and even temporarily apply what is called the “precautionary principle,” which allows them to set standards temporarily where relevant scientific evidence is lacking (although those countries are supposed to do the necessary research within a reasonable period of time).

The SPS Agreement also establishes notification obligations of these measures by WTO members, and there is an SPS Committee within the institution where those notifications are reviewed and where countries can present their concerns about other members’ compliance with the agreement.

The TBT Agreement also recognizes countries’ rights to adopt the standards they consider appropriate to their societal goals, but it is designed to ensure that regulations, standards, certification, and similar procedures do not discriminate against foreign producers and do not create unnecessary obstacles to trade. Toward that end, it encourages WTO members to apply international standards, to recognize each other’s standards and procedures for assessing products, and to offer complete, timely, and easily accessible information about those technical standards, regulations, and procedures. Members must provide the information to the TBT Committee established in the WTO, where countries can discuss concerns about the regulations and their implementation.

In the case of SPS measures, some of the concerns have been related to whether the precautionary principle is being abused to protect less-efficient domestic producers from foreign competition. Also, developing countries have complained that SPS measures and inspections of their exports tend to become stricter when there are agricultural surpluses in the domestic markets of industrialized countries. But these problems also appear in trade among developing countries. Another criticism is related to the long periods required by some countries to complete the pest and disease studies needed to allow the import of new agricultural products (see Matthews 1994 for other SPS issues).

These complaints have led to about 40 cases being heard by the WTO’s Dispute Settlement mechanism, of which almost 50 percent were between industrialized countries complaining about violations of the SPS Agreement; some 22 percent of the cases were developing countries complaining about industrial countries’ practices; 17 percent of the cases were brought by industrial countries against developing countries; and the balance were cases between developing countries. Therefore, more than 70 percent of the cases represented complaints against industrialized countries.

In fact, WTO (2012), based on evidence from WTO members and business surveys, notes that TBT/SPS measures applied by developed countries have raised relatively more specific trade concerns than measures imposed by developing economies, and that those practices affect mainly agriculture. Using business surveys weighted by value, the reported incidence of SPS/TBT measures as a problem is more prevalent in agriculture (59 percent) than in manufacturing (34 percent).

Since the Uruguay Round Agreement was concluded, some developing countries have also argued for greater flexibility in the implementation of their obligations under the SPS Agreement. Finger and Schuler (1999) have calculated the relatively important budgetary costs that some of the operational requirements of different WTO commitments (not only the SPS Agreement) may impose on low-income developing countries. They argue that WTO regulatory issues should be evaluated considering the real developmental needs of developing countries and not focus exclusively on formal compliance with WTO legal texts. For instance, SPS issues related to human health should be approached as part of the improvements needed to protect the local population from food-borne diseases, not only as a way to comply with trade regulations. Similarly, tackling animal and plant health problems must be seen as part of SPS requirements to increase production and productivity in developing countries. As a general proposition, it seems imbalanced to ask low-income countries to devote a larger share of resources (as a percentage of their GDP) to the administrative machinery required to implement WTO obligations than industrialized countries assign to similar functions (see Díaz-Bonilla, Thomas, and Robinson 2003).

On the other hand, a strong SPS framework may be important for developing countries, not only because a competitive export position requires establishing and maintaining the sanitary and quality requirements for their products but, more importantly, as a way of improving domestic health conditions, to the extent that best practices and standards would then be more widely applied in those countries. Probably the best approach for developing countries is to insist on receiving the technical and financial assistance considered in the SPS Agreement (Articles 29 and 30) to build and improve their own systems of quality control and health and safety standards. These systems should be centered on countries' own domestic health and sanitation needs; in addition, the regulatory burdens of compliance should, in general, not represent shares of the GDP or of the value of agricultural production larger than what industrialized countries devote to similar functions (see Díaz-Bonilla, Thomas, and Robinson 2003).

A further issue is the advance of private-sector food safety requirements, which may be stricter than government regulations. A real outcome of these regulations is the possibility that low-income countries and small farmers would have to participate in international markets (for a broad discussion of SPS trade regulations and private-sector quality and certification standards, see Roberts, Orden, and Josling 2004; Orden and Roberts 2007; Orden, Beghin, and Henry 2012).

### **Intellectual Property Rights**

The global agro-food system is also experiencing changes in R&D and intellectual property rights.<sup>26</sup> Pinstруп-Andersen and Mengistu (2008) highlight three trends: the growing level of involvement of the private sector in industrial nations in agricultural R&D; the increasingly proprietary and competitive research environment being changed by the introduction in the WTO of intellectual property rights (IPR) protection for plant varieties and biotechnology products; and the slowing down of public expenditures on R&D in both developed and developing countries. There are still different opinions about the correct balance of rights and obligations under the WTO's Agreement on IPR, but developing countries need to use the space they already have and increase investments in agricultural R&D.

In this regard, it is important to remember that there is no such thing as an international intellectual property right in relation to patents and plant breeders (see a debate of the issues involved in Pardey and Koo 2003). A patent awarded in one country does not confer intellectual property rights in the rest of the world. Although the TRIPS Agreement sets out minimum standards that each country belonging to the WTO must implement, there is room for developing countries to tailor legislation to their own needs. There is the exception under Article 27(3)(b) that allows members to exclude from patentability "plants and animals other than micro-organisms as well as essentially biological processes for their production," although if patents are not used, then for plant varieties (not for animals) an alternative "effective sui generis system" may be utilized (such as the International Convention for the Protection of New Varieties of Plants [UPOV]), which allows countries to apply the so-called farmer's

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<sup>26</sup> Intellectual property rights are not part of the agricultural trade negotiations, but they have crucial implications for agriculture, poverty, and food security in developing countries. Within the WTO they are treated in the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). This is a large topic that exceeds the scope of this book (see, for instance, FAO 2000).

exceptions, through which farmers can save seed for reutilization (Pardey and Koo 2003).

Still, there are different views about the freedom of researchers to operate in developing countries and the rights of farmers. Also, as in the case of SPS and other WTO regulations, the administrative costs of an IPR system may impose an undue burden on the economy of a poor country (Pardey and Koo 2003).

## **Agricultural Trade and Food Security**

### **Background**

It can be argued that monetary, fiscal, and exchange rate policies have more impact on food security than trade, to the extent that they exercise a greater influence on growth, employment generation, external competitiveness, inflation, and the possibility of crises. However, the public debate (with strong participation from global civil society) seems to have focused on the effects of trade on food security. The price spikes in 2008 and 2011, although not as pronounced as in the 1970s (after adjustment for inflation), have nonetheless renewed the focus on this topic.

This debate took place in the context of GATT negotiations and has continued since the creation of the WTO. During the Uruguay Round of trade negotiations the issue was reflected in the Marrakesh Declaration and the establishment of the category of net food-importing developing countries (NFIDCs), which were supposed to receive financial and other help in case food prices increased as a result of the trade negotiations. Also, several industrialized countries claimed food security concerns during those negotiations to justify barriers to food imports and higher levels of domestic support, although, under any metric, the notion of food insecurity in richer countries is completely unrelated to the conditions in developing countries that merit such denomination.

Subsequently, during the Doha negotiations, the concept reappeared in the request by several developing countries of a Food Security Box, which included more options to maintain high levels of protection for some agricultural products. Those proposals evolved eventually into the special safeguard mechanism (SSM), which would allow developing countries to increase tariffs during a certain period when facing import surges or price declines. A version of the SSM was included in the Revised Draft Modalities for Agriculture (WTO 2008; in what follows, this document will be called the 2008

Modalities).<sup>27</sup> Disagreement about the product coverage and duration of the remedy was one of the main reasons for the breakdown of the global WTO negotiations in 2008.

Notwithstanding the claims made by the advocates of the SSM regarding the benefits for food security, simulations in a global model showed that if that protection was sustained over time, developing countries using that safeguard would have been worse off in terms of food security (measured as food consumption) and in other dimensions as well, such as employment, production, and exports (Díaz-Bonilla, Diao, and Robinson 2004).

Developed countries also included food security as one of the components of the notion of multifunctionality, again to try to justify barriers to food imports and higher levels of domestic support (see the debate about multifunctionality in FAO 1999a, OECD 2001, and Díaz-Bonilla and Tin 2006).<sup>28</sup> Several of them tried to build alliances with developing countries around that notion. However, it was clear that no developed country fit the profile of food insecurity as commonly understood using standardized indicators of food consumption, production, and exports (Díaz-Bonilla et al. 2000). Also, if developed countries expanded agriculture on account of multifunctionality using protection and domestic support, this would mean that, for an exogenous level of global demand, other countries, mostly developing ones, would see their agriculture and therefore their multifunctionality contract (Díaz-Bonilla and Tin 2006). In consequence, the use of food security and multifunctionality as the foundation for protection and subsidization

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27 This document, circulated on December 6, 2008, by the chairperson of the agriculture negotiations at the WTO, was the last attempt to reach an agreement on agriculture before the general Doha talks collapsed in 2008 (see the document in [http://www.wto.org/english/tratop\\_e/agric\\_e/chair\\_texts08\\_e.htm](http://www.wto.org/english/tratop_e/agric_e/chair_texts08_e.htm)). While the 2008 Modalities were not agreed upon, in the process leading to the 9th Ministerial Conference and in the Bali Package related to agriculture, part of the language from that document reemerged in some proposals, including those related to food security stocks, general services in the Green Box, and on tariff rate quota administration.

28 The notion of multifunctionality argues that agriculture creates public goods for the economy whose importance goes beyond the market value of food and fiber as such. These effects are considered inseparable from production and may require maintaining subsidies and protection for agriculture. As discussed in Díaz-Bonilla and Tin (2006), a similar notion of positive externalities, with a parallel debate about what were the adequate policies, was behind the drive toward industrialization in developing countries after World War II. The debates about multifunctionality include (1) whether there are better instruments to achieve the postulated multifunctional effects than protection and distorting subsidies, and, probably more relevant, (2) whether using protection and distorting subsidies to expand a sector on account of its multifunctionality would displace production in other sectors in that country and the equivalent sector in other countries (that is, other sectors and/or other countries may lose the postulated benefits of multifunctionality, if they exist, if a country expands a sector beyond what would have normally been the case) (Díaz-Bonilla and Tin 2006).



of agriculture in developed countries did not gain much traction in trade negotiations.

Although food security issues are not new in trade negotiations, what has changed is that earlier, those concerns were postulated in a context of low food prices, while since around 2008 they have reappeared against a background of higher nominal prices and volatility.<sup>29</sup> Previous agricultural trade negotiations focused on policies that artificially expanded supply in some countries or reduced demand for other countries through protection (thus lowering global prices); after the price spikes of 2008 and 2011, there has been a greater interest in policies that may artificially restrict supply to other countries or that expand demand in some countries (linked to higher world prices). The previous trade concerns focused on producers, while now there seems to be a greater emphasis on consumers (Tangermann 2013; Bureau and Jean 2013).

Other changes in the agricultural trading system with implications for food security have been the expansion of biofuels and the impact of climate change variability. Biofuels have led to trade disputes under the current WTO framework (from complaints about the high ethanol tariffs in the United States [now reduced] to the current antidumping procedures by the EU against biofuel imports from other countries). More generally, the global trading system and food security would most likely benefit by at least freezing mandates at the current levels, making them more flexible and less complex, and opening up trade in biofuels. The whole topic would require a more careful review within the WTO, considering the implications not only for the AoA (including issues of distorting and Green Box domestic support) but also for other WTO legal texts such as the Agreements on Subsidies and Countervailing Measures and on Technical Barriers to Trade.

Regarding climate change, several computer models predict the probability that the world may be on its way to surpassing the 2°C threshold of temperature increase during the next decades (IPCC 2014). If such a projection proves correct, it will affect agricultural and food production and will require sustained R&D investments in both adaptation and mitigation, with implications for the AoA, particularly in regard to domestic support measures (Blandford 2013). In the shorter term, however, one of the aspects of more immediate importance for agriculture is increased volatility around the

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29 Chapter 3 noted that while the prices of agricultural and food items in world markets seem high in nominal US dollars, they are not as high when measured in a more stable basket of currencies (such as the IMF's Special Drawing Rights), and they are in general lower than in the previous spikes during the 1970s when measured in inflation-adjusted or real US dollars.

long-term trend. It has been argued that the warming of the atmosphere has already increased the frequency of extreme weather events at the world level, which affects the volatility of global agricultural production (Hansen, Sato, and Ruedy 2012). This greater volatility, with a more frequent realization of extreme events such as droughts and floods, may be the most important effect of climate change to consider currently for food security, taking into account that potentially negative consequences for yields due to increases in average temperature (the long-term trend) are projected to take place over several decades. If that is the case, then Green Box measures such as those related to food security stocks (AoA, Annex 2, paragraph 1) and domestic food subsidies (paragraph 4) would be more relevant topics than those discussed in the context of lower prices, such as the special safeguard mechanism (see Murphy 2010).

Although the overall global context has changed, some of the policies advocated to address food security concerns seem very similar to those in the past. For instance, in many countries the alarm over high prices and volatility has prompted proposals to achieve self-sufficiency by using import barriers and distorting domestic support, much as when food security concerns were postulated to help producers affected by low prices. Under this line of thinking, trade is uncertain and would not suffice to insure against volatility and price spikes; what is needed, in this view, is to expand productive capacity to reach some level of self-sufficiency, so as to depend less on external sources.

For that expansion, some countries are requesting additional policy space within the WTO legal framework, usually linked to the possibility to impose additional import constraints. Some of the proposals discussed during these negotiations and afterward implicitly or explicitly suggested taxing consumers in developing countries through higher levels of border protection to support agricultural producers and to reduce poverty and promote food security. Sometimes this suggestion has been accompanied by the argument that such protection does not cost money and is easier to implement in poor countries than options considered in the Green Box, such as agricultural research and extension. This approach is flawed, as discussed briefly below.

At the same time, it must be noted that while many policymakers and trade observers in civil society would always suggest protection as their preferred policy option, both with low or high prices, some standardized economic analyses seem to always recommend trade liberalization in all circumstances. Here, as in other things, a more nuanced approach is required.

To analyze these issues, we need to clarify some conceptual issues surrounding food security and trade and then discuss some of the economic and legal issues under the WTO agreements.

### **Some Conceptual Issues**

The first point to note is that, as discussed in Chapter 1, food security is a multidimensional concept, which in the definition of the World Food Summit in 1996 includes four main components: availability of food (which depends on domestic supply and trade); economic access to food (which is influenced by income, employment, and poverty patterns related to economic growth and development, as well as inflationary pressures and price spikes); adequate utilization of food (which depends on the quality of food and factors such as health and sanitation infrastructure and services, education, female empowerment, and good governance, among other things); and stability in that access (the fact that physical and economic access should be available at all times).

As noted before in relation to the triple burden of malnutrition, lack of dietary diversity appears a more relevant indicator of food security and nutritional problems (Arimond and Ruel 2006). Also, there are important changes in consumption patterns linked to increasing incomes in developing countries. Therefore, food security programs focusing on a limited number of staple crops may not address the main problems. In addition, food price inflation (and price spikes) refers to a larger basket of goods and it is mostly related to general macroeconomic imbalances than to trade issues.

In the end, what counts is the impact at the individual level (which, summing all components, can be called nutrition security), and this is a multidimensional concept.

Second, Figure 2.2 in Chapter 2 (adapted from Smith 1988) shows that trade (and other macroeconomic factors) may influence the components of food security through a variety of channels, which would make simplistic a single reference to the impact of trade on food security. Trade and trade policies may affect domestic production and imports (which determine national availability), but they also affect food prices, growth patterns, and employment and income opportunities, which are crucial for economic access to food. Trade policies (directly through trade taxes and indirectly through the growth pattern) have an impact on government revenues that can be used to implement policies and investments to ensure different components of national food security.

Figure 2.2 also illustrates other factors that influence nutrition security at the individual level and that are not necessarily related to trade factors. As discussed in Chapter 2, availability and access at all times are preconditions for adequate utilization of food, but these factors do not unequivocally determine malnutrition (or nutrition insecurity) at the individual level. There are other factors, such as women's education and status and health and sanitation infrastructure, that are crucial for food security (Smith and Haddad 2000), and these and other drivers may be only tenuously if at all related to trade and trade policies.<sup>30</sup>

It was also noted that poverty, a main cause of food insecurity, is affected by many factors as well, including what Sinha, Lipton, and Yaqub (2002) have called "damaging fluctuations." Typically, only a small part of those fluctuations may be caused by trade and trade policies; rather, most of them are related to macroeconomic crises, weather shocks, health events, the spread of conflict and war, and the like.

In summary, the best trade policy or the best WTO framework will not solve food security problems if other and perhaps more crucial factors are not addressed.

Third, the reference to "trade factors" above combines three different concepts that at times get mixed in general debates: one is trade, as the act of exchange; a second concept is trade policy (which, as argued before, economists consider mainly as border measures); and a third concept refers to trade policies in the context of the WTO agreements—in particular the Agreement on Agriculture—that include more than border measures. The sections below aim to separate these three notions in their links to food security.

Fourth, to reiterate a point made in the context of macroeconomic policies in general, the same trade policy may have different impacts depending on its interactions with other policies and structural factors. For instance, the reduction of agricultural tariffs will have a different impact depending on whether it happens with an overvalued exchange rate or with a neutral to undervalued parity: in the first case, there will be a negative impact on production in sectors that would have been competitive at more adequate levels of the ER. Also, changes in tariffs will have different impacts depending

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30 There have been studies related to gender issues showing that trade expansion that creates income opportunities for women may also give them greater control over expenditures, with positive impacts on child nutrition and development, as well as greater incentives to invest in girls. But the impact may depend on the type of crops (with fruits and vegetables showing better results for women than cotton, for example), and there may be trade-offs between income-generating activities and leisure time, and perhaps those opportunities could also affect some of the time allocated for childcare (Paolisso et al. 2001).

on whether they include only agriculture or other sectors as well and whether they are made unilaterally or as part of multilateral negotiations. Furthermore, the same trade policy may have different effects depending on contextual and structural factors such as land distribution and rural infrastructure.

Fifth, trade, as is the case of general macroeconomic policies, has diverse effects depending on the characteristics of households and individuals. Such heterogeneity needs to be considered because food insecurity takes concrete form at the household and individual levels. Therefore, any general policy may not address food security problems in a precise manner; more differentiated policy approaches are needed. For instance, it has already been mentioned that increasing protection that leads to a higher domestic price for food will have different impacts on households depending on whether they are net food buyers or net food sellers. Urban households are typically net buyers; but, as discussed in Chapters 1–3, there are also important numbers of rural households that are net buyers, including landless rural workers and a significant percentage of small farmers, some of whom may experience seasonal variations as net sellers/buyers. Only poor families that are net food sellers (which do not represent the largest percentage of rural families in many developing countries) would benefit directly from those higher food prices (see, for instance, Poulton et al. 2006 and World Bank 2005, whose estimates for different developing countries suggest that only 20–30 percent of farmers are net sellers, the rest being net buyers, at least temporarily during the year). Only if higher prices lead to increased production that generates strong multiplier effects in the rest of the economy will net buyers also benefit because of the expanded production and employment.

In summary, food and nutrition security are multidimensional concepts affected by many factors, only some of which may be trade related. Therefore, a variety of policies are needed to address the multidimensionality of the problem. The following sections, however, maintain the focus on trade issues, first in general and then looking at the Agreement on Agriculture of the WTO.

### **Trade, Protection, and Food Security**

As shown in Tables 11.5 and 11.6, most of the food consumed in developing countries is produced domestically,<sup>31</sup> making food trade a complement that can provide the margin of supply necessary to stabilize food prices and

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31 There are some obvious exceptions such as city-states, small islands whose main activity is tourism, oil-producing countries with poor endowments of agricultural land and water, war-torn countries, and the like.

quantities in the domestic market. In fact, the variability of domestic consumption is lower than the variability of domestic production (with international trade acting as one of the smoothing mechanisms). Minot (2011, 2012) showed that (1) food price volatility in several sub-Saharan countries is higher in many domestic markets than in international markets; (2) such domestic food price volatility has not changed much with the post-2008 increases in international price volatility; (3) commodities that are more frequently traded internationally have lower volatility than those less traded; and (4) volatility is higher in countries and for commodities where governments intervene most actively in markets through different mechanisms, including state-owned enterprises (see also Hazell, Shields, and Shields 2005 for several products, and Chapoto and Jayne 2009 for maize).

All this would suggest that self-sufficiency as insurance against food insecurity may increase rather than decrease vulnerability to external and internal fluctuations.

Another way in which trade can improve access to food is that the food import bill, as a percentage of total merchandise exports, appears to have declined in general for aggregate groups such as least-developed countries (LDCs), net food-importing developing countries (NFIDCs), and low-income food deficit countries (LIFDCs), as shown in Figure 3.1 of Chapter 3.<sup>32</sup> This ratio is a better indicator of food security vulnerability than the more often quoted net food-import position (see Díaz-Bonilla et al. 2000).

Table 11.7 (starting only from the 1990s) shows the same ratios as in Figure 3.1, but now they are disaggregated by developing regions. In most cases, the ratios have come down from the levels of the 1990s, even when the comparison is with 2008–2010, the period of price spikes. The reduction in the incidence of the food bill has occurred not because food imports have declined in value in developing countries (in fact, they have increased) but because all exports have gone up in value (and by more than food imports), thanks to expanded global trade.<sup>33</sup>

32 Again, there are exceptions such as the type of countries mentioned in note 32. Still, there are some countries in which the food import bill increased in 2008–2010 and do not fall in any of the categories mentioned in that note (such as Burundi, Senegal, Uganda, Nepal, Philippines, Costa Rica, and El Salvador). The ratio uses merchandise exports; if service exports, such as tourism, were included in the calculations, ratios would be lower.

33 In Chapter 3 it was also mentioned that the 2008 food price spike, although increasing somewhat the amount of exports needed to pay for imported food, never increased the ratio to the levels seen in previous decades. This was in part related to the fact that developing countries export other commodities that also increased in value, partially compensating for the upward movement in food prices.

Notwithstanding the importance of trade in reducing volatility in consumption and making food imports more affordable, a widespread policy reaction to both the low global food and agricultural prices of the 1980s and 1990s and the current period of higher global food and agricultural prices has been to suggest increased self-sufficiency through trade protection. But to understand whether this policy approach would ensure food security, it is useful to consider how the policy operates and to analyze the economywide implications.

**TABLE 11.7** Value of food imports over total merchandise exports

Region	1990s	2000–2007	2008–2010
World	6.2	5.0	5.0
Developing regions	6.9	4.7	5.0
Africa	14.1	10.4	10.0
North Africa	21.2	12.3	13.0
Africa south of the Sahara	10.9	9.5	9.0
Asia	5.2	3.7	4.0
Caucasus and Central Asia	19.4	6.7	7.0
East Asia	3.7	2.6	3.0
East Asia (excluding China)	4.3	3.1	3.0
South Asia	11.1	7.6	7.0
South Asia (excluding India)	15.8	10.5	11.0
Southeast Asia	4.4	4.1	5.0
West Asia	9.2	5.5	6.0
Latin America and the Caribbean	9.8	6.9	6.0
Caribbean	23.6	22.1	21.0
Latin America	8.8	6.6	6.0
Oceania	17.1	17.8	19.0

**Source:** Author's calculations based on FAO (2014).

First, on the most basic level, protection costs money, and someone pays for it. Contrary to some common perceptions of protection as a tax paid by foreigners and collected by governments, much of the (implicit) tax is paid by domestic consumers and collected privately by domestic producers in the form of higher prices. Only a fraction of total consumption of food products is imported in developing countries (typically not more than 10–25 percent, with the exception of some types of countries noted before; see Table 11.5). But border restrictions increase prices for the total amount of the commodities consumed domestically, of which the largest percentage is produced domestically. Thus, through border protection, there is an implicit transfer from domestic consumers to producers.

This implicit tax on food has an obvious negative impact on poor households, which in many developing countries spend more than half their incomes on food; similarly, the proceeds from the implicit tax are mainly received by bigger agricultural producers with larger quantities of products to sell. Landless rural workers, poor urban households, and many poor small farmers tend to be net buyers of food, as discussed before. It is also important to note the steady shift in the locus of poverty in developing countries, where food insecurity and malnutrition are moving from rural to urban areas (Ruel, Haddad, and Garrett 1999).

Second, trade protection for food and agricultural products has economy-wide impacts. For instance, a government may try to compensate consumers through food subsidies, but these transfers can become a heavy budgetary burden.<sup>34</sup> An example was Morocco during the second half of the 1990s: the country was spending about 1.7–2.4 percent of its GDP on food subsidies (IMF 2001), in part trying to compensate for the higher prices generated by trade protection. At the same time, simulations of alternative uses of water in Morocco showed that the protection of certain crops was shifting the use of water, a scarce resource, toward protected products, even though the value of agricultural production measured at world prices would increase if protection were reduced and water were reallocated to other crops (Diao, Roe, and Doukkali 2002). Moreover, concentration of production in some protected crops seems to have increased the vulnerability of the country's agriculture to droughts. This in turn made the whole economy more volatile (World Bank 2001). Finally, more expensive food may have put upward pressure on wages, affecting various manufacturing sectors in which Morocco may otherwise have had comparative advantages. If the dynamic export sector was manufactures, maintaining competitiveness in this sector without reducing real wages called for a reduction, not an increase, in the cost of food (however, this should be achieved through investments in agriculture, not through forcing the terms of trade against agriculture).

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34 The fact that the implicit tax from trade protection falls mostly on consumers also limits the use of the receipts from import taxes to subsidize food consumption of the poor. To the extent that the volume of taxed commodities is only a fraction of total domestic consumption and that the poor population may represent, as a whole (though not necessarily per capita), a sizable percentage of that domestic consumption, government revenues from taxing imported commodities would typically not be enough to compensate poor consumers in low-income countries. The case of developed countries, where the incidence of poverty is smaller and which have additional fiscal resources, is different. These countries can tax consumers in general with border protection for food but can, at the same time, subsidize poor consumers through targeted policies financed by general revenues.



Third, to the extent that protection is a privatized tax, a relevant question is whether the funds generated by protection policies can be collected by the government and put to better uses. For instance, Díaz-Bonilla, Diao, and Robinson (2004) simulate two alternatives in a world model. In the first scenario, there is an increase in protection of crops considered important for food security (assumed to be grains in the simulations) only in those countries that at the time were supporting the concept of a development or food security box based on increased import tariffs. In the second scenario, the governments in those countries collect, through an explicit tax, the equivalent of the implicit consumption tax privately collected through protection and then invest that amount in agricultural R&D. The increase in agricultural protection results in a negative effect on GDP and employment; similarly, there is less consumption of food products, suggesting that food security declines with increased protection. On the other hand, an increase in investment in agricultural R&D financed by an equivalent tax calculated from the first scenario shows increases in GDP, employment, agricultural production, and consumption, particularly for food items. Agricultural trade among developing countries, including those applying higher levels of protection, declines in this simulation. This suggests that such policies would hurt South-South agricultural trade as well.

Fourth, as already discussed, because of the heterogeneity of households, trade policies (or any other general policy for that matter) will have differentiated impacts. But it is at the household and individual levels where food security issues take a concrete form. Therefore, trade policies tend to be too unfocused to address food security problems, and more differentiated policy approaches are needed. Such differentiated approaches need to consider that economic access is not only a problem of food prices but also depends on the relation between household incomes (broadly defined) on the one hand and the cost of the minimum household food requirements (MHFR) on the other. An implication is that if a trade policy measure increases the cost of MHFR, this, other things being equal, would negatively affect both the poverty headcount and food security for households that are net food buyers, including many in the rural areas (see Chapter 2).

Food prices, wages and employment, and other sources of income for the poor and vulnerable must be considered in the short and medium terms as well as the long term. Higher food prices will have an immediate negative effect on the poor and vulnerable, but the longer-term effects would depend on whether those prices lead to higher employment and/or wages as well (both in rural and urban areas) by amounts that compensate for the greater cost of

food.<sup>35</sup> For example, higher agricultural and food prices may lead to increased investments by the private and public sectors in agricultural production and in rural areas, increasing productivity and production, and reducing costs and prices in the medium term. Of course, the opposite may also happen: farmers shielded by high protection may not need to incur additional costs and investments to attain the desired levels of profits; therefore, protection in this scenario may lead to less investment and productivity. In general, increased trade rather than protectionism seems to have greater positive effects on technological advancement, investments, and productivity (see the literature review on total factor productivity by Isaksson 2007).

Fifth, if protection and perhaps other distortionary policies are utilized to expand the production of some food items, then the positive impacts on production and employment from the protected sector must be compared not only to the consumption losses from protection but also to the displacement effects on production in other sectors that may have to contract to free some of the productive resources that can then be used in the artificially expanded food production. If distortionary domestic support measures are implemented, they will have fiscal impacts that need to be considered as well. These impacts may displace other public expenditures that have more positive impacts on production and poverty (Fan 2008; Mogues et al. 2012; see Chapter 8 as well). Also, trade protection tends to overvalue the real exchange rate, with negative implication for tradable sectors.

Finally, considering that domestic production tends to be more volatile than global production for most countries, self-sufficiency may in fact increase volatility, as noted before.

So far the argument has been against some approaches that in the context of both high and low prices would suggest protectionism as the preferred policy option. But there is also a mirror image case to be considered with caution: the argument—based on undifferentiated trade theory—that proposes trade liberalization irrespective of the context of low or high prices. Proponents of this approach should consider the fact that slow or no mobility in labor, capital, and land implies that any reallocation of factors and resources will take time and will include potentially significant transaction costs. In particular, small and vulnerable producers may not be able to adjust to the new policy environment and may

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35 On the demand side, there may also be some substitution of products, with different potential impacts on food security and nutrition.

see a definite negative impact on their livelihoods.<sup>36</sup> A policy of complete free trade in agriculture and food production may not necessarily increase national welfare if it leads to increases in unemployment of labor, capital, and other factors of production that are not easily transferred to other activities, particularly if the latter correspond to the poor and vulnerable and there are no other policy instruments available to support incomes during the (probably long) transition (see also Fernandez de Cordoba et al. 2006). This possibility highlights the need for carefully modulated policies for poor producers and consumers. The aggregate production, consumption, and employment effects need to be analyzed in a general economic setting that considers how labor and other relevant markets really operate in a given country context (see Chapter 7).

### **Food Security and the WTO Framework**

The focus here is on the AoA and the three pillars of market access, export competition, and domestic support. The WTO framework has different commitments or disciplines on each of these pillars. Also, the obligations are differentiated between developed and developing WTO members. Since the adoption of GATT in 1947, there has been a constant debate about whether to give developing countries special treatment under trade rules; what those dispensations would be and under what circumstances they should be granted; and whether to differentiate further within the general category of developing countries (see Kessie 2011 and Corrales-Leal 2003). Some major events related to special and differential treatment (SDT) aspects before the Uruguay Round included the 1955 GATT revision of Articles XVIII and XXVIII (bis),<sup>37</sup> the 1966 adoption of Part IV on Trade and Development within the GATT (with new Articles XXXVI to XXXVIII),<sup>38</sup> and the Enabling Clause adopted during the Tokyo Round in 1979 that allowed developed

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36 In trade theory, this would apply to models with specific factors of production (they cannot be converted easily or at all into other activities) (see Chapter 7).

37 The revision of Article XVIII in 1955 allowed developing countries measures, among other things, to address balance-of-payment problems and to promote the establishment of some industries. Article XXVIII (bis), paragraph 3(b) recognized “the needs of less-developed countries for a more flexible use of tariff protection to assist their economic development and the special needs of these countries to maintain tariffs for revenue purposes.”

38 Article XXXVI recognized the principle of nonreciprocity in trade negotiations (that developed countries should not expect reciprocity for commitments made by them); Article XXXVII asked developed countries, “to the fullest extent possible,” to give preferences in market access and special consideration before applying contingent protection measures; Article XXXVIII allowed collective action by developing countries to stabilize commodity prices.

countries to grant trade preferences to developing countries, waiving the most-favored-nation requirements.

Some debates focused on whether the SDT provisions were really appropriate to promote development and whether developing countries have increased trade participation due to SDT. Other discussions focused on whether the fact that developing countries were asking for such SDT provisions marginalized them from the main negotiations and made it easier for developed countries to maintain their special treatment in topics such as agriculture, textiles, and other products of interest for developing countries (see, for instance, Bhagwati 2013).

During the Uruguay Round, due to the single undertaking, SDT moved in part from the notion of increased policy space toward flexibilities in the form of longer transition periods and reduced levels of commitments, but this was within a framework in which all countries had to comply with broadly the same trade framework (Kessie 2011).

Therefore, a first question would be whether the categories of countries considered in the WTO adequately reflect food security vulnerabilities. As mentioned, the first distinction is between developed and developing countries, but within the latter there are two other subcategories: the least-developed countries (LDCs) and the net food-importing developed countries (NFIDCs). The first category of countries usually has fewer obligations and more time to implement them. The second category was created in the Uruguay Round because of concerns that the agreement would lead to higher world prices and would affect net importers; therefore, those countries were offered financial and other support in case they had balance-of-payment problems because of the WTO negotiations.

Díaz-Bonilla et al. (2000) applied cluster analysis using three methodologies (hierarchical, k-means, and fuzzy) and five variables (calories per day per capita, proteins per day per capita (grams), food production per capita, total exports [merchandise and services] over food imports, and nonagricultural population over total population) to classify 167 countries (of which about 93 percent were WTO members) into 12 categories of food (in)security. The different cluster groups were then compared to the WTO country categories (developed, developing, LDC, NFIDC) to see whether they adequately reflected food security profiles. The conclusions were as follows:

- The LDC category is better at identifying food insecurity, but some food-insecure countries are not included. Similarly, some countries that are

included in this category are actually classified as food neutral (meaning they are in intermediate categories of food security).

- The NFIDC category was a weak indicator of food insecurity, considering that one-third of the countries appeared in the food-neutral groups.
- The developing-country category was spread over all twelve groups except the top group with the most food-secure countries.
- Among food-insecure countries, profiles also differed: some were rural (mostly in Africa and South Asia) while others were urban (LAC and Eastern Europe); some were considered consumption vulnerable (because they showed low levels of caloric and protein consumption per capita), while others entered food-insecure categories because they were trade vulnerable (manifested in the use of large percentages of their exports to buy food).
- Developed countries were all in the food-secure category, showing that food insecurity in poor countries cannot be mixed with trade concerns in developed countries claiming food security reasons.

The extension of this analysis to the category of small and vulnerable economies (SVEs) considered in the 2008 Modalities also shows a great variety of situations, with only 23 out of the 45 SVEs appearing in the food-insecure groups.<sup>39</sup> The question then is whether it is necessary, or possible, to create new categories to accommodate food security concerns.

While we have thus far discussed the variety of food security situations at the country level (which is the focus for trade negotiations), it must always be kept in mind that, as argued before, relevant food security issues emerge at the level of families and individuals, not countries.

The next question is whether WTO disciplines and SDTs linked to different categories of countries are adequate to address food security concerns. In particular,

- Do they force/allow industrialized countries (IC) to follow good policies that help with global poverty reduction and food security and to avoid bad ones?
- Do they force/allow developing countries (DC) to do the same?

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<sup>39</sup> According to the Draft Modalities, the term SVE applies to “Members with economies that, in the period 1999 to 2004, had an average share of (a) world merchandise trade of no more than 0.16 per cent or less, and (b) world trade in non-agricultural products of no more than 0.1 per cent and (c) world trade in agricultural products of no more than 0.4 per cent” (paragraph 157 of the Draft Modalities).

The first question relates to whether allowable trade policies for ICs may displace agricultural and food production in DCs, denying employment and production opportunities that might help reduce poverty in the latter countries. As the focus of this book is on developing countries' policies, this issue will not be analyzed here (on this topic, see, for instance, Díaz-Bonilla, Thomas, and Robinson 2003; and Díaz-Bonilla and Ron 2010).

The second question is usually framed in the context of whether WTO disciplines allow enough policy space for developing countries. The discussion of which interventions should be allowed as good policies to solve food security problems revolves around the policy dilemma already mentioned several times: What contributes more to generating food security, high prices for producers or low prices for consumers?

Those that take the perspective of poor producers typically prefer high prices, arguing that the multiplier effect of agriculture has important benefits for employment and poverty alleviation. Those that take the perspective of poor consumers emphasize low prices, considering the impact on urban and rural poverty and malnutrition. However, the most effective way out of this policy dilemma is through interventions that both increase production efficiency and reduce costs (mostly agricultural R&D, infrastructure, and related investments, all allowed in the Green Box), all of which increase profits for producers while contributing to lower prices for consumers. The cases of poor and vulnerable populations can be addressed through properly designed and funded safety nets and cash transfer programs.

In any case, the AoA allows a variety of policy interventions, not all of which may solve the high price/low price policy dilemma in an efficient and equitable way. This list includes the following:

- Green Box (Annex 2 of AoA): food security stocks (paragraph 3), domestic food subsidies (paragraph 4), and other Green Box measures
- De minimis support of 10 percent of production
- Article 6.2 on investments and input subsidies for low-income or resource-poor producers (LIRP)
- The possibility of applying countervailing duties to subsidized exports, and to use the common safeguard measure allowed in GATT
- The possibility of changing applied tariffs when they are below bound tariffs

The 2008 Modalities consider further policy space and instruments (see Díaz-Bonilla and Ron 2010). In this regard, it is important to note that, on the one hand, there is the need for instruments to protect against import surges and unfair trade practices, particularly to avoid drastic shocks that affect the survival strategies of the poor; however, on the other hand, it is also crucial to remember that poverty and hunger materialize at the household/individual level, and thus protection for crops does not focus on the main problem. In fact, as noted, while predicated as a way to help small farmers, protectionist measures that increase the domestic price of crops mostly benefit large producers while penalizing poor consumers.

For many of these instruments, the main issues are availability of fiscal resources (rather than policy space) and an adequate design of the interventions. For example, the operational problems and costs involved in managing food stocks are probably more important than the issue of policy space for developing countries under the WTO agreements (see Chapter 8 and Díaz-Bonilla 2014). Also, the operation of food stocks for price stabilization and domestic food aid tends to be affected by the same high/low price dilemma: that is, if the level at which prices are stabilized is too high, this may help producers but harm consumers. Thus, there may be a trade-off for the poor between price stability and price levels.

## **Special Topics in Trade and Agriculture**

### **Are There Still Trade Biases against Agriculture in Developing Countries?**

The early theory of development placed agriculture in a subordinated role compared to the industrialization process (see Chapter 1). Several arguments were utilized to support this view. Quantitative historical analysis (for instance, Kuznets 1966) showed that agriculture declined in importance with the advance of economic development. This fact appeared to be related to Engel's Law, which argued that the percentage of food expenditures declined as incomes increased. Also, especially in Latin America, it was argued that increasing the price of agricultural products in the developing countries' domestic markets would not increase production (the supply side was considered to be price inelastic) but could add to inflationary pressures. At the same time, the assumption of supply-side price inelasticity led to the notion that the imposition of taxes on agricultural products would not significantly diminish domestic production. It was also said that even if primary domestic production and exports were increased, that might not result in greater incomes for those countries because, following the thesis of Prebisch-Singer, the

international terms of trade were moving against agriculture (ECLAC 1969). Therefore, early development theory focused on the diversification of the productive structure through industrialization (see Chapter 1).

One of the key assumptions of this approach was challenged by Schultz (1964), who argued that, like their counterpart in rich countries, farmers in developing countries react to incentives within the constraints they face. While the response to relative incentives had been long recognized for individual agricultural products, the reaction of the aggregate supply to overall relative incentives was more complex to calculate: there are different estimates of the price elasticity of the aggregate supply, depending on the time horizon considered (with short-term elasticities being obviously smaller), the variables included as conditioning factors in the equation, and the methodologies utilized (see reviews in Mamingi 1996; Mundlak, Larson, and Butzer 1997, 2008). Still, econometric estimates have shown that, in line with Schultz's main hypothesis, agricultural supply is responsive to relative prices<sup>40</sup> within the constraints faced by the producer (such as access to infrastructure, ownership of physical and human capital, land and natural resource base, access to credit, available technology, marketing structures, governance institutions, and weather conditions) and that the price elasticity of supply increases when longer horizons are considered.

Other studies, mostly covering the period from the 1960s to the mid-1980s, looked at macroeconomic policies, basically trade and exchange rates, which affected the relative incentives for agriculture (Krueger, Schiff, and Valdés 1988; Schiff and Valdés 1992a, 1992b). The focus of these studies was basically on the relative price between agricultural and nonagricultural sectors (or between agriculture and industry) in the whole economy. As discussed before, those studies argued that there was a price bias against agriculture (which has even been referred to as the "plundering" of agriculture in developing countries; Schiff and Valdés 1992b), mainly as a consequence of the trade and exchange rate policies followed by those developing countries that privileged industrialization and hurt agricultural development.

More recently, the methodology of those studies has been criticized by Jensen, Robinson, and Tarp 2002, who argued that (1) they relied on a partial equilibrium modeling methodology that misses intersectoral linkages and feedback effects from changes in incomes and relative prices and cannot

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40 Mamingi (1996) notes that there are several definitions of the appropriate deflator for the relative price, such as the consumer price, a price index for inputs, and the price of alternative productions.



properly determine the equilibrium exchange rates; (2) used nominal protection rates instead of effective rates of protection (ERP), therefore ignoring the differences in relative input cost structures between agricultural and nonagricultural production; and (3) assumed that domestic agricultural products and world market goods are perfect substitutes and that essentially all agricultural goods are traded.

Jensen, Robinson, and Tarp (2002) ran simulations to measure the level of agricultural bias using effective rates of protection (ERP) in 15 developing countries, 6 of which overlapped with the countries considered in Krueger, Schiff, and Valdés (1988) and Schiff and Valdés (1992a, 1992b).<sup>41</sup> The impact on relative price incentives was measured by the proportional difference between (1) an agricultural value-added price index and (2) a nonagricultural value-added price index, which is the measure of the ERP.<sup>42</sup>

Jensen, Robinson, and Tarp (2002) found that in their sample during the 1990s, the economywide system of taxes, including tariffs and export taxes, significantly discriminated against agriculture in one country, was about neutral in five, offered a moderate subsidy to agriculture in four, and strongly benefited agriculture in five. If in addition to the tax/tariff system, the effects of exchange rate overvaluation/undervaluation were considered, then they found significant bias against agriculture in Malawi and Zimbabwe; however, seven other countries showed significant agricultural protection, and the net effect for the other six countries was small. Although the issue of determining a sustainable current account is controversial,<sup>43</sup> the previous analysis indicates that tax and exchange rate policies during the 1990s had more complex impacts than those assumed in partial equilibrium analysis.

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41 The countries included are Argentina, Brazil, Korea, Mexico, Costa Rica, Egypt, Indonesia, Malawi, Morocco, Mozambique, Tanzania, Tunisia, Venezuela, Zambia, and Zimbabwe. There is an overlap of six countries (Argentina, Brazil, Egypt, Korea, Morocco, and Zambia) with the sample used in Krueger, Schiff, and Valdés (1988) and Schiff and Valdés (1992a, 1992b).

42 An important issue of the simulations in a general equilibrium context is to specify the macroeconomic closure rules, an issue that cannot be addressed in partial equilibrium models. The simulations in Jensen, Robinson, and Tarp (2002) are carried out using a macro closure that assumes no major swings in macro aggregates in response to external shocks. In particular, all simulations were carried out specifying a flexible real exchange rate and fixed foreign savings (the level of capital flows at the time of the simulations was maintained), except for the group of simulations of changes in exchange rates, which allows for adjustments in foreign capital flows.

43 The assessment of overvaluation/undervaluation of exchange rates has to be based on some measure of the sustainability of the current and capital accounts (see Chapters 7 and 10); different assumptions about the proper level of sustainability generate different results for the simulations. The results by Jensen, Robinson, and Tarp (2002) already mentioned assumed a current account deficit of 3 percent of absorption. There are also simulations without deficit or surplus (0 percent current account).

Jensen, Robinson, and Tarp (2002) also calculated the aggregate incentives in the six countries that were part of the study by Krueger, Schiff, and Valdés (1988). Comparing results by country, the authors also found agricultural protection in Korea but did not find strong levels of antiagricultural bias in Argentina, Brazil, Egypt, Morocco, or Zambia. They concluded that the partial equilibrium measures used in earlier studies sometimes tended to overstate the price bias against agriculture or—whatever the bias that may have existed in the past—it had been greatly reduced or eliminated during the 1990s through all the changes in exchange rate, fiscal, monetary, and trade policies documented in other chapters.<sup>44</sup>

**TABLE 11.8** Average protection applied by various importing regions (%)

Product	Asian NICs	China	South Asia	Transition economies	Africa south of the Sahara	Middle East and North Africa	Latin America	Western Europe	North America	Japan	Rest of the world
Natural resources	2.3	1.9	14.1	1.3	4.9	4.0	4.9	0	0.2	0	4.5
Primary agriculture	37.7	15.5	20.6	12.6	16.3	48.7	12.4	12.1	8.5	30	6.3
Processed agriculture	20.2	15.4	29.4	19.7	26.9	57.8	16.5	20.9	10	46	12.5
Textiles and apparel	8.0	12.9	27.5	13.5	20.5	13.4	14.7	5.1	10.3	6.0	14.2
Other manufactures	4.8	6.1	23.8	8.8	10.9	8.0	10.7	1.9	1.3	0.3	9.2

**Source:** Díaz-Bonilla and Robinson (2010).

In fact, while the conventional wisdom of the late 1980s was that industrial protection in developing countries was larger than protection for agricultural products (imparting an antiagricultural bias to overall incentives), more recent data do not show that pattern (Table 11.8). Rather, the opposite holds: agriculture (considering both primary and processed) seems, on average, more protected than industry (including textiles and apparels) both in developing

<sup>44</sup> It must be noted again that there may be other biases, such as the general urban bias in investments suggested by Lipton (1977), which may still be very much present in many developing countries.

and developed countries. The imbalances are particularly large in MENA, which has important levels of protection for agriculture.

Another indicator of the relative bias is based on estimates of the Nominal Rate of Assistance (NRA)<sup>45</sup> for the agricultural and nonagricultural sectors calculated in Anderson and Valenzuela (2008) and in Anderson and Nelgen (2013).

They calculate the relative rate of assistance (RRA) as

$$RRA = \left[ \frac{(1 + \text{NRA agriculture})}{(1 + \text{NRA nonagriculture})} \right] - 1.$$

Therefore, a negative RRA would indicate an antiagricultural bias, while a positive would signal a pro-agricultural bias.<sup>46</sup> Their estimates suggest that the NRA for agriculture has been growing in developing countries, while NRA for nonagricultural goods has been declining, with the RRA showing a significant bias against agriculture during the 1960s, 1970s, and early 1980s ( $RRA < 0$ ) but becoming mostly close to neutral or positive in the 2000s (Table 11.9).

**TABLE 11.9** Relative Rate of Assistance in developing countries (1960–2010)

Region	1960s	1970s	1980s	1990s	2000s
South Asia	-0.54	-0.41	-0.14	-0.15	-0.01
Southeast Asia	-0.12	-0.22	-0.15	-0.11	0.00
Africa	-0.19	-0.27	-0.12	-0.14	-0.13
LAC	-0.31	-0.37	-0.25	-0.02	-0.03
ECA	-0.55	-0.36	-0.30	0.06	0.10
Developing countries	-0.50	-0.45	-0.32	-0.13	-0.01

**Source:** Anderson and Nelgen (2013).

**Note:** ECA = Europe and Central Asia.

45 The NRA includes border trade measures, as in the nominal rate of protection (NRP) discussed before, but also considers production subsidies and estimates of the impact of exchange rates. Therefore, at least in theory, those measures may not directly reflect an increase in trade protection (understood as border measures) but may result from the other two components (production subsidies and estimates of the equilibrium exchange rate). The original study covered 75 countries, 55 of which are developing countries, which, according to the authors, represent 90 percent of the population, 92 percent of agricultural value-added, and 95 percent of GDP at the world level (Anderson and Valenzuela 2008).

46 For instance, if the agricultural sector has an NRA of 0.1 (implying a protection of 10 percent) and the nonagricultural sector has an NRA of 0.2, then the RRA is  $[(1.1/1.2) - 1] = -0.08333$ ; this implies that the agricultural sector has a negative protection relative to the nonagricultural sector amounting to -8.3 percent.

The main exception is Africa, where, according to these calculations, overall relative incentives still favor the nonagricultural sector (an RRA of  $-0.13$ ).

These indicators are based on nominal protection data, which as discussed before do not capture the relative profitability considering costs (see Jensen, Robinson, and Tarp 2002). A possible indicator of relative incentives that capture costs as well is the ratio of the value-added deflator for the agricultural sector and the equivalent deflator for the rest of the economy, as in Jensen, Robinson, and Tarp (2002).<sup>47</sup> Díaz-Bonilla and Robinson (2010) calculate that ratio for countries in LAC, SSA, and Asia covering the period 1970 to 2007.<sup>48</sup> They show that the relative incentives (measured by the value-added relative prices) were higher in the agricultural sector in relation to the rest of the economy during the 1970s and 1980s, precisely the period when the nominal rates reported earlier showed a bias against agriculture. The ratio declined during subsequent decades, which would indicate a change of relative incentives against agriculture, just when the NRA and RRA calculations were suggesting the opposite. They also calculate the ratio comparing agriculture only against industry (before it was against the whole rest of the economy). Again, at least considering the relative prices from value-added, agriculture had a more favorable ratio during the 1970s than afterward.

One possible interpretation for the differences is that, even if macroeconomic and trade policies worked against agriculture in the 1970s, high world prices for agricultural commodities and sectoral policies that kept costs low for agriculture resulted in relative incentives for agriculture that were more favorable than in subsequent decades, when more positive trade and macroeconomic policies for agriculture were more than compensated by lower world agricultural prices and the elimination of many of the favorable sectoral policies.

Other possible explanations (not necessarily incompatible with the previous comments) refer to differential productivity growth across sectors. For instance, the decline in the agricultural value-added price in relation to the rest of the economy can be seen simply as another manifestation of Baumol's effect, with increasing relative costs in low-productivity activities, mostly in services, which

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<sup>47</sup> In principle, national accounts measure outputs at basic prices or producer prices and measure inputs at purchaser prices; therefore the ratio of value-added deflators should reflect the proper incentives for a sector.

<sup>48</sup> The calculation of the deflators was done in local currency units, dividing the value-added in current values by the constant ones. Value-added in the nonagricultural sector (constant and current) was calculated by subtracting agricultural value-added from total GDP. The data used was from the World Development Indicators of the World Bank.

make up a good percentage of the nonagricultural sectors (see, for instance, Baumol and Towse 1997). If instead of comparing the agricultural sector with the whole economy we focus only on the relative incentives between agriculture and industry, the decline of agricultural value-added prices compared only to those of the industrial sector may reflect that productivity change in the agricultural sector as a whole has been higher than in industry in developing countries during recent decades (Martin and Mitra 1999).

In summary, it seems that nominal relative biases against agriculture have declined and have either been reversed or have disappeared altogether in the aggregate for developing countries, with some exceptions. However, the trends in the ratios of valued-added show that to properly capture relative incentives for agricultural production, relative prices are not the only factors that matter: it is important to also look at what is happening with the rest of the domestic economy, the costs of inputs, technological developments, and the evolution of the world economy (for tradable agricultural goods). Analyzing policy biases measured only by relative nominal prices of products may leave out important determinants of the performance of the agricultural sector in developing countries.

### **Import and Export Tax Differentials**

There are two practices that have generated considerable debate in trade policy and trade negotiations. One operates on the import side, while the other affects exports. On the import side, tariff escalation (or import tax differential, to be consistent with the one on exports discussed below) is the practice of imposing high import taxes on processed goods and low or no tariffs on primary products. This practice has been controversial since the early days of GATT (Yeats 1974). Countries that do not produce the primary product tax the processed imported product at a higher rate than the raw material to favor industrialization in their own territory (for example, wheat with regard to flour milling and pastas, or green cocoa compared to chocolate). The other side of the coin is that this practice places the possibility of expanding agro-industrial production in the primary producing countries (PPCs) at a considerable disadvantage, strongly tilting their export profile toward raw materials (Balassa and Michalopoulos 1986).

This can be shown in an example. Assume, for instance, that PPCs can sell raw material and processed products at world exogenous prices. Assume also that the cost structure for agro-industry is such that the raw material amounts to 60 percent of the total value of the processed good, another 20 percent is spent on other cost items excluding factors of production, and the final

20 percent is value-added. Assume then that the raw material, produced by a primary producing country, is imported by a nonproducer with zero tariffs, but that the processed product faces an import tariff of 10 percent and that transport costs add 5 percent to the world price of the raw material. Finally, assume that agro-industry in the non-PPC has the same basic cost structure except for trade taxes and transport costs. Non-PPCs, even though their basic technology is the same and they have to absorb transport costs, still have a value-added margin that is 35 percent larger than the PPCs (27 cents on the dollar for non-PPCs against 20 cents in PPCs).<sup>49</sup>

This implies that the factors of production in the PPCs will be paid less, probably discouraging the processing of the raw material in those developing countries.

Golub and Finger (1979), in one of the early studies that quantitatively analyzed the issue of tariff escalation for some manufactured products, including only coffee and cocoa from the food sector, found that the removal of such escalation would lead to the reallocation of some processing of agricultural products from industrialized to developing countries and that the latter experienced important increases in export revenues from processed cocoa and coffee exports. Although this characteristic of the tariff structure has diminished somewhat since the Uruguay Round, nontrivial levels of tariff escalation still remained during the period of implementation of the Uruguay Round (Lindland 1997; OECD 1997). Furthermore, the fact that even in the 2000s, industrialized countries dominate or are major players in world trade of cocoa and coffee processed products (when they do not produce the raw material) may be considered an indicator of the impact of tariff escalation, as can be seen in Table 11.10, which shows tariff escalation in coffee and cocoa in the early 2000s (from Cheng 2007; see also Díaz-Bonilla and Reca 2000).

However, the practice of tariff escalation does not involve industrialized countries only but developing countries as well, as Table 11.8 suggests. Furthermore, eliminating tariff escalation may or may not lead to primary producers expanding their processing industry, with the final result depending among other things on the level of market concentration in the processed products globally, which tends to be high (see McCorriston and Sheldon 2004).

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<sup>49</sup> Assuming  $ER = 1$ , the profit equation in the importing country for the processed good is as follows:  $110$  (world price 100 plus 10 percent import tax)  $- 60$  (cost of raw material, with same technology as the exporting country)  $- 3$  (resulting from 5 percent of transport costs over the total cost of raw material)  $- 20$  (other costs)  $= 27$ . For the PPC, the profit for the same product is  $100 - 60 - 20 = 20$ .

A conceptually similar debate has taken place over exports, but with a reverse incidence of taxes on primary and processed products: the practice, called export tax differentials, involves using export taxes on an agricultural primary product that is an input to a processing industry and applying zero or smaller export taxes on the processed product. Export tax differentials reduce the domestic price of the raw material compared to the world price and, therefore, lower the processing costs of the industry in the country using differential export taxes. Within the WTO and some regional trade agreements, there have been debates about whether these export tax differentials should be considered a specific subsidy and therefore subject to WTO disciplines.<sup>50</sup>

**TABLE 11.10** Tariff escalation in coffee and cocoa in the early 2000s

Primary, intermediate, and final products	Average bound tariffs (%)					Global exports	Developing countries' exports	
	Australia	Canada	European Union 15	Japan	United States	(million US\$)	(million US\$)	Market share (%)
<b>Cocoa</b>								
Cocoa beans	1	0	0	0	0	8,380	8,084	96
Cocoa paste	0	0	10	8	0	838	440	52
Cocoa butter	0	0	8	0	0	4,397	1,887	43
Cocoa powder	9	6	27	19	16	620	156	25
Chocolate and products	17	57	18	21	15	4,355	361	8
<b>Coffee</b>								
Coffee: not roasted	1	0	4	0	0	14,213	13,592	96
Coffee: roasted	0	0	8	12	0	1,843	164	9
Coffee mixtures and extracts	1	1	12	39	10	2,638	1,084	41

**Source:** Cheng (2007).

While the distributive impact is more evident in the case of tariff escalation (or import tax differential) to the extent that countries that are

<sup>50</sup> An extreme case of the differential treatment of primary and processed products would be the prohibition of exports of a raw material to keep the product available for the domestic industry. Within the North American Free Trade Agreement (NAFTA) there has been a long-running dispute between the United States and Canada on lumber products, which included the role of export restrictions on the Canadian side.

nonprimary producers will expand their processing activities through that practice while primary producers will not, in the case of export tax differentials the impact is more complex and must be analyzed in a general equilibrium context. This is because the primary producing sector (which loses from the export tax differential) and the processing industry (which may benefit from lower prices of raw materials) are in the same country now.

For instance, Hudson and Ethridge (1999) argue that Pakistan's export tax on raw cotton from 1988 to 1995 (aimed at benefiting the domestic yarn industry) had a negative impact on the growth rate in the primary cotton sector and did not increase the growth rate of yarn production above what would have occurred naturally.

Countries using export taxes have also argued that the export tax differential is only a way to counter the mirror image of the import tax differential. This seems to be the case in the oilseeds complex, where some countries use tariff escalation on the import side, while others have differential taxes on the export side. Bouët, Estrades, and Laborde (2012) analyze the impact of export and import taxes along the oilseeds value chain (seeds/vegetable oils/biodiesel), considering three countries that tax exports differently (Argentina, Ukraine, and Indonesia) and the United States and the European Union that use tariff escalation. The primary products analyzed are soybeans, sunflowers, and palm. They simulate the impact of eliminating tariff escalation only, export tax differentials only, and both types of taxes together.

Elimination of tariff escalation in importing countries, as discussed before, leads to the expansion of processing activities in Argentina, Ukraine, and Indonesia, while it falls in the European Union and the United States. Also, overall welfare (as the sum of producers' and consumers' surpluses plus government revenues) increases in the three developing countries. In the United States, overall welfare increases, and in the European Union it declines: although consumers benefit in both cases and producers lose, in the European Union the loss for producers (and government revenue) is large enough to make overall welfare decline.

Eliminating export tax differentials produces more mixed results. For Argentina, in line with the case of Pakistan's cotton, the elimination of the export tax on oilseeds leads to an important increase in primary production, which also increases processed production (oilseeds meals and oils). However, in the cases of Indonesia (palm) and Ukraine (sunflowers), primary production increases but the processed products decline. This happens because the difference in export taxes (and therefore the implicit support for the processing activities) is far larger in the last two countries (between 12 and



15 percentage points, compared to about 2–3 in Argentina). In the United States and the European Union, primary production declines due to the competition of the expanded primary production in the other exporting countries, while the processed industry remains about the same. Overall welfare declines in Argentina, Indonesia, and Ukraine, but the reasons are different: in the first two countries, although the producers' surplus (driven by primary producers) increases, it is more than compensated by the loss in government's revenues; in the case of Ukraine, unlike the other two countries, there is also a loss in producers' surplus because the decline for the processing industry is not compensated by the gains of primary producers as in Argentina and Indonesia. Overall welfare declines in the United States and increases in the EU, the opposite of the elimination of the import tax differential.

The third scenario is an approximate sum of the previous two, with the results from the elimination of import taxes dominating the aggregate.

Beyond the specific results (which are influenced by the parameters of the models), the main point is that these complex trade effects need to be analyzed with economywide models, and that production effects are in many cases different from welfare results.

### **Disciplines on Export Measures**

The increase in nominal food prices in world markets since 2008 led several exporting countries to impose export bans and restrictions, which exacerbated the price spike. Therefore, there has been a new interest in stronger trade disciplines on export restrictions. This discussion can be divided into legal issues and economic issues.

Regarding legal issues, export prohibitions and restrictions are considered in Article 12 of the AoA. According to that article, members that institute new export prohibitions or restrictions on foodstuffs (following Article XI 2(a) of GATT 1994) must "give due consideration to the effects of such prohibition or restriction on importing Members' food security" and must write, "as far in advance as practicable, to the Committee on Agriculture" explaining "the nature and the duration of such measure." The member instituting the measure must consult, "upon request, with any other Member having a substantial interest as an importer" and must provide the latter with the requested information. These obligations do not apply to developing-country members "unless the measure is taken by a developing country Member which is a net-food exporter of the specific foodstuff concerned."

The 2008 Modalities, if eventually adopted within the WTO negotiations, would tighten current disciplines on export restrictions. Existing export

prohibitions and restrictions on foodstuffs and feeds must be eliminated by the end of the first year of implementation of a potential Doha Round agreement. Regarding new export prohibitions or restrictions, these cannot “normally be longer than 12 months” and can exceed 18 months only with the agreement of the affected importing members. The obligations to consult, however, do not apply to least-developed and net food-importing developing countries. The 2008 Modalities document also expanded members’ obligations to notify, inform, and consult the Committee on Agriculture by designating 90 days for the notification; it also strengthened the surveillance role of the Committee on Agriculture in these matters.

There have been calls to further strengthen disciplines on export bans, including accelerated notification procedures, as well as to exempt food aid from export bans (Tangermann 2013).

On the economic side, some studies have tried to determine the impact of export measures on domestic and global variables. Regarding export restrictions and volatility, Martin and Anderson (2011) calculated that increases of 45 percent in rice and 29 percent in wheat in the price spike of 2008 were due to trade measures in general, both on the export and import side. Also, another work (Anderson 2012) calculated that import measures represented a nontrivial percentage of those increases: 45 percent in the case of rice and 37 percent in the case of wheat. If applied on the impacts in Martin and Anderson (2011), this calculation would make the impact on prices related to export measures alone about 25 percent and 18 percent of the total increase in rice and wheat, respectively,<sup>51</sup> with the difference of 75–82 percent due to other reasons, including import measures (such as reducing import tariffs) and other (nontrade) factors.

In a theoretical model of a small country, Gouel and Jean (2012) showed that an optimal combination of storage and trade policies (subsidizing imports and taxing exports) stabilizes domestic food prices. The optimal policy in their analysis includes export restrictions: they may be harmful to export partners, but not to use them is costly for national welfare, even though they entail substantial transfers from producers to consumers. Using a global general equilibrium model, Bouët and Laborde (2010) also show

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51 Of the total increase in the price of rice (45 percent), 55 percent were export measures and 45 percent import measures. Therefore, the incidence of export measures on the price of rice was 45 percent multiplied by 0.55 = 24.75 percent (rounded to 25 percent in the text above). For wheat, the calculation is similar: 37 percent were import measures and 63 percent export measures; therefore, the impact of export measures was 29 percent multiplied by 0.63 = 18.3 percent (rounded to 18 percent in the text).

(1) that both import and export measures have an upward impact on world prices and (2) that exporters using export measures to stabilize domestic prices improve their welfare but negatively affect net importers.

In the case of a single country, Cicowiez, Díaz-Bonilla, and Díaz-Bonilla (2008) analyze the potential elimination of export taxes in Argentina and find that eliminating them has some negative impacts on overall GDP and employment poverty and domestic welfare. Their conclusions result from several factors: first, the largest agricultural export taxes fall on the primary production of grains and oilseeds, and the elimination of these taxes favors these sectors that are less labor intensive to the detriment of other activities that generate more employment (in particular, primary products that were formerly transformed locally are now exported as raw materials); second, the domestic industry using the primary products as inputs declines due to the higher costs of those raw materials. Further, the additional exports from grains and oilseeds also appreciate the real exchange rate, which affects production and employment in other tradable sectors. In terms of poverty, the elimination of agricultural export taxes increases the domestic price of food (and therefore the poverty line), which, together with the decline of employment, leads to an increase in poverty. The authors also find a negative fiscal impact that could be even bigger than just the revenue loss from eliminating export taxes due to the decline in production and employment of that policy change (as in the case analyzed by Bouët, Estrades, and Laborde 2012). The authors caution that these results need to be analyzed in a dynamic setting to better understand the potential for growth and employment of the differential development paths with and without export taxes, assuming that, given enough time, labor could be reconverted and move across activities.

More of these studies may help to align the legal treatment with the economic impacts, considering that now there seems to be an asymmetric legal treatment of economic equivalents. For instance, the following pairs of trade actions would seem to have similar economic effects (for equivalently scaled interventions):

- Increasing export taxes or reducing import taxes
- Reducing export subsidies or increasing import subsidies
- Reducing production subsidies or increasing consumption subsidies
- Using export tax differentials or import tax differentials (tariff escalation)
- Imposing an export quota or eliminating an import quota
- Imposing an export ban or anticipatory hoarding by an importer

In other words, even though all of these measures that aim to stabilize domestic prices may lead to increases in world prices, affecting other countries (and, therefore, being “beggar-thy-neighbor” policies in some sense), they have different legal treatments. Also, the discussion appears to have focused mostly on the export side, while the nonexport trade interventions have also had numerically important effects, as shown using the calculations in Anderson (2012).

Even if food price spikes are a trade problem generated by export restrictions, a separate question is whether the WTO is the best place to address the issues involved. Some of the simulations show that there are strong economic incentives (see Bouët and Laborde 2010) as well as political reasons for governments to act now to protect the people in their own country and only later worry about potential challenges in the WTO dispute settlement mechanism. In that sense, the process of notification and consultation within the Committee on Agriculture and then the lengthy WTO dispute settlement mechanism would be too slow to offer solutions during a price spike.

On the other hand, having stronger disciplines in the WTO, along with the greater transparency of the notifications and the prospect of having to answer consultations, may act as a reputational constraint, somewhat changing the cost-benefit analysis mentioned above. Also exporters should consider that it may be necessary for them to be more flexible about accepting disciplines on export bans and restrictions to avoid doubts about the trading system that are leading to the reemergence of self-sufficiency approaches. The potential costs of these doubts and the inadequate policies they may generate may well be larger for exporters in the medium to longer term than the perhaps shorter-term benefits of using export restrictions to temporarily stabilize domestic prices. Overall, for all parties involved, stronger WTO disciplines may act as a coordinating device to avoid self-defeating beggar-thy-neighbor policies in which all countries exacerbate the price spike and price volatility by trying simultaneously to insulate their own domestic market (Martin and Anderson 2011).

Clearly, other non-WTO options may have to be explored as well to deal with food price spikes. For example, it is crucial to have better information about national food stocks. Another alternative is to improve forecasting and early warning systems for crucial food products. Mechanisms to finance food imports during price spikes have also been discussed and utilized in the past (see Sarris 2010; Tangermann 2011). Different financial hedging approaches and global physical stocks have been also debated. For instance, Sarris (2010) has suggested an international grain clearing arrangement, which may

eliminate counterparty performance risk<sup>52</sup> in international contracts hedged on commodity exchanges and also directly address the problem of physical delivery due to government-imposed export restrictions (see Tangermann 2011). All of these trade and nontrade options merit further analysis.

### State Trading Enterprises

State trading enterprises (STEs) have been and still are present in international trading activities in a variety of fields, particularly agriculture, where both industrialized and developing countries operate a variety of these entities. STEs can influence trade on both the import and export side, as well as affect domestic production. The recognition of this fact led to the consideration of STEs in GATT's Article XVII: they were accepted under the trade regime provided they acted in accordance with the general principles of nondiscrimination and based their decisions on commercial considerations.<sup>53</sup> Also, STEs should not diminish or nullify the commercial value of negotiated tariff concessions and should not be operated in a way that creates quantitative restrictions on imports, export subsidies, and other WTO-inconsistent measures. Finally, governments had to notify GATT about the operations of their STEs on a regular basis.

However, the original GATT did not define state trading enterprises, and this created a variety of interpretations. With the Uruguay Round and the creation of the WTO, the agreements included an "Understanding on the Interpretation of Article XVII," which presented the following definition: "Governmental and non-governmental enterprises, including marketing boards, which have been granted exclusive or special rights or privileges, including statutory or constitutional powers, in the exercise of which they influence through their purchases or sales the level or direction of imports or exports."

This clarification changed somewhat the original meaning: while before an STE was a "state enterprise," or one receiving exclusive rights or privileges,

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52 That is, the risk that the physical delivery of the commodities does not happen.

53 However, given that STEs may have different objectives than commercial firms and were created with those separate objectives in mind, the controversy over what it means to base their operations on commercial considerations alone has led to some debates. The United States brought a case within the dispute settlement of the WTO against the Canadian Wheat Board with the argument that the regime under which that STE operated violated the notion of commercial behavior. The panel and Appellate Body found that the primary discipline of the WTO regarding state trading enterprises was nondiscrimination; operating under "commercial considerations" was not an independent obligation, but the potentially noncommercial nature of some operations could be used as a test of discrimination (see Hoekman and Trachtman 2007).

the new definition obliged notifications in the case of “Governmental and non-governmental enterprises, including marketing boards, *which* have been granted exclusive or special rights or privileges” (emphasis added). Therefore, the “or” of the original article was replaced by “which,” excluding government-owned companies that are not granted those special privileges.

A variety of developed and developing countries have notified the operation of STEs to the specific WTO committee overseeing this topic. Some 75 percent of the STEs notified under GATT Article XVII are in agriculture (FAO 2002). Some of them operate on the export side, others on the import side, and some do both (such as China’s National Cereals, Oil and Foodstuff Import and Export Co.). With some exceptions (such as, for example, China and India), the STEs that play a significant role in global markets (both on the export or import side) have been based in developed countries, while the STEs in developing countries, although some of them important in their own markets, have until recently tended to have less influence on international markets (FAO 2002). This situation is changing with the reduction or elimination of the operations of some of the developed countries’ STEs and the expansion of those enterprises in some large developing countries.

The WTO Working Party on State Trading Enterprises has identified a variety of STEs, where statutory marketing boards (or similar names) constitute the most common type of STE in the agricultural sector. They usually have exclusive authority for a variety of market interventions, such as the regulation and purchase of domestic output, defining quality standards, setting consumer and producer prices, controlling domestic marketing, and conducting foreign trade. Other categories of STEs have narrower objectives, and their market interventions are more limited (FAO 2002).

There are different views on the impact of STEs. On the one hand, some argue that the exclusive or special privileges allow STEs to exercise domestic monopoly or monopsony powers, distorting domestic and international markets and evading international obligations. On the other hand, it has been argued that STEs, mainly in developing countries, contribute to more stable supply and prices, thus helping with food security, and they either fill a role not provided by a weak private sector or operate as a countervailing power in the form of a collective trading entity in markets for agricultural commodities that are imperfectly competitive or that are dominated by large private firms. Also they may perform other functions such as support for rural development and operate subsidized food distribution schemes to help the poor and vulnerable (FAO 2002; McCorrison and MacLaren 2006). The track record of the STEs in developing

countries has been uneven, with some successes but also significant failures (see, for instance, Kherallah et al. 2002 on SSA).

A separate debate has been on whether the main problems for international trade are exporting STEs (such as Canada's STEs for wheat) or importing STEs (for example, those operating in countries such as Japan, Korea, and China) or both. In fact, there is a variety of activities that can influence trade in ways that may affect the interests of producers and consumers, both in the country owning the STE and in other countries that may compete with that enterprise on the import or export side. The question then would not be the existence of STEs per se but specific practices, such as import restrictions and export subsidies, that are disciplined in general by the WTO legal framework. In that regard, the issue of notifications and transparency becomes central, considering that different operations have a variety of effects regarding potential trade distortions: STEs that administer different price support schemes for domestic production and/or a monopoly on imports or exports can be far more trade distorting than those STEs whose main operations are simply quality control of domestic production, the provision of export-related support services such as storage, shipping, handling, processing, and packaging, or the operation of emergency stocks of key staples (Ingco and Ng 1998).

Therefore, it is important to continue the work to improve the frequency and detail of the notifications to the WTO's Working Party on STEs (see WTO 2013b).

Although many STEs are justified because of the need to solve some market failures (like imperfect competition or lack of markets for risk insurance), they also tend to redistribute income, which in the case of developed countries is usually in favor of producers and in the case of developing countries tends to favor consumers (McCorrison and MacLaren 2006). The market impacts of STEs are related to the objectives pursued, the type and number of products covered, the operations allowed and the general legal powers bestowed on them, and the market structure in which they operate, both domestically and internationally. Usually, the alternative market structure if the STEs did not exist would not be perfect competition (McCorrison and MacLaren 2006). Case studies tend to show that those enterprises face the same dilemma of high prices to help producers or low prices to help consumers. In particular, simulations show that the elimination of STEs in developed countries would increase their welfare and that of the exporting countries (McCorrison and MacLaren 2006). Also, while much of the debate at the WTO has focused on exporting STEs, the operations of importing STEs need to be monitored as well: for instance, McCorrison and MacLaren (2006) show that in the case of rice in Korea, the operations of the

STE implied an ad valorem tariff equivalent of 178 percent and a producer subsidy of 25 percent of the value of production.

In the case of developing countries, the creation of STEs is also related to the opposite assumptions that the private sector is too weak to adequately serve producers and consumers or, conversely, too strong and has the market power to extract unjustified rents from producers and/or consumers. Therefore, STE operations are assumed to either try to fill a market vacuum or act as a countervailing market power.

However, regarding the first point, the expansion of the private sector in developing countries is evolving along with general economic development and the expansion of infrastructure. For instance Rashid, Gulati, and Cummings 2008 have documented the changes related to improved infrastructure and integration of markets in Asia. Reardon et al. (2012) documented the modernization of rice and potato value chains in four Asian countries due to the expansion of roads, electricity, and government support to small traders and processors. More generally, Reardon and Timmer (2012) have summarized the important changes in the processing, wholesale, and retailing sectors taking place in many developing countries, particularly the advance of supermarkets. Although the expansion of supermarkets started earlier and has gone further in LAC, the retail revolution has also expanded in Asia and more recently in Africa as well. Reardon and Timmer (2012) show that modern food retail in many developing countries is spreading, or has already spread, beyond the upper and middle classes into low-income markets, small cities, and rural towns in a variety of small formats. The small size of the operations, cheap prices, and flexible inventories have facilitated the penetration of retail food stores into rural towns and poorer urban areas. These transformations have not advanced equally in several regions in Africa, where landlocked areas and countries still lack the modernized marketing chains that are present in other countries. However, the overall tendencies point in the same direction (see also Reardon, Timmer, and Berdegue 2004).

Then the question of whether the government or the private sector is better equipped to handle the trading functions (on products and inputs) becomes an empirical issue. In several developing countries where the STEs have had exclusive legal powers to operate in markets, the legal framework has been changing toward one in which the private sector has had increasingly more participation.

Regarding the concerns about the exercise of monopoly/monopsony power by private operators, it is important to determine whether such a problem exists and, if so, to understand the causes. One reason for private monopolies



to exist in general-consumption food products may be a public policy that, directly or indirectly, grants such powers to private firms (such as discretionary import licenses or domestic trade licenses and restrictions). If the monopoly (or monopsony) power has its origin in market imperfections (as opposed to the previous example of a policy-induced imperfection), then the persistence of the problem may be related to the fact that the government is failing to implement adequate regulatory approaches to eliminate market abuses. Therefore, a better approach would be to eliminate the policy-induced monopoly/monopsony in the first case and to establish adequate anticompetitive regimes in the second, rather than trying to establish an STE to counterbalance the potential abuses of the private sector, which may lead to larger costs than the perceived lack of market competition. In any case, the possibility of abuse of market position by private-sector operators must be compared to the possibility of inefficiency, corruption, and abuse by the public staff operating governmental schemes (Díaz-Bonilla 2014). These options should be analyzed empirically, avoiding ideological generalizations about the operations of the private or public sectors.

There is still the issue of the development and poverty alleviation functions that some STEs in developing countries may perform. Some studies show that in SSA, the elimination of marketing boards, which in many cases taxed producers and generated significant fiscal costs, may have led in the short term to less use of fertilizers and reduction of credit (Kherallah et al. 2002), but the medium-term impact may have been to open space for the subsequent development of private-sector operators in the countries analyzed. In Latin America, economic reforms were generally more radical, and the number of STEs has declined significantly, with the private-sector taking up the productive functions and governments implementing new types of public safety nets (such as conditional cash transfers) focusing on the poor and vulnerable; although these are sizable public operations, they do not necessarily involve STEs. In Asia, on the other hand, STEs are still present, although they may be operating within legal frameworks that are slowly reducing their public monopoly powers (FAO 2002).

The presence of market failures in developing countries related, for example, to the provision of agricultural inputs, credit, insurance, and marketing services may provide justifications for some types of STEs (FAO 2002). These market failures must be compared to the possibility of government failures in running those schemes. Also, the relevant question for developing countries is whether or not STEs are the best policy instrument for achieving rural development and poverty alleviation objectives (FAO 2002). The fiscal

implications of the different approaches must be considered as well, given the important impact on public deficits that some schemes based on STEs have had in the past and the potentially better alternative uses of scarce public funds, considering the diversity in the cost-effectiveness and distributive impacts of STE-based approaches (see related discussion in Chapter 8).

### **Concluding Comments on Trade and Agriculture**

Trade policies must be analyzed in the context of the whole macroeconomic program, considering in particular the exchange rate. As discussed in Chapter 10, it is crucial to avoid the overvaluation of the domestic currency with the effects on trade imbalances, dollarization of the economy, capital flight, and the possibility of balance-of-payment and financial crises. But an overvalued ER also has implications for trade policies, considering that it usually leads to requests for trade protection to compensate for the declining international competitiveness. In turn, increased trade protection exacerbates the problems created by the misaligned parity. On the other hand, a policy of trade liberalization done in conjunction with an overvalued ER will negatively affect production and employment in sectors that would have been otherwise competitive. And once productive capacity is weakened or destroyed (that is, specialized labor becomes long-term unemployed and productive capital becomes nonoperational or obsolete), it may be difficult to reconstruct the previous capabilities that would have survived under a more adequate combination of trade and ER policies. Also, an extremely volatile ER may lead to calls for variable tariffs and other trade policies to compensate for such volatility, generating further uncertainty that may deter investments and perhaps place the country in violation of WTO commitments.

Besides the influence of an overvalued ER on trade, there is the reverse link as well: large trade protection tends to overvalue the ER and ends up reducing exports, which makes the economy more vulnerable to external shocks (see Box 11.1). As discussed in Chapters 6 and 7, trade protection introduced with the objective of reducing a trade deficit will not have the intended results if the internal balance of demand and supply is not modified by other macroeconomic policies.

Regarding food security, an instinctive reaction of many policymakers and civil society observers in debates about the links to trade and agriculture is to advocate protectionist measures, self-sufficiency schemes, and the like. Sometimes investments in human capital, infrastructure, and technology (all allowed in the AoA) are dismissed with the argument that they cost money and are difficult to administer, with the implication that protection

does not cost money and is easier to implement (see the discussion and references in Díaz-Bonilla, Thomas, and Robinson 2003). But in fact, protectionism does cost money. It is important to realize that protectionism for food products operates as a privately collected and regressive tax on food; this tax burden falls predominantly on poor consumers (given the incidence of food in their expenditures), and greater benefits are seen by large producers (considering that protection is a markup received per unit produced). High tariffs and related import restrictions also increase the price of agricultural inputs to other sectors (primary and agro-industrial), affecting production and employment in the latter. Protection for food products means higher costs of wage goods and may lead to higher salaries, affecting other labor-intensive export industries. Large trade protection also tends to overvalue the real exchange rate, with negative implications for other tradable sectors. Finally, increased trade, rather than protectionism, seems to have greater positive effects on technological advancement, investments, and productivity.

On the other hand, as noted, a policy of complete free trade in agriculture and food production may not necessarily increase national welfare if it leads to increases in unemployment or production factors that are not easily transferred to other activities. Also, there are no other policy instruments available to support incomes during the anticipated lengthy transition to other employment opportunities.

When discussing poverty and food security problems, it must be remembered that trade policies are just an instrument to address those concerns, with a variety of potential aggregate and distributive impacts that need to be considered. Trade policies can make a positive contribution to poverty alleviation and food security within a properly defined global program of macroeconomic, investment, institutional, and social policies in which differentiated approaches and instruments are targeted to the households and individuals that suffer from poverty and food insecurity.

In that sense, it is important to remember that poverty and hunger materialize at the household and individual level. Therefore, protection and related trade policies aimed at specific food products—even if labeled special, food security staple, or any other name suggesting the need for particular consideration—do not necessarily represent the most effective, efficient, and even equitable way of addressing the poverty and food security challenges of affected households. Instead, poor countries need adequate policies that operate at the household and individual levels. Investments should be targeted to helping the poor and vulnerable rather than to protecting and subsidizing crops in general, which usually benefit larger farmers.

Although high and permanent agricultural protection is not the answer to poverty and hunger in developing countries, there are other factors that must be considered when analyzing the liberalization of agricultural and trade policies in those countries. One factor is the presence of high levels of protection and subsidization in industrialized countries, which continued even after the implementation of the Uruguay Round agreements. There are certainly imbalances in the AoA, because industrialized countries have been able to secure exemptions for some of their policies and have been allowed to continue using significant amounts of money for distorting domestic and export subsidies. Under some proposals by WTO members, these asymmetries may continue even if the Doha Round is completed. Developing countries, though pressing for a substantial reduction of these subsidies and protections in rich countries, are also rightly requesting some trade instruments to protect themselves against unfair trade practices that may generate negative and irreversible shocks to the livelihood strategies of the poor and vulnerable countries.

In general, the best approach for developing countries is to follow a relatively neutral trade policy across products with a level of import tariffs that balances the needs of consumers, particularly the poor, for affordable food, with some price margin to try to avoid the disadvantages in size, natural resource endowments, and similar factors affecting small producers in developing countries that may leave them without alternative employment (assuming that, within the short to medium term, they may be relatively immobile across activities and that there are no policy alternatives better targeted to help with the eventual transition). Also, food security is more than a trade issue, and other complementary policies for poverty alleviation will be needed.

Regarding the claims about the need of additional policy space in the WTO, the AoA does not seem to constrain effective policies in developing countries to address agricultural and food production (such as investments to support producers or domestic food aid for populations in need). However, the AoA does not constrain bad policies much either, such as distortionary subsidies in industrialized and also developing countries, which may not lead to a more competitive or equitable economy. Rather than the lack of legal policy space, the most important factors in designing and implementing adequate trade and nontrade policies to support agricultural and food production, enhance food security, alleviate poverty, and protect the environment are financial and human resources and institutional capabilities in poor developing countries.



## CLOSING REMARKS

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**G**iven the important economic, social, and political implications of agricultural production and food security, governments usually utilize a variety of interventions directed to those topics. The range of economic policies is wide both in scope (covering the farmer, the rural setting, and the value chains, plus different aspects of overall economy) and in the policy areas considered and the instruments utilized (Chapter 1). Macroeconomic policies are just a component of that broader range of government interventions, but they can have significant effects on agriculture and food security, affecting in turn the achievement of policy objectives such as sustainable growth, poverty and inequality reduction, food security and safety, environmental sustainability, and regional/area development (Chapters 1 and 2).

This book presents a simplified framework, focusing on developing countries, to analyze macroeconomic policies (basically fiscal, monetary and financial, exchange rate, and trade topics) and their interactions with the agricultural sector, extensively utilizing the accounting identities of national accounts. Those equations provide the foundations for broader macroeconomic analysis. There may be different theories (called opinions in this book) about how the whole economy, individual markets, and people behave, but the consistency framework based on the discipline of the double-entry accounting provides an organizing principle that cannot be ignored. Chapters 1, 2, 4, 5, 6, and 7 explore different aspects of that consistency analysis. Then Chapters 8 to 11 present a range of approaches to fiscal, monetary and financial, exchange rate, and trade issues.

This chapter focuses on a series of policy messages and concepts that summarize, at the risk of being repetitive, some of the main points discussed in the book. It is hoped that these final comments, and the whole book, help policymakers and practitioners in developing countries to further develop and organize their own views on macroeconomic policies, agriculture, and food security.

## General Policy Issues

### **Acknowledge the Relevance of Agricultural and Food Production for Overall Economic Growth, Poverty Alleviation, and Food Security**

Agricultural and food production and the extended agro-industrial sector represent important percentages of GDP, employment, and exports in developing countries. Different empirical estimates suggest that agriculture-led growth has larger multipliers for the rest of the economy than other alternatives in developing countries, particularly low-income ones, because of different backward and forward linkages and cumulative dynamic effects over time, through expanded employment, investments, and technology adoption.

Moreover, several studies have shown that agricultural growth is pro-poor (it reduces poverty or increases the income of the lower levels of income distribution) and it seems to have larger impacts on poverty reduction than when growth takes place in other sectors of the economy. This is unsurprising, considering that in some estimates up to three-quarters of the world's poor live in rural areas and depend on agriculture-related activities for their employment and incomes. Agricultural and food production help to reduce poverty and increase food security through different channels: they increase producers' income; generate more employment opportunities in rural areas; help to stabilize food supply and prices for net buyers, urban and rural; and, as noted, generate positive multiplier effects for the rest of the economy.

Exceptions to these results appear in developing countries with large inequalities in land holdings: an agrarian structure based mainly on large mechanized farms is not the same as one based on small family farms and poor producers. Furthermore, some agricultural products, such as cereals and dairy, have influence not only on incomes and employment but also on consumption for the poor, whereas others, such as coffee or sugar, mainly impact incomes and employment in agriculture but have a smaller influence on the consumption basket. Therefore, the net effect on poverty of policies supporting different products may vary. The correlation between agricultural development and poverty alleviation also weakens at higher levels of a country's national income.

In any case, poverty and food security are multidimensional concepts, affected by many factors and policies beyond agricultural and food production, as emphasized several times in this book. Food security requires physical availability of food, economic access to it, nutritious food and its use in a healthy environment, and stability in access and use. Poverty, in turn, is affected by what Sinha, Lipton, and Yaqub (2002) called "damaging

fluctuations,” such as (1) violence (wars, civil strife, and the like); (2) natural disasters; (3) harvest failure; (4) disease or injury; (5) unemployment or underemployment; and (6) shocks that worsen the relative prices of food, especially when compared to income. For poor and food-insecure households, the main issues are exposure and vulnerability to these damaging fluctuations, including macroeconomic crises that lead to abrupt and large devaluations, high inflation, and important drops in production and employment. Analyses based only on comparisons of food prices with wages or an exclusive focus on food price fluctuations may miss the main causes of poverty and food insecurity.

In summary, a healthy and dynamic agrifood system appears to be a necessary foundation for strategies of economic development, poverty alleviation, and food security in many developing countries. This book also aims to show that appropriate macroeconomic policies are important factors within an overall strategy and policy framework that considers agricultural and food production as an important component.

### **The Focus on Agriculture and Food Activities Should Balance the Interests of Producers and Consumers and Consider the Economywide Effects of the Policies Analyzed**

The previous section presented the case for a policy framework of incentives and investments that support agriculture and food production, noting in particular the presence of small farmers and poor producers and the positive multiplier effects of agriculture for the rest of the economy in developing countries.

Yet, early studies showed that, overall, developing countries seemed to have followed an opposite strategy, favoring consumers in urban centers and supporting the process of industrialization and the rest of the economy through low agricultural and food prices, overvalued exchange rates, taxation of agricultural exports, and other mechanisms transferring incomes from the agricultural sector. This policy configuration seemed to display a policy bias against agriculture or an urban bias in development.

Industrialized countries, on the other hand, have used transfers from consumers (through border protection) and from taxpayers (through subsidies paid through the budget) to maintain high prices for producers, with a policy bias in favor of agriculture. Some of those countries have defended that policy approach with the notion of the multifunctionality of agriculture, which argues that the sector creates public goods for the economy whose importance goes beyond the market value of food and fiber as such. In this line of thinking, these effects are considered inseparable from production and may require



maintaining subsidies and protection for agriculture. But the issue, as discussed below, is whether expanding agriculture in a country on account of its assumed multifunctionality may negatively affect other sectors in that country or the agricultural and food conditions in its trade partners.

Policy reforms in many developing countries during the 1980s, 1990s, and 2000s, however, appear to have reduced or even eliminated the past price bias against agriculture, although the urban bias in the allocation of investments and public services (as suggested by Lipton 1977) may still be present in several low- and middle-income countries.

A question now might be whether developing countries, after removing the price bias against agriculture, may move further toward a policy bias in favor of agriculture. In evaluating this question, it is necessary to consider three aspects. First, the price bias is different from the urban bias in investments and public services. This book has shown that with some exceptions, protection and support for the agricultural sector in several developing regions is increasing (a price bias), while the urban bias against it may still remain.

Second, price policies must also consider the interests of poor consumers, both urban and rural, who spend large percentages of their income on food and may suffer from different types of malnutrition. Landless rural workers and many poor small farmers are net buyers of food as well. At the same time, it should be noted that, with increasing urbanization in developing countries, the percentage of urban poor has been steadily increasing in several developing countries, with food insecurity and malnutrition moving from rural to urban areas.

Therefore, a policy framework that tries to favor agriculture and food production by maintaining artificially high prices for those products will affect poor consumers negatively. As argued in Chapter 2, the positive multiplier effects of agriculture on overall growth and poverty reduction may not materialize if farmers, comfortably supported by high protection and subsidies, do not increase investments and productivity. Also, the distorting support of agriculture increases wages and production costs in other sectors that then become less competitive and may even contract, with potentially negative impacts on overall production and employment (more on this below).

Certainly a government may try to keep producer prices high and consumer prices low through subsidies and market interventions. Many developed countries have followed that strategy in the past, and several still do. But these countries, although imposing welfare costs on their population and the rest of the world, may be able to afford that approach because the agricultural sector and the population in poverty represent smaller percentages of the economy and society. On the other hand, developing countries that tried such

an approach have usually found the policies unsustainable, mostly because of the fiscal cost that they incur given the large incidence of agricultural activities and poverty.

Third, any policy framework for agriculture must consider the economy-wide impact of the expansion of agriculture on other sectors. Developed countries, as noted, have argued that the multifunctional effects of agriculture merit special treatment. However, if that notion is accepted for agriculture, then other productive sectors may have their own multifunctionality as well. In fact, a similar notion of positive externalities was behind the drive toward industrialization in developing countries after World War II. According to that view, the multifunctionality of industry was significant: there were positive political and social externalities (such as political sovereignty, social modernization, more entrepreneurial spirit, a more pluralistic and participatory political and social life); in economic terms, it would counter the postulated declining terms of trade of countries exporting agricultural products (or primary products, in general); it would also lead to higher growth and employment through technological spillovers, backward and forward linkages, and strategic complementarities; and it would help with macroeconomic stability, making the economy less vulnerable to external shocks. In summary, according to these arguments, the multifunctionality of industry—although it was not called that—appeared substantial (see the discussion and references in Díaz-Bonilla and Tin 2006).

However, the expansion of a sector using protection and distorting subsidies may negatively affect production and employment in other activities through transfers of incomes and productive resources from these other sectors. This can happen when certain key productive resources (such as capital or skilled labor) are already employed or in limited supply and their use by the privileged sector implies that other activities must contract. This is argued to have happened in developing countries that followed strategies of import substitution industrialization, where the set of policies favoring industrial expansion would have affected the agricultural sector. But this is a more general result that can work the other way if agricultural activities are supported with protection and subsidies paid by the rest of the economy and they expand beyond what would have been the case under a more neutral policy regime.<sup>1</sup>

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<sup>1</sup> Also, when a productive sector is important internationally, such as agricultural and food production in developed countries, if it expands beyond what would have been the case under less distorted policies, the equivalent sector in other countries (such as agriculture in developing countries) may have to contract, affecting the postulated benefits of multifunctionality, if they exist, in those other places as well (Díaz-Bonilla and Tin 2006).

A more adequate answer to the question of how to support agriculture in developing countries that balances producers and consumers and takes into account economywide effects on other sectors is (1) to maintain a reasonably neutral system of price incentives, rather than moving from a negative to a positive price bias for agriculture (which may affect other productive sectors and consumers); and (2) to redress the urban bias in investments and public services in general.

The most effective way to support agricultural production and food security in ways that consider the interests of producers and consumers and maintain a balanced development strategy is through interventions that improve production efficiency and reduce costs, all of which increases profits and incomes for agricultural and food producers while contributing to reducing prices and expanding availability for the agro-industry, consumers, and net exports.

A policy approach that increases rural welfare and agricultural and food productivity and contributes to overall growth should focus on policies and investments in rural areas and in the value chains to enhance human capital (health, nutrition, and education); improve productive capital and infrastructure; increase agricultural R&D and the adoption of technology; promote climate change adaptation and mitigation and facilitate an appropriate management of natural resources; ensure the adequate functioning of product and factor markets; and expand land ownership and access to water by small and family farmers and landless workers, creating a more equitable agrarian structure. A dynamic and expanding agricultural sector will trigger the dynamic linkages already mentioned, helping with production and employment in other sectors. Higher productivity will help reduce food prices for consumers. Finally, the challenges faced by poor and vulnerable populations can be addressed through properly designed and funded safety nets (such as conditional cash transfers, school lunches, women and infant nutrition programs, food-for-work, and the like).

An overall adequate policy framework for agricultural growth and productivity, food security, and poverty alleviation should also encompass other aspects of good governance, including strong efforts to reduce corruption and ensure the rule of law; macroeconomic stability; women's empowerment programs; support for community organization and participation, particularly for the poor and vulnerable; and maintenance of law and order in rural areas. As noted, this list of policies includes but goes clearly beyond the macroeconomic policies discussed in this book. However, an adequate macroeconomic framework facilitates the design and implementation of many if not most of the other policies mentioned above.

**The Design and Implementation of Macroeconomic (and Other) Policies Need to Consider Price Variables but Also Quantity Variables, Such as Employment, Both in the Short-Term Impacts and in Their Medium- and Long-Term Effects**

Early empirical analyses of the connections between macroeconomic policies and agriculture in developing countries typically emphasized price effects caused by trade and exchange rate policies and focused on two main indicators: the real exchange rate (an index of relative prices of tradable to nontradable products) and the internal terms of trade between the agricultural and nonagricultural sectors. However, the impacts on agriculture stemming from different macroeconomic conditions involve a larger number of variables and channels. This book takes a broader view of the agricultural impacts of macroeconomic issues and policy options, considering (1) the proper alignment of aggregate demand and aggregate supply; (2) the level, stability, and sustainability of macro prices; (3) the avoidance of economic crises; and (4) the potential social and microeconomic implications. These policies operate at four different levels: the farmers, who represent the primary supply side; the functioning of the whole economy and the opportunities for trade (which define the demand side); the links between supply and demand through the value chains; and the geographical setting where those activities take place.

While growth models tend to focus only on the supply side, it is crucial to consider the demand side, both domestic and external. In general, it is necessary that macroeconomic (and other) policies maintain aggregate demand growth in line with potential aggregate supply, ensure socially inclusive and broad-based growth, and facilitate trade opportunities as part of the demand for agricultural products. Macroeconomic policies also need to ensure sustainable macro prices (such as exchange rate, interest rates, and wages) that define the relative incentives between agricultural and nonagricultural activities, with important implications for the growth path of the economy. Also, macroeconomic policies affect the prices and availability of factors of production and inputs (from credit availability to access and prices of inputs and machinery), the level and composition of investments, employment, and the technological bias as well. In general, the crucial links between agricultural supply and the domestic and external demand, ensuring that overall demand is translated in specific market opportunities for agricultural producers, are all influenced by macro policies that affect the provision of public goods and infrastructure for the rural economy and the operation of value chains. Finally, as noted in Chapter 2, an important objective of macroeconomic policies is to

avoid economic crises, which affect growth, poverty, and food security both when they happen but also in the future through different channels such as the deterioration of human and productive capital.

A broader analysis must consider both the static, short-term effects of policies and changes in macroeconomic scenarios and the dynamic, longer-term results, considering the agricultural and nonagricultural components of the economy.

In particular, it is important to consider whether the domestic economy is close to full employment or whether there is considerable underutilization of human, capital, and natural resources. Actual conditions in developing countries normally do not resemble the full-employment assumptions of some macroeconomic and trade analyses (that mainly estimate the usually small welfare gains from reallocation of fully employed, fixed resources) and poverty studies (that simply compare prices of food and wages, without considering employment effects).

But developing countries do not fall on the other extreme of factors of production and resources that are completely unemployed and readily available for production. In the intermediate cases, the impact of different policies on aggregate demand, production, and employment may vary significantly. Favorable prices and other incentives for the agricultural sector in the presence of significant unemployment and land and water availability may have large multiplier effects for the economy: expanded agricultural incomes increase demand for nonagricultural products and lead to more employment and production in nonagricultural activities, with further rounds of expansionary effects for the economy as a whole. The overall economic expansion under these Keynesian conditions is clearly larger than under the classical and neo-classical full-employment assumptions (see, for instance, Diao et al. 2005). On the other hand, if an economy is operating at or close to full employment (or if other key factors of production or inputs are scarce and are already utilized in other activities), agricultural and food production can expand only by taking labor and other resources from nonagricultural activities; therefore, the multiplier effects on the rest of the economy from an expanded agricultural sector may be small or nil.

An issue related to the assumption about unemployment and full employment refers to how homogeneous and mobile the factors of production are. Regarding homogeneity, the question is whether labor (and also capital) employed in a specific production activity can be employed in other activities or whether those factors of production can operate only in one sector (specific factors). Mobility is related to factor specificity, but it goes beyond that: a

specific factor is immobile by definition. But there may be several alternatives in between the two extremes of all factors being mobile and all of them being specific.

A case relevant for agriculture is land as a factor of production: it may have alternative uses within agricultural activities (but not necessarily for all of them) but would not have significant uses outside that overall sector. Other factors of production may move (say skilled workers and capital), but unskilled farm labor (family or hired) may not be very mobile across different activities, at least during the short to medium term. Also, factors may move at different speeds. In general, in the short term most factors are specific, and only with the passage of time will they be able to move across activities, in which case the transition to a new economic configuration may be different depending on the assumptions about the potential mobility. Slow or limited mobility in labor, capital, and land implies that any reallocation of factors and resources will take time and will include potentially significant transition costs.

In particular, the poor and vulnerable, including small farmers and rural workers, may not be able to adjust to sharp external shocks or drastic policy changes that affect their livelihood strategies, and they cannot be simply accommodated by labor moving to other activities as it is assumed in some policy analyses. In such cases, there may be substantial transition costs for those involved, and very negative shocks may even compromise their livelihood strategies on a permanent basis if, for example, they have to sell livestock or other productive assets or take children out of school.

The analysis of adjustments in factor markets related to agricultural and food production needs to be based on a realistic consideration of the levels of unemployment and the important limitations in labor mobility across activities in many developing countries.

### **When Focusing on Prices, It Is Necessary to Distinguish Policy Debates about Levels (and in Particular the High/Low Price Dilemma) and Volatility**

The level, changes, and volatility of prices in nominal and real terms are important variables to be considered in macroeconomic and agricultural analysis, although certainly they are not the only ones. On the agricultural side, Schultz (1964) argued that farmers in developing countries react to price incentives as much as their counterparts in richer countries. While the response to relative price incentives had been long recognized for individual agricultural products, the reaction of the aggregate agricultural supply to overall relative incentives, although more difficult to calculate, has also been

estimated to be responsive to relative prices (especially when longer horizons are considered) within the constraints faced by the producer.

This book has analyzed the effects of different types of adjustments in prices, and it was argued that it is important to differentiate changes in price trends from changes in price volatility around the trend (cycles and extreme events) both for food production and food consumption. Price levels affect profits of food producers (and therefore the incentives to produce) and the food costs to consumers (and consequently their economic access to food, as already discussed). Volatility in prices generate uncertainty about the true price level for producers and consumers, and therefore the production and consumption decisions may be less efficient than what would have been the case under more stable prices.

The discussion of prices in levels reflects the policy dilemma, mentioned several times in this book, about high food prices for producers (presumably supporting production growth) and low prices for consumers (ostensibly to help the poor). In terms of the components of food security, high prices would increase availability, which helps with physical access but may affect economic access, particularly for the poor and vulnerable. The evaluation of that policy dilemma requires considering not only the impact (or immediate effect) of high or low food prices but also the dynamic effects in the medium to long term and to evaluate the wider economic linkages of agricultural and food production. In the last analysis, the resolution of the dilemma, as argued throughout this book, depends on the use of a range of policies and needs to consider the role of agriculture and food production (with the positive multiplier and dynamic effects discussed before) in the overall development strategy.

Regarding price volatility for producers, the uncertainty tends to shift production toward low-risk but also less-productive technologies. But the potential production costs of that volatility must be compared with the overall economic losses from badly designed and fiscally costly public attempts to stabilize prices. In the case of consumers, more than volatility per se (which implies that prices may go up or down), it is high food inflation (that is, when prices move consistently up) that affects them negatively through reduced or, at least, uncertain access to food. This is particularly the case with poor and vulnerable households whose incomes do not adjust with inflation and who do not have assets or access to credit that can be utilized to stabilize consumption patterns. But food inflation is more closely related to erroneous macroeconomic policies and may not be corrected by agricultural-based price stabilization efforts.

Also, as noted before, there are many factors affecting poverty and food insecurity beyond the level and volatility of prices. Therefore, it is important to take a multidimensional view of the problems involved because a single variable or policy intervention will not address the multiplicity of factors affecting poverty and food insecurity.

**Macroeconomic Accounting Identities Always Balance One Way or Another (Sometimes through an Economic Crisis): The Accounting Linkages Imply That the Macroeconomic Program Needs to Be Considered as a Whole in an Integrated Policy Framework**

Inconsistent economic programs may project values of macroeconomic variables that do not fulfill the accounting identities *ex ante*, or, if they do fulfill those identities, it is by assuming values for key variables that do not seem realistic given the historical experience. Also, those projections may imply unsustainable levels for some variables (for example, the accumulation of public and/or private debt, internal or external, as percentage of the GDP), and so on. If an economic program is perceived as inconsistent or unsustainable, private agents will most likely adopt behaviors that would derail the program and negatively affect the economy (such as maintaining high inflationary expectations, asking for very high real interest rates to keep their assets in local currency, mounting speculative attacks on the local currency, postponing investment decisions, and so on).

Moreover, significantly inconsistent macroeconomic programs tend to end in economic crises. Crises may come in a variety of flavors, but those that affect the financial/banking system have the largest negative impacts on the economy and society. Besides the damage to productive sectors, macroeconomic crises have particularly grave implications for poverty and food security. So one of the most important things a policymaker can do to improve food security is to avoid macroeconomic crises. A corollary is that governments need to make sure that specific policy interventions to address food security concerns (such as different production and consumption subsidies) do not generate macroeconomic imbalances that may lead to more damaging crises.

Consistent economic programs, on the other hand, consider carefully the accounting identities, look at the internal and external balance of the economy (striving to align aggregate supply and demand), monitor macro prices (particularly the real exchange rate), and try to maintain the economy on an even keel. These consistent economic programs need to consider within a single policy framework all macroeconomic policies related to fiscal, monetary and financial, exchange rate, and trade issues.



### **Consider Complementarities, Trade-Offs, and Inconsistencies across Objectives and Instruments: Remember the Tinbergen Rule and the Bhagwati Principle**

Chapters 1 and 2 discussed objectives of economic programs, such as (1) growth and employment, (2) microeconomic efficiency, (3) achieving a sustainable equilibrium in the balance of payments, (4) controlling both inflation and deflation, and (5) eliminating poverty and improving income distribution and opportunities (the numbers do not imply any hierarchy of importance). Also, those chapters highlighted the potential contributions of agriculture and food production to the five objectives of growth, poverty and inequality reduction, food security and safety, environmental sustainability, and regional/area development. In Chapters 8 to 11, a variety of instruments for fiscal, monetary and financial, exchange rate, and trade policies were reviewed.

Because of the multiplicity of policy objectives and instruments, there may be a wide variety of complementarities across them; but inconsistencies, incompatibilities, and unwanted side effects may emerge as well. Several examples are mentioned in this book, such as the dilemma about high or low food prices or the trade-offs between a high interest rate aimed at lowering inflation but that may affect growth and employment. Other examples included issues such as whether a government should mainly subsidize inputs for small farmers, hoping that this will help to reduce poverty and increase production, or whether a strict targeting of small farmers that leaves larger farmers out of the program will affect the production objectives desired.

Policymakers sometimes tend to present policies to the public by listing a variety of objectives, as if they were all achievable at the same time. But it is usually very difficult to avoid some level of inconsistencies and trade-offs among them. It is very important to be aware of this fact and to identify clearly those potential conflicts to devise appropriate policies.

In terms of aligning objectives and instruments, it helps to remember the two general policy notions discussed in Chapter 1: one is the Tinbergen rule, which says that it is usually necessary to have at least as many instruments as objectives; the other is the Bhagwati principle, which argues for the need to tailor policy interventions as closely as possible to the source of the problem in order to minimize unwanted side effects. An example of this principle, repeated several times in the book, is that if a government wants to help the poor and vulnerable, it should use policy instruments (such as cash transfers) focusing directly on them. Targeting specific food products (even if called food security crops) may not be the most efficient and equitable way to reach the intended objectives of poverty reduction and food security.

A separate corollary of the previous discussion is that individual macroeconomic policies (or any general policy for that matter) cannot be analyzed individually without a clear reference to the entire economic program (explicit or implicit) of which they are a component. It was mentioned, for example, that the expansion of money supply will have different impacts depending on whether fiscal policies are expansionary or restrictive, exchange rates are fixed or floating, and the economy has open or closed trade and financial links with the rest of the world.

### **Consider the Interaction of Macroeconomic Policies with the Structure of the Economy**

Macroeconomic policies are filtered through and interact with the structure of an economy, with a variety of impacts across developing countries with different structures. A policymaker or policy analyst should try to understand the main characteristics of the country of interest that may be relevant for the issues analyzed. Chapter 3 and different chapters in Part 3 discuss several structural issues, from the agricultural-based classification of the World Bank's 2008 *World Development Report* (divided into agriculture-based countries, transforming countries, and urbanized countries) and different productive conditions in the developing regions of Africa, Asia, LAC, and Central Europe to the diversity in degrees of financial integration, dollarization of the economies, exchange rate and monetary frameworks, and fiscal conditions.

Just as an example, Table 12.1 presents three possible archetype economies using different dimensions discussed in this book, combined with some macroeconomic policy choices as well.

These three examples do not exhaust the potential categories, which can be expanded just by reordering cells in some rows (for example, it was noted in Chapter 10 that there are low-income agricultural economies that are dollarized and that have lower levels of capital controls, which is different from the characterization utilized in Table 12.1 for Type A countries). Although some of the variables are based on actual data, the three examples are just hypothetical constructs to highlight possible dimensions to be considered when analyzing real cases.

For example, a Type A country (which may resemble the case of several SSA countries) may have to expand public expenditures to improve infrastructure, health, and education, correct the urban bias, and support the poor and vulnerable, who are mostly in the rural areas through expanded safety nets. Formulating a more independent monetary policy, which is allowed by the existence of capital controls, is nonetheless limited by the fact that the ER acts as nominal anchor. These countries should expand the coverage of the

financial system, trying to avoid dollarization, which would require keeping inflation under control and maintaining a somewhat undervalued ER. They must monitor developments in commodity markets and adjust the ER considering the evolution of prices of the main export(s). Finally, these countries should avoid or reduce the Dutch disease effects of concessional aid by investing those resources to increase the productivity of the economy.

**TABLE 12.1** An example of a typology of developing countries

Category	Type A	Type B	Type C
Income (as developing countries)	Low	Middle	Upper middle ("emerging markets")
Agricultural type (World Bank classification)	Agricultural based	Transition	Urbanized
Agrarian structure, investment, and infrastructure	Small farmers, low investment, weak infrastructure	Small farmers, higher investment, better infrastructure	Dual agrarian structure, higher investment, better infrastructure
Poverty and hunger/food insecurity indicators	High; mostly rural; undernutrition and lack of vitamins	Middle; balanced rural and urban; incipient problem of triple burden of malnutrition	Low; mostly urban; more extended problem of triple burden of malnutrition
Fiscal issues 1: expenditures and revenues	Low 20%	Between 20% and 30%	More than 30%
Fiscal issues 2: public debt	Concessional	Nonconcessional Less than 50% GDP	Nonconcessional 50% or more of GDP
Monetary and ER frameworks	ER based (Type 2 in Chapter 10)	Managed ER with monetary targets (Type 3)	Floating ER with inflation targeting (Type 4)
Banking/financial issues	Low financial development; not dollarized	Intermediate financial development; intermediate to no dollarization	Higher financial development; intermediate to high dollarization
International financial transactions	Controls in current and capital accounts of the balance of payment	More open current and capital accounts of the balance of payment	Liberalized current and capital accounts of the balance of payment
	External debt (public and private) less than 30% of GDP	External debt (public and private) 30–50% of GDP	External debt (public and private) 30–50% of GDP or more
Trade	High % of GDP; commodity exporter	Medium to high % of GDP; more balanced structure of exports between primary commodities and manufactures	Medium % of GDP; intermediate balance in the structure of exports, with a nontrivial presence of primary commodities

Source: Author.

Type B countries (which could include some middle-income countries in Asia) may have to be more concerned about the efficiency and composition of public expenditures. They would also benefit from the expansion of a targeted safety net. Monetary policy has more room to operate, considering that the capital account is closed and the ER is not used as nominal anchor (and therefore these countries have the option of following a policy of purposefully undervaluing the ER to maintain external competitiveness, as some countries in that category do). Commodity developments are less relevant than in Type A countries, and Dutch disease effects, if they are present, may be more related to private capital flows (and perhaps remittances). They need to monitor the currency imbalances in the financial sector, as well as surges in credit growth.

Type C countries (with examples from several emerging countries in LAC) do not have much room to keep expanding public expenditures: they need to work on the efficiency and composition of public expenditures, shifting to public goods and targeted safety nets. There may be a trade-off between inflation targets that are too tight and lower growth associated with the overvaluation of the ER. Commodity developments on the export side are perhaps less relevant than in Type A countries but more so than in Type B countries. Dutch disease effects may be more closely related to private capital flows and remittances. Type C countries need to reduce the degree of dollarization in the financial sector and design improved financial regulations to monitor currency mismatches and surges in credit growth.

Again, these are just examples, and there are important differences within the developing regions, as emphasized many times in this book. In the final analysis, each country is unique and requires a specific characterization of possible combinations of the structure of the economy with the relevant macroeconomic dimensions.

### **Understand the Global Context and Anticipate Problems Linked to Drops in World Growth, Sharp Declines or Increases in the Prices of Commodities, and Destabilizing Changes in Key Exchange Rates, Interest Rates, and Capital Flows**

Macroeconomic policies in developing countries need to respond to global macroeconomic developments, which heavily influence the efficacy of any domestic policy framework. Therefore, policymakers and policy analysts in developing countries need to be acutely aware of the global context. Chapter 3 aims to make that point by showing, within a historical narrative, the main macroeconomic variables and links between world developments

and the performance of the economies and agricultural sectors in developing countries.

In the last few decades (Chapter 3), the world economy has experienced a trend toward deeper integration (what has been called globalization) along with different growth cycles, usually lasting about a decade. The global economy, against that background of further integration, has seen a period of rising inflation and interest rates in the 1970s followed by a long period of decline in both variables, strong gyrations in global currencies, and important ups and downs in capital flows (with associated economic booms and busts in developing countries). There were also two periods of high growth and high agricultural and commodity prices, one in the 1970s and another that started around 2005, whose continuation is unclear. The crisis that started in 2007–2008 ended a period of strong global growth led mainly by developing countries.<sup>2</sup> There are important uncertainties going forward regarding growth, exchange rates (which have been appreciating in developing countries), commodity prices (particularly energy), and climate change.

With these global conditions as a background, this book has focused on fiscal, monetary and financial, exchange rate, and trade policies in developing countries and their implications for agriculture. In general, it seems that the macroeconomic framework improved during the early 2000s in many developing countries. This has helped to stabilize growth, including in the agricultural sector, and has had beneficial impacts on the reduction of poverty and inequality and improvements in hunger indicators. However, the global financial crisis that started in 2007–2008 and its aftermath have presented new questions and challenges, with uncertain prospects on those dimensions.

History serves as a point of reference and a way to learn lessons about past actions. But the job of policymakers and policy analysts is usually forward looking. Therefore, they need to consider potential global scenarios for the economy and for the agricultural sector, including both shorter-term cyclical issues as well as medium-term trends. Building future scenarios for agricultural development and food security requires the consideration of the evolution of global economic integration, income and population growth, urbanization, changing consumption patterns, technological changes, and developments in energy markets and in climate change, which are themselves

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2 In Chapter 3, it is shown that higher growth in the 2000s has been driven mostly by developing countries as a whole, which, both in total and per capita GDP, have had the best growth performance during the last half century. However, if China is not included, growth in the 2000s, although still strong for developing countries, is clearly below that of the 1960s and 1970s.

related (the strategic dimensions presented in Table 3.6 of Chapter 3). The high-energy intensification of agriculture seen in recent decades, starting with the Green Revolution, may not be possible in the future, not only because of the impact of higher energy costs but also because of the significant levels of greenhouse gas (GHG) emissions implied in such an approach.

The appendix briefly discusses some issues that may be considered by policymakers and policy analysts when sketching potential future scenarios that would define the medium- to long-term global context for macroeconomic and sectoral policy decisions in developing countries.

### **Understand the Distributive Impacts and the Political Economy of Macroeconomic Policies**

All policies, even those that are considered of a general nature (those not directed to a particular activity or group) have distributive consequences. Some fiscal and trade policies are more obvious in that regard because specific taxes, subsidies, import tariffs, and quotas benefit certain activities or groups and are financed by the rest of the society. In the case of fiscal measures, this financing comes from the rest of the society in terms of specific taxes, the inflationary tax, or the future cost of paying for accumulated debt. In the case of trade measures, the financing comes from the consumers of the protected goods and services, who pay a higher price than would have been the case without protection. Also, some monetary and financial and ER policies may be transparent in their distributive implications: for example, if a public program of targeted credit goes to a sector or even a firm; also, if access to rationed foreign exchange is given to some sector or group. These are interventions with relatively obvious winners and losers.

Some studies have noted that for the beneficiaries of these policies, the rewards are clear and important, and therefore they lobby for the privileges, while the costs may be diffuse for society, and therefore there would be less opposition (see early discussions of these topics in Tullock 1967 and Krueger 1974). Conceivably then, every social group and economic sector may lobby for some special privilege, expecting low resistance.

But it is impossible to protect and subsidize all productive activities: if a government starts protecting, say, corn and soybean, this will affect meat and dairy activities; if the government then protects meat and dairy producers, this will affect consumers and, being wage goods, that protection may increase salaries and affect industrial production; therefore, the government may try to increase protection for the industry, but this would raise costs for all nontradable activities, which in the end will pay a higher price for food and industrial

goods;<sup>3</sup> finally, the government may decide to subsidize food, but the money to do that will come from all taxpayers or from all of society in the form of higher inflation, and so on. In the end, the whole society pays for those policies, one way or another, although it may receive some benefits as well.

The key question is whether the combination of all those public interventions leads to greater aggregate welfare, or whether it is a wasteful system of expenditures and transfers that leaves everybody equally good or bad.<sup>4</sup> Also, costs and benefits are not necessarily equitably distributed.<sup>5</sup>

In this book, there were several examples of distributive issues. For instance, looking only at the price of food, the impacts on households will be different depending on whether households are net food buyers or net food sellers. Also, the political economy implications for policies benefiting the agricultural sector will be different in the small-farmer agricultural economies of Asia than in many LAC countries with dualistic agrarian structures and large populations of urban poor. In the latter countries, macroeconomic policies improving relative prices for agriculture may help large farmers the most, with potentially negative impacts on poor urban consumers, at least initially.<sup>6</sup>

But general monetary and ER policies also have general distributive effects, perhaps less obvious than the previous examples but equally relevant. Regarding exchange rate adjustments, for example, producers of tradables generally prefer a devalued exchange rate (depending on the import content of their products), whereas nontradable activities (including government employees and those working in services in general) would benefit from an overvalued domestic currency (at least in the short term, until a balance-of-payment crisis forces a devaluation). Also, debtors in the domestic currency can be helped by devaluations that increase inflation and reduce the real cost of servicing their debt, but the situation is different in dollarized countries, where debtors may have their liabilities denominated in foreign currency.

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3 Nontradable activities, by definition, are already protected from foreign competition.

4 There is an old joke about two friends who every year gave each other a \$20 bill as a gift for the holidays. However, at some point the economy worsened and they decided that it was better to save some money by stopping the exchange of the \$20 gift.

5 Ideally, government interventions should lead to an increment in the aggregate welfare for the society (focusing on some of the market failures discussed in Chapter 1) so that, at least in theory, some people can be better off with the policy change without making other people worse off (what has been called the Pareto Criterion). However, there are also interventions and societal decisions based on some notion of justice and related to income distribution objectives (Chapter 1).

6 As mentioned elsewhere in this book, the medium- to long-term effects on growth and employment need to be considered as well.

Monetary policy is usually supposed to be distribution neutral, but this may not be the case in practice: money always enters into the economy through specific actors, not by equally endowing each citizen with the same amount of currency. Also, if, as discussed in Chapter 9, the relation between inflation and growth is an inverted U, then monetary contractions to reduce inflation may also lead to lower growth and higher unemployment, at least in the short term, with different distributive effects across social and income groups and activities.<sup>7</sup>

In summary, policymakers and policy analysts need to consider these distributive impacts. Hopefully, they will embrace a policy bias in favor of the poor and vulnerable, considering the innate dignity of every person and the greater constraints poverty and vulnerability impose on the fulfillment of each person's potential. In any case, distributive issues will also affect the possibility to articulate and maintain a viable political alliance with social groups that can support the execution of an economic program. As discussed in Chapter 1, a program may be politically unsustainable if it lacks a supportive political and social coalition, even though it can be technically implemented as envisaged (consistency) and the government wants to do it and will not change it (credibility).

### **Ensure the Collection of Good Data; Understand Its Meaning and How to Use It**

Chapter 4 presented an overview of the most important macroeconomic variables. When designing, implementing, and evaluating any policy, it is crucial to have the best data possible and to understand the meaning and limitations of the variables and numbers that appear in tables and charts. Because macroeconomic data is estimated from different sources, it helps to construct a Social Accounting Matrix (SAM) with a level of disaggregation that matches the desired analytical and policy objectives (Chapter 5). The SAM provides a consistency check on the data and defines the skeleton of macroeconomic accounts that are needed for macroeconomic analysis. Usually SAM data are in flows, but if it is available, a SAM for stocks helps as an additional consistency check and for more sophisticated policy analyses. It must

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7 For instance, Coibion et al. (2012) argue that contractionary monetary policies in the United States increase economic inequality. In their estimations, disinflationary policies have larger negative effects on the employment and wages of those persons at the bottom of the income distribution. They also find disproportionate increases in the expenditures of those at the upper end of the expenditure distribution, which they interpret as implying that there may be significant wealth transfers through changes in interest rates and inflation.



be remembered that the accounting identities of the SAM in flows drive the changes in stock variables such as physical productive capital, public debt, external debt, and so on, which define the growth trajectory of an economy, along with population growth and technological change (as discussed in Chapters 6 and 7).

There are also several other indicators and datasets that focus on specific macroeconomic aspects, such as the degree of dollarization, capital controls, financial regulations, nominal rates of protection, and the like. They can help to better understand a country's economic structure and its challenges.

Developing countries should continue their efforts to strengthen their statistical offices and their policy analysis capabilities.

## **Fiscal Policy**

### **Monitor the Fiscal Deficit, the Ratio of Public Debt, and Its Service Compared to GDP and Revenues; Develop and Maintain Fiscal Space for Countercyclical Activities**

In general, fiscal conditions appear to have improved in developing countries during the 2000s after emerging from the economic crises of the 1980s and 1990s. Still, the global crisis of 2007–2008 and the expansionary fiscal policies that many countries implemented to counter the economic decline have placed public accounts under strain again. Although this is more obvious in industrialized countries, developing countries also need to recover and maintain a stronger fiscal position. They should try to keep deficits low (say, less than 1.5 percent of GDP in absolute value), public debt below 50 percent of GDP, and net debt service at very low single digits as a percentage of GDP.

A special fiscal policy issue in many developing countries, particularly low-income ones, is managing commodity cycles (booms and busts). Although with exceptions, many of those countries appear to have managed the fiscal implications of the last decade's commodity developments somewhat more prudently than in the 1970s. Still, it is not clear whether their fiscal accounts will be strong enough when global economic conditions deteriorate in coming years as part of the usual business cycle. Therefore, for those countries with revenues and economic activity very dependent on some specific products, it would be extremely helpful to develop countercyclical instruments, such as a commodity fund.

Overall, developing countries need a stronger fiscal position to be able to invest in human capital and infrastructure, to set up safety nets for the poor and vulnerable, and to implement countercyclical policies.

### **Consider the Level, Efficiency, and Composition of Public Expenditures in Light of the Societal Objectives for Those Expenditures**

The level of expenditures should be a societal decision, aligned with desired growth, efficiency, and equity objectives. All countries would benefit from expenditure reviews that periodically evaluate the composition, efficiency, and effectiveness of public expenditures, assessing the quality of execution and evaluating impacts and effects. Still, it could be argued that lower-income countries having expenditures and revenues of 20–22 percent or less of GDP may need to increase those levels in order to invest in infrastructure, health, education, public safety, and social safety nets. On the other hand, developing countries with expenditures and revenues over 30 percent of GDP need to work first on improving the composition, efficiency, and effectiveness of expenditures.

Regarding agriculture, the issues are similar. Many developing countries that suffered from serious fiscal problems during the 1980s and 1990s reduced the level of agricultural expenditures during the 1990s, but with a better fiscal position in the 2000s, agricultural expenditures appear to have recovered. Still, the ratios of agricultural expenditures, including those in R&D, to agricultural GDP in developing countries are well below the levels seen in developed countries. Therefore, it is not clear whether the levels of public expenditures in agriculture are adequate to ensure strong and balanced economic agricultural growth in developing countries. Furthermore, the rural sector appears to lag the urban counterpart in investments in public infrastructure and services. Therefore, as mentioned before, the urban bias in public expenditures noticed by Lipton (1977) still seems to be present in many developing countries.

In addition to considering the levels of expenditures in agriculture and the rural economy, it is also necessary to analyze their composition to improve the quality of such spending. In Chapter 8, it is noted that although there seems to have been some change for the better, there is still plenty of room to improve the allocation of fiscal resources toward public expenditures that have the best payoff for agricultural productivity, poverty reduction, food security, and environmental sustainability. These expenditures and investments are usually those oriented to agricultural R&D, rural infrastructure, transport and communication, food safety, animal and plant health, environmental sustainability, enhanced land and water property rights for rural communities, and the proper operation of labor, credit, input and output markets, social services (housing, education, and health), and social safety nets.

Other expenditures, such as subsidies for fertilizers, water, and credit, may still play a role depending on the level of the country's development, either by

helping to jump-start some activities in the short term or by contributing to the correction of market failures. But the validity of these assumptions needs to be assessed carefully, as well as the economywide effects of such programs (see below).

### **Monitor and Evaluate Programs with Large Fiscal Impact**

Chapter 8 discusses in detail three types of agricultural programs that usually have important fiscal implications: price stabilization, food subsidies, and input subsidies. Chapter 9 mentions programs of subsidized agricultural credit.

The first two programs try to address problems related to the level and variability of agricultural and food prices. Possible policy approaches to confront those issues and public debates tend to revolve around public stocks to stabilize prices and subsidized food prices for consumers. In Chapters 1 and 8 it is argued that there are causes that affect agricultural production and food security besides price volatility, and that there are different policy instruments to address price instability. Therefore it is useful to take a multidimensional view of the problems of agricultural production and food security that includes price volatility along with other factors. Within that multidimensional framework, food stocks and consumer price subsidies are two among several possible policy instruments, and their contribution to national welfare will vary significantly with the design of the programs, the way they are financed, consumption diversification, the perishability of the main food products consumed in a country, the level of the country's development (which, among other things, defines the quality and extension of infrastructure and the operation of the private sector), and its geographical position (whether landlocked or not).

Another topic discussed was input subsidies. They may be necessary to increase production quickly in some low-income countries (such as those in SSA), but in other regions and countries those subsidies seem to show diminishing returns over time and in some cases may have benefit/cost ratios below 1, depending on the design and implementation (Mogues et al. 2012).

These price interventions and subsidies, if considered necessary and if they can be operated efficiently and at reasonable costs, must be embedded in an integrated policy framework for agricultural production, food security, and poverty alleviation that should include other components as well.

All these interventions must consider financial sustainability, cost-effectiveness, and an appropriate operational design. It is crucial that they are designed to address clear market failures or distributive problems and that the design and implementation are such that the program is achieving

the desired objectives in a cost-effective manner. Their evaluation should consider the full macroeconomic impact, including the form of financing (such as cuts in other programs, money financing, or debt financing), in addition to the microeconomic effects. They should also be compared to other policy instruments and approaches to evaluate whether there are other ways that may achieve the desired objectives in a more effective and efficient manner.

### **Design an Adequate Taxation and Revenue System Considering the Societal Objectives**

Agriculture is considered a hard-to-tax sector, and improvements can thus be made in this regard. Although agriculture should not be taxed at a higher or lower rate than other sectors, tax collection may be increased by integrating land and income taxes with a general value-added tax and by focusing on farmers with the ability to pay. Output and input taxes tend to generate more problems from an efficiency point of view, but their welfare and other impacts need to be analyzed in a general equilibrium framework. The decline in trade taxes has most likely improved economic efficiency, while overall revenues do not seem to have declined in most developing countries.

### **Final Remarks on Fiscal Issues**

As indicated in Chapter 8, it is fundamental to achieve a fiscal position that can be sustained over time; to design tax systems that avoid disincentive effects and are operated by an efficient and honest tax administration; to define levels and composition of expenditures that allow the attainment of the growth, efficiency, and equity objectives; and to use efficient and transparent budgetary and implementation systems for the public programs and investments.

Fiscal policy decisions must be based on informed analysis that tries to assess the short-term impacts and medium-term effects of alternative policy choices and emerge from a political process that facilitates the accommodation of the different perspectives in an integrated and longer-term plan. Finally, fiscal decisions must be analyzed in the context of the whole macroeconomic program considering the economywide impacts. As discussed many times in this book, expenditures use fiscal resources that may have a better alternative use for growth and equity in agriculture and the economy in general and are financed through mechanisms that may create second-round negative effects (such as inflationary money financing of deficits or increased indebtedness).

## **Monetary and Exchange Rate Policies**

### **Monetary and Exchange Rate Policies Must Be Considered Together and Placed within the Context of the Overall Macroeconomic Program; Potential Trade-Offs across Objectives Should Be Identified**

The main question is what monetary and ER policy framework (a) will align growth, inflation, and competitiveness in ways that support the whole economy, agricultural development, and food security in normal times; and (b) will also maintain growth, employment, and relatively stable prices and avoid sharp increases in poverty and food insecurity when the economy and the agricultural sector suffer external or internal shocks.

To answer that question, monetary and ER policies should be analyzed in conjunction with the rest of the macroeconomic variables and policies, particularly those related to fiscal accounts. Monetary and ER policies work better if a country avoids what has been called fiscal dominance—that is, the presence of high fiscal deficits that need to be financed through money creation.

The initial question refers to several objectives, which suggests the presence of trade-offs among them that need to be acknowledged and addressed as well. For instance, rising interest rates to control inflation may conflict with growth and employment objectives, may affect the stability of the financial sector, and may lead to further capital inflows that appreciate the real exchange rate (RER), affecting tradable sectors such as agriculture.

A particular trade-off in this context is related to the dual policy role of ER, which has been repeatedly highlighted in this book: as a relative price in the real exchange rate approach, which emphasizes trade and competitiveness issues; and as a financial variable in the nominal anchor approach, which uses the nominal exchange rate to control inflation and/or is concerned about the balance in assets and liabilities of domestic actors, particularly the banking system. As noted before, many economic crises in developing countries resulted from failed economic programs that did not properly articulate that dual role. Policymakers need to have at least one instrument for each goal; it would be very difficult for a government to attain two objectives (external competitiveness, as in the real exchange approach, and low inflation and financial stability, as in the nominal anchor approach) with just the ER as single instrument. Therefore, it is necessary to define the exchange rate, monetary, fiscal, and trade policies together within a consistent economic program.

### **Avoid the Overvaluation of the RER**

The equilibrium real exchange rate (ERER) is defined as the one that is compatible with both internal equilibrium (meaning that nontradable markets clear in the current period and are expected to do so in the future with a reasonable price stability) and external equilibrium (meaning that current account balances, now and in the future, are compatible with long-run sustainable capital flows). That value depends on the rest of the macroeconomic policies and may change with different conditions in global markets, such as commodity prices, capital flows, and monetary and exchange rate policies in systemically important countries (which now include more than just industrialized countries).

Governments in developing countries should monitor a variety of indicators, taking into account that all the possible ways to estimate the equilibrium RER have limitations. In particular, they must consider Dutch disease effects linked to booming tradable sectors, capital inflows (including foreign aid and remittances), the possibility of sudden reversals in those flows, and the evolution of commodity prices in the case of commodity-exporting developing countries. This means considering commodity prices in the design of inflation-targeting arrangements and evaluating whether exchange rates have deviated excessively from their equilibrium value.

Acknowledging that there are difficulties in estimating what the equilibrium RER is, developing countries should strive nonetheless to avoid appreciated real exchange rates. Governments may suffer pressures from firms and workers in the nontraded and formal sectors (government employees, industrial workers in protected sectors, services, and so on) to maintain overvalued ER. In dollarized countries, firms and individuals indebted in foreign currency may also prefer an overvalued ER (and the overvaluation of the domestic currency is also a reason for economic agents getting indebted in foreign currency in the first place).

But overvalued RERs lead to trade imbalances, excessive accumulation of external debt, the dollarization of the economy, and low growth. Episodes of acute overvaluation of the RER tend to end in widespread economic, financial, and balance-of-payment crises. Usually, these crises are accompanied by increases in poverty and deterioration of food security. Therefore, the best way of sustaining growth, alleviating poverty, and improving food security is to avoid the overvaluation of the ER and related imbalances, which lead to sharp devaluations and economic and financial crises. Also, when negative shocks happen that require adjustments in the RER, it is better to do it early rather than letting imbalances

grow, which will need more drastic measures later. Resorting to practices such as rationing of foreign exchange to avoid a devaluation would normally further deteriorate economic performance, poverty indicators, and income distribution. The best way to protect the poor and vulnerable is by avoiding macroeconomic crisis and by deploying social safety nets that can be expanded during emergencies.

While overvaluation is clearly bad for the economy, it seems that some undervaluation may be associated with a better economic performance in developing countries. If anything, erring on the side of some undervaluation helps insure against overvaluation. However, permanent and significant undervaluation of the RER is very difficult to sustain, even with extensive controls on external financial transactions, and it can impose additional costs on the economy.

Overall, the discussion of whether countries should follow fixed or flexible exchange rate regimes seems less relevant than whether they have allowed their RER to get overvalued, whatever the ER regime may be.

### **Consider Carefully the Articulation between Inflation and Growth Objectives**

Chapter 9 discusses the potential impact of both on the overvaluation of the ER and on slowing growth when inflation-targeting monetary regimes use targets that are too low. But that may happen as well with monetary frameworks other than inflation targeting. If those monetary regimes lead to less GDP and price volatility but at the expense of lower average growth and employment, then such a trade-off needs to be recognized. Governments should take into account Robert Lucas's point (Lucas 1987, 2003) about the welfare benefits of smoothing consumption being minimal compared to the impact of differences in long-term growth rates.

As noted in Chapter 9, a 2 percent annual inflation rate may be too low for a developing country, considering that reaching that target may require high real interest rates that affect growth. But inflation in the range of 25–30 percent or higher will have negative effects on growth and could also generate an appreciation of the domestic currency through other channels (such as a rate of devaluation lower than inflation, in part to try to control inflationary pressures). Additionally, inflation may have a more negative effect on the poor, which may not be compensated by higher growth (depending on how pro-poor growth is).

These concerns apply to agriculture as well: it is necessary to analyze the impact of the selected target level for inflation on agricultural performance.

The question then is whether the domestic macroeconomic policies used to reduce inflation to targets that are too low may be simultaneously slowing growth, increasing unemployment, and appreciating the real exchange rates in ways that could more than compensate for the positive impact of lower inflation on agriculture.

On the other hand, if the target is too high there may be repercussions for poverty and food security. As noted in Chapter 9, the poor cite inflation as a central concern, and, given the larger shares devoted to food, inflation in these products may be more relevant for food security than overall inflation. Therefore, there may be a trade-off between agricultural and food producers that might benefit from (somewhat) higher inflation in the prices of those commodities and the poor consumer who may suffer from it. In the end, it depends on the proper alignment of inflation targets that are not too tight to suffocate growth and employment generation but not too high that they affect the poor and vulnerable.

It is also worth recalling again that, from the point of view of food security, what is likely more relevant than price volatility (the problem that agricultural price stabilization schemes try to solve) is the problem of high and persistent food inflation (which most likely requires treatment with macroeconomic rather than sectoral policies).

### **Understand Different Types of Monetary and ER Frameworks and Different States of the World**

In trying to answer the question posed at the beginning of this subsection, it helps to remember that Chapter 10 discusses at least four types of monetary and ER frameworks, each one with particular challenges. In countries using hard ER pegs linked to the use of a foreign currency as the domestic money (Type 1), there is no independent role for the monetary and exchange policies, and those countries need to rely heavily on the rest of the macroeconomic policies. Type 2 countries use the ER as the monetary anchor and have a relatively fixed ER. Several of those countries have capital controls and low or no dollarization, and while in principle this would lead to more room to pursue independent monetary policies, the fact that they operate a fixed ER limits that flexibility. They need to articulate fiscal, monetary, ER, and other policies affecting nominal variables so that the levels of inflation do not lead to overvaluation of their currencies. Devaluations to correct imbalances, however, will not trigger the same type of debt and banking crises as in countries with more open capital accounts and dollarized economies. Type 3 countries use money targets and crawling pegs/softer pegs.



This is a heterogeneous group where it is essential to distinguish at least those countries with capital controls (and other controls on international transactions) and low or no dollarization (Type 3a) and those with low or no controls on capital and external transactions and high dollarization (Type 3b). Countries in Type 3a can expand money supply and manage the ER peg tightly at the same time, while those with open current and capital accounts and dollarization are more restricted in their choices. Type 4 countries use an IT monetary regime and have a floating or freely floating ER regime. They appear to have less inflation and volatility, but as mentioned several times, it is important to evaluate whether excessively low inflation targets may appreciate the exchange rate and negatively affect growth. Also, during the difficult global economic and financial times that began in 2007–2008, many of the developing countries in this group have used not only the short-term interest rates as monetary instruments but have resorted to a variety of monetary instruments and tried to manage their ER. Therefore, the IT framework has been more eclectic in its practical applications than in the original formulations.

Overall, the policy framework would differ between countries that have opened their current and capital accounts (most of the higher-income developing countries identified by the World Bank as urbanized economies) and those that maintain significant controls on external accounts (mostly agricultural-based and transition countries). Additionally, among those with open capital accounts, the level of dollarization of the financial system would also make a difference for macroeconomic policy.

Chapter 10 also discusses the seeming convergence of the different policy frameworks, although from different starting points: the money targeters are including inflation targets; inflation targeters are considering the ER and using changes in reserve requirements and provision of liquidity as other policy instruments; those that utilize ER anchors also must consider the consistency with the other monetary policy instruments and variables. This is a recognition that in many instances, all monetary and ER policy instruments may have to be used simultaneously and in a coordinated manner with other macroeconomic policies.

This will be particularly the case when a country tries to reduce inflation from high levels (which would need a combination of monetary targets and ER management, coordinated with other policy instruments) or when a country faces strong external or internal shocks (from surges in capital inflows to jumps in food and fuel prices to global disruptions affecting growth and financial conditions).

### **Avoid Dollarization and Promote the Use of Domestic Currency; Monitor Imbalances in the Financial Sector**

The operation of the economy and the welfare of the population is strongly influenced by how the financial system performs its three functions: as payment system for the economy, as the intermediary between savings and investments, and as key provider of insurance and risk management services. The importance of the financial system is more clearly perceived during crises that affect banks and financial institutions, which lead to deeper recessions than those generated by other possible causes.

In developing countries, these crises have usually been linked to misaligned exchange rates that led to strong devaluations to correct imbalances and that forced the collapse of affected borrowers and banks, due to unpayable loans in foreign currency (a currency mismatch). Therefore, there is now a more generalized interest in documenting and understanding the sources and interlinkages of potential risks that may lead to systemic banking and financial crises. The main policy question, then, is: What monetary frameworks and financial regulations would reduce the possibility of those crises and minimize their systemic impacts if they happen?

Regulations must ensure that banks are not affected by currency exposures (such as lending in a foreign currency to domestic economic agents that have incomes in the national currency); that they apply adequate loan-to-value ratios for their lending operations; and that they have enough capital and liquidity to confront difficult times. The regulatory authority must also be able to apply cyclical regulatory tools, such as requiring large provisions for losses or increased capital ratios when credit is growing too fast, or imposing other restraints on credit expansion if some categories of assets are showing signs of a bubble in valuations. Countries should try to limit and reduce dollarization (although there are few examples of such a process having been reversed) by keeping inflation under control and by avoiding the overvaluation of the domestic currency.

Agricultural policymakers should monitor those regulations to make sure that they do not create or reinforce a potential antiagriculture or antirural bias in the operations of the banking system.

Central banks also need to have the credibility and the financial instruments to be able to inject liquidity in the financial system without triggering currency substitution or capital flight fueled by a frightened population, while regulatory agencies must strive to avoid excesses of indebtedness (external and internal), currency mismatches, bubbles, and dollarization. Monetary policy and regulatory tools need to be articulated considering the macroeconomic dimensions of the functioning of financial systems.

### **Agriculture May Need Specific Credit Programs, Institutions, and Instruments; Consider Carefully Their Design and Analyze the Micro- and Macroeconomic Consequences**

The agricultural sector in many developing countries still suffers from the perennial problem of limited availability of medium- and long-term financing, despite the expansion in private-sector banking facilities in those countries. Private financial institutions sometimes avoid agricultural credit or discriminate against some types of farmers due to sectoral risks and high transaction costs. Therefore, differentiated credit approaches may be needed to strengthen rural public-financing mechanisms, including developing private- and public-sector financing alternatives. Specialized public institutions will need better management and incentives than existed in the past. There are examples in some countries, such as Indonesia, of the successful transformation of agricultural public banks, providing both credit to farmers and also deposits and other financial services to the rural population. If central bank funds are utilized to finance an agricultural credit program, the latter has to be embedded within a sustainable monetary program that does not lead to inflation or exchange rate crises.

A controversial issue is the subsidization of interest rates, which have fiscal implications as well as monetary and financial consequences. Considering that the final nominal interest rate is the combination of funding costs, inflation, risks, and administrative and transaction costs, public policy can help with some of the components without interfering with financial markets in the setting of funding costs. For starters, keeping inflation under control will contribute significantly to maintaining low nominal interest rates. Also, as discussed in Chapter 9, the government may offer subsidies to financial institutions to cover the relatively high administrative and transaction costs per unit of loan value that affect small farmers. Furthermore, it is possible to improve the functioning of commercial courts and public agencies working on land titling, which reduces transaction costs as well. Government investments in public goods such as agricultural R&D, small irrigation schemes, drought-resistant seeds, improved sanitation and preventive health services, and weather forecasts diminish production risks and can lead to lower overall interest rates. In some instances, the government may offer budgetary or central bank matching funds to help reduce funding costs, but these operations should be transparent and should not distort the market rates needed to mobilize rural savings.

Chapter 9 also mentions that other factors such as accessibility to local bank offices may be more relevant to rural borrowing, savings, and deposits in developing countries than the interest rate. In that regard, more extensive and more efficiently used information and communication technology (particularly cellular

phones) has proven to be very useful in reducing transaction costs and expanding financial services into rural areas. Also, small farmers face constraints in other markets such as fertilizer, seeds, extension services, soil testing, animal health, and so on. Credit alone may not be enough to overcome those constraints.

Therefore, governments need to take a holistic approach focusing primarily on problems such as those created by high inflation, uncertain property rights, inoperative land markets, and high transaction costs in financial intermediation, as argued by Swinnen and Gow (1999).

### **Final Remarks on Monetary, Financial, and Exchange Rate Policies**

Monetary, financial, and ER policies must be considered in an integrated framework that recognizes a realistic inflation target properly communicated, utilizes the different monetary instruments in a coordinated manner, is aware of potential trade-offs, tries to maintain an equilibrium ER (or somewhat undervalued ER), uses a managed but not fixed ER (with some variability so market participants are aware of currency risk and do not enter into excessive dollar debts), applies prudential restrictions on currency mismatches in debtors and financial institutions, and uses regulatory instruments that limit cycles of excessive credit growth and bubbles.

Finally, it should be recognized that in increasingly democratic societies in many developing countries, citizens care about different objectives and that, implicitly or explicitly, central banks are expected to consider them all, not only concerning inflation but also the level of output, employment, the competitiveness of the ER, the stability of banking/financial institutions, and even perhaps the overall impacts on poverty and food security of different monetary policies. From the point of view of the political economy involved, it seems unrealistic in many developing countries to insist on central banks focusing exclusively on inflation and ignoring other broader societal concerns. Therefore, central banks will have to strengthen the communication of objectives and policies, starting with inflation, but probably covering other targets and projections, and they should consider the relevant projection models and operational procedures for these more complex challenges.

## **Trade**

### **Trade Deficits and Lack of Competitiveness Are Mostly General Macroeconomic Problems and Usually Will Not Be Corrected by Trade Measures Alone**

Chapters 6 and 11 emphasize that if a country has a trade deficit ( $EX - IM < 0$ ), then it means that the country is absorbing (A) more than it is producing (GDP)

(that is,  $GDP - A < 0$ ), probably because of excessively expansionary monetary and fiscal policies (strong capital inflows or high levels of remittances may also lead to trade deficits). Trade policies that try to expand exports  $EX$  or restrict imports  $IM$  but do not modify the relation between production ( $GDP$ ) and absorption ( $A$ ) will not change the trade balance. Therefore, trade policies, as most broad public measures, must be analyzed in the context of the whole macroeconomic program and need to consider the general equilibrium effects.

The interaction with the exchange rate is particularly relevant. As discussed in Chapter 11 and earlier in this chapter, it is necessary to avoid the overvaluation of the domestic currency with its multiple negative effects. Regarding trade policies, appreciation of the ER usually leads to requests for trade protection to compensate for the declining international competitiveness, and increased trade interventions normally exacerbate the problems created by the misaligned parity. On the other hand, trade liberalization in the context of an overvalued domestic currency is a certain recipe for the destruction of production and employment in sectors that would have been otherwise competitive with an appropriate level of the ER. Also, an extremely volatile ER may lead to requests for variable tariffs and similar policies, which can generate further uncertainty and lead to violations of WTO commitments.

Besides the influence of an overvalued ER on trade, there is the reverse link as well: large trade protection tends to overvalue the ER and ends up reducing exports, which makes the economy more vulnerable to external shocks (Chapter 11 and Box 11.1).

In summary, as discussed in Chapters 6 and 11, trade protection introduced with the objective of reducing a trade deficit will not have the intended results if the internal balance of demand and supply is not modified by other macroeconomic policies. The focus should then probably be on excessively expansionary monetary and fiscal policies and an overvalued ER. Also, if the trade deficit is generated by capital inflows or remittances, trade policies will not change the underlying imbalance.

### **Trade Policies Are Usually Too General to Solve Food Security Problems, Which Take Place at the Level of Households and Individuals**

When discussing poverty and food security problems, it must be remembered that trade policies are just an instrument (and in several cases a blunt one) to address those concerns, with a variety of potential aggregate and distributive impacts that need to be considered.

Poverty and hunger materialize at the household and individual level. Therefore, as discussed before, protection for important staple crops—even if

labeled “special,” “food security staple,” or any other name suggesting the need for extraordinary consideration—do not necessarily represent the most effective, efficient, or equitable way of addressing the poverty and food security challenges of affected households. Policies should be targeted to the poor and vulnerable rather than to crops in general.

As discussed before, the most effective way out of the policy dilemma of high prices that help producers and conceivably lead to more availability (one of the components of food security) or low prices that benefit consumers and lead to more affordability (another component of food security) is through interventions that increase production efficiency, reduce costs, and increase profits for producers, while contributing to expand availability and reduce prices for consumers.

In summary, trade policies can make a positive contribution to poverty alleviation and food security within a properly defined global program of macroeconomic, investment, institutional, and social policies in which differentiated approaches and instruments are targeted to the households and individuals that suffer from poverty and food insecurity.

### **Consider the General Equilibrium Effects of Protection (or Any Other Trade Policy)**

An instinctive reaction of many policymakers and civil society observers in debates about the links to trade and agriculture is to advocate protectionist measures, self-sufficiency schemes, and the like. Sometimes investments in human capital, infrastructure, and technology (all allowed in the AoA) are dismissed with the argument that they cost money and are difficult to administer, with the implication that protection does not cost money and is easier to implement (see the discussion and references in Díaz-Bonilla, Thomas, and Robinson 2003). But, in fact, protectionism does cost money. It is important to realize that protectionism for food products operates as a privately collected and regressive tax on food. Poor consumers tend to carry the burden of this implicit tax (given the incidence of food in their expenditures), and the benefits accrue greatly for large producers (considering that they have larger volumes of production to sell at the higher internal prices allowed by protection). High tariffs and related import restrictions also increase the price of agricultural inputs to other sectors (primary and agro-industrial), affecting production and employment in the latter. Protection for food products means higher costs of wage goods and may lead to higher salaries, affecting other labor-intensive export industries. Large trade protection also tends to overvalue the real exchange rate, with negative implications for other

tradable sectors. Finally, increased trade, rather than protectionism, seems to have greater positive effects on technological advancement, investments, and productivity.

On the other hand, as explained in Chapter 11 and mentioned in this chapter, a policy of complete free trade in agriculture and food production may not necessarily increase national welfare if it leads to increases in unemployment of factors of production that are not easily transferred to other activities (they are specific factors in trade jargon) and there are no other policy instruments available to facilitate the (probably long) transition to other employment opportunities and support incomes during that process.

It is remarkable that many protectionist measures are presented by their defenders as job creators in the activities protected, without considering the general equilibrium effects of the trade measure and, in particular, what happens with aggregate employment, which may well decline due to the trade intervention suggested. On the other hand, many standard analyses of free trade assume that there is always full employment, without considering the significant increases of unemployment that ill-conceived liberalization experiments can generate well beyond the short term, affecting aggregate demand in the economy and leading to the deterioration of human capital (as well as the social, family, and individual problems related to lack of employment).

In this regard, and not only with respect to trade policies, it is important to focus on workers and producers, providing employment opportunities and helping them during unemployment and bad shocks, while at the same time allowing stagnant and unviable industries, companies, and jobs to be restructured or to disappear (Commission on Growth and Development 2010).

### **Developing Countries Should Keep Working at the WTO and in Other Trade Negotiations to Improve the International Trade Framework for Agriculture and Food Security**

Although high and permanent agricultural protection is not the answer to poverty and hunger in developing countries, there are other factors that must be considered when analyzing the liberalization of agricultural and trade policies in those countries. One of them is the presence of high levels of protection and subsidization in industrialized countries, which have continued even after the implementation of the Uruguay Round agreements. There are certainly imbalances in the Agreement on Agriculture (AoA), because industrialized countries have been able to secure exemptions for some of their policies,

allowing them the legal right under the WTO agreements to continue using significant amounts of money for distorting domestic and export subsidies.<sup>8</sup> Under some proposals by WTO members, these asymmetries may continue even if the Doha Round or another trade round is completed. Developing countries should then continue to press for a substantial reduction of distorting subsidies and protection in rich countries, and during the process they may need accelerated but temporary trade instruments to protect against unfair trade practices that can generate negative and irreversible shocks to the livelihood strategies of the poor and vulnerable countries.

A separate issue from whether the important policy dispensations for developed countries should be limited are the claims by developing countries about their need for additional policy space within the WTO. In this regard, the AoA does not seem to constrain effective policies to address agricultural and food production in developing countries (such as investments to support producers or domestic food aid for populations in need). However, the AoA does not much constrain bad policies either, which do not lead to a more competitive or equitable economy. Rather than the lack of legal policy space, the most important factors in designing and implementing adequate trade (and nontrade) policies to support agricultural and food production, enhance food security, alleviate poverty, and protect the environment are financial and human resources and institutional capabilities in many poor developing countries.

Finally, it should be noted that several developments have substantially modified the landscape for the political economy of global trade negotiations. As documented in Chapters 3 and 11, general economic advances in developing countries have been accompanied by a larger presence of those countries in world agricultural production and trade and by increasing policy support to agriculture.

During the 1990s, only one developing country was last among the top five net agricultural exporters by value and only two more were in the top ten; by 2010–2011, there were three developing countries in the largest five net exporters (and the top two were developing countries), and five out of the main ten net agricultural exporters were developing countries. On the other hand, Chapter 3 also showed that many developing countries are net importers of food and agriculture. And there are special cases such as India:

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8 The actual use of distorting domestic and export subsidies has diminished recently due to high world prices of many agricultural commodities. But the legal space to use those subsidies still exists and can be used again when prices decline.



on the one hand, this country has been climbing the ranks as a significant net agricultural exporter, and in recent years India has become the main global exporter of rice and the second of both beef and cotton; on the other hand, India's agricultural sector includes a large number of very small farmers and consumers affected by poverty and vulnerability. In recent trade negotiations, India has emphasized the latter aspect, but its trading partners have taken note of the country's increasing presence in global food and agricultural exports (Díaz-Bonilla 2014).

Not only have developing countries as a whole been advancing in production and trade globally, they have also increased their agricultural support, as noted in Chapters 3, 8, and 11. Judging by the Nominal Rate of Assistance (NRA) (as calculated by a World Bank project), the Producer Support Estimate (PSE) (computed by the OECD), and the categories of domestic support as defined in the AoA that must be notified to the WTO, support for the agricultural sector in developing countries has been clearly increasing.

The political economy of the negotiations under such a scenario may change significantly from the past rounds. Developing countries that do not have the fiscal space to grant higher levels of support and developed countries that may have the money but may be legally constrained under a new set of WTO rules may join forces against those large developing countries that have both the financial resources and the legal space under current special and differential treatment provisions, and that might even increase the policy space further under some proposals for the continuation of the agricultural negotiations (Brink 2011). Also, WTO members may be less willing to accept as valid concerns food security claims of countries that are large exporters in the global food market.

**Agricultural and Food Trade Policies Must Take into Account the New Context of Complex Value Chains and Networks of Suppliers, the Advance of Supermarkets, and the Use of Private Standards; Developing Countries May Need to Consider the Role of Competition and Investment Policies**

The current global agrifood system is large and complex: more than 450 million farmers worldwide (of which about 85 percent operate on 2 hectares or less) buy inputs, equipment, and machinery from a variety of industrial firms and then supply their products to an intricate network of processors, traders, and retailers, which in turn could reach a market of about 7 billion potential consumers worldwide (although about 12–13 percent of them lack purchasing

power and suffer from undernutrition) (Von Braun and Díaz-Bonilla 2008). Transactions and trade occur across all these segments, which have become more integrated at a global scale with big players in each one of them. Foreign direct investment in agriculture, processing, and retail (supermarkets) has increased the level of global integration. Some of the players in these segments include important state trading enterprises and large private firms that operate, both domestically and internationally, under market structures with different degrees of imperfect competition. Supermarkets are expanding rapidly into developing countries, changing how the food value chains operate there (Reardon and Timmer 2012), including the rapid increase in private standards and food safety requirements. The global agrifood system is also experiencing changes in R&D and intellectual property rights in ways that may affect farmers in developing countries and the ability to conduct agricultural research there.

All these changes have been placing competitive pressures on farmers, but they have not necessarily led to widespread exclusion of small producers: there are examples of small farmers included in procurement systems of large-scale agro-processors and supermarket chains; but those included seem to have better physical, human, and organizational capital (Reardon and Timmer 2012).

These global agrifood value chains tend to be complex. Different from the paradigm of trade analysis based on final products, comparative advantages may now be defined as the ability of firms in general (and farmers in particular) to participate in those international networks that generate a final product sourcing from different places and using a variety of goods and services. Trade (and other) policies in that context should consider measures that help insert producers in those value chains, which may be very different from a trade approach based only on border measures (WTO 2013a).

Finally, the presence of large players in different segments of those value chains highlights the need to pay attention to the relative market power of different actors, both in product and input markets (see, for instance, the discussion of imperfect competition in the global fertilizer industry in Hernandez and Torero 2011). Therefore, developing countries will have to strengthen domestic policy and legislation (such as antitrust laws) to govern monopolistic structures. There is also a parallel international challenge if the horizontal and vertical integration of the agrifood system makes the global system less competitive. At minimum, it would be useful to improve the information about competition issues related to the international agrifood system. Efficient functioning of the global agrifood system may well

need an internationally approved global policy framework in the future (for different views on these issues, see Von Braun and Díaz-Bonilla 2008).

### **Final Remarks on Trade**

In general, the best approach for developing countries is to follow a relatively neutral trade policy across products with a level of import tariffs that considers the needs of consumers, particularly the poor, for affordable food. In the case of poor developing countries with a large number of small producers who suffer from disadvantages in size and natural resource endowments and who may not have alternative employment (assuming that, within the short to medium term, those small farmers and their productive factors may be relatively immobile across activities), some compensatory price margin through trade and other general policies may be needed. Still, it must be remembered that targeted policy alternatives are usually better than blanket protection. Also, part of the process of development has historically been the transition of human resources out of agriculture. Training and human capital development, income support, and employment policies are key factors for that transition.

Food security, as has been mentioned several times in this book, is more than a trade issue, and other complementary policies for poverty alleviation will be needed.

### **Final Comments**

This book aims to present a variety of opinions, with references throughout the book to various empirical studies to showcase different approaches and results. As noted at the beginning, it is hoped that this book contains enough relevant material regarding the intersection of macroeconomic policies, agriculture, and food security to be useful to developing-country practitioners and that it provides enough background material to be useful to those interested in pursuing some topics in greater depth.

Policy analysis and the design and implementation of policies require the consideration of complex situations, which evolve over time in a context of uncertainty and lack of data. I hope that the patient reader who has gone through the book and has come to this last section does not feel the way a US president is supposed to have felt when, somewhat frustrated by analyses that considered “on the one hand this, but on the other hand that,” finally asked for “one-handed economists.” This book will have fulfilled its objective if the readers come to their own “one-handed” opinions, with some assistance from the policy framework and discussions presented here.

## **APPENDIX: OUTLINES OF POSSIBLE FUTURE SCENARIOS**

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### **Shorter-Term Issues**

In the short term (the rest of the decade of 2010s), a key question relates to the aftermath of the global financial crisis that took place in the last decade and how much longer the current period of lower global growth might continue.<sup>1</sup> It has been shown that this type of financial crisis has a lasting negative impact on growth because of the debilitating effects on the fiscal position of governments and the weakening of the solvency of consumers and the financial sector. The economic crisis has other longer-term negative effects on growth, such as a lack of investment in infrastructure by fiscally constrained governments and declines in human capital due to the effects of longer-term unemployment.

A related shorter-term issue of importance for agricultural production and food security is the evolution of biofuel mandates and energy prices. Current biofuel policies have been based on objectives such as energy independence, reduction of greenhouse gas (GHG) emissions, and support for agricultural and rural development. Yet these policies have lately been under criticism due to their contribution to high food prices, the significant cost to taxpayers and consumers of mandates and subsidies, the limited contribution to the reduction of GHG emissions (which may be even negative in some instances if indirect changes in land use are considered), and the limited contribution to energy independence under the current technological scenarios (Schnepf 2013; Laborde and Msangi 2012). Changes in these policies will alter one of the pillars of high agricultural prices of recent years.

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<sup>1</sup> This outline is based on Díaz-Bonilla et al. 2013.

However, the expansion of biofuels depends not only on those specific policies but also on the evolution of energy prices. Conceivably, even if policies become less supportive of biofuels (and therefore less distorting of food markets), very high energy prices may still provide enough incentives for further expansion of biofuel production. Therefore, for the food-versus-fuel debate it is necessary to also look at projections of energy prices.

As noted in Chapter 3, energy commodities, particularly oil, have been experiencing during the early part of the 2010s the highest real prices in the last half a century. The previous period of high oil prices in the 1970s was followed by a collapse in the early 1980s due to a global recession, the ensuing debt crises in many developing countries, and technological innovations that led to the development of deep-sea oil extraction in the North Sea, which weakened OPEC's price setting. A relevant question then is whether the world is going to experience a scenario similar to the 1980s and 1990s, in which technological developments in energy (such as those related now to shale gas and unconventional oil) and depressed global economic conditions led to a decline in energy (and agricultural) prices, or whether the world is moving to a scenario of sustained real energy prices at levels not yet experienced in history (this is discussed below). As of this writing, developments in energy markets seem to be moving closer to the first scenario than to the second one.

### **Longer-Term Issues**

Different analyses seem to consider that in the medium term, the world economy will revert to (or even exceed) the high growth previous to the global crisis of the previous decade. These projections are based on growth models that consider the accumulation of factors, rather than the growth effects of structural change.<sup>2</sup>

In fact, the acceleration of growth in previous decades appears linked to an important structural change and a particular alignment of supply and demand in the global economy, as discussed in Chapter 3.<sup>3</sup> High growth in the 1990s and early 2000s was based on the restructuring and trade

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2 McMillan and Rodrik (2011) have shown that growth in developing countries is more related to structural change than to the mere accumulation of factors without that structural change. Convergence models focus on the latter and are estimated using growth data that may reflect structural transformation but without variables in the model to account for this effect (see also the discussion of structural change and growth in Temple and Wößmann 2006).

3 Growth models operate from the supply side, assuming that demand is always there to absorb the products generated (a form of Say's Law) and that factors of production are fully employed, even though there are important variations in demand conditions. Solow (2005), one of the authors of the basic Solow-Swan growth model, has acknowledged the omission of demand considerations as a weakness of the growth theory based on this model.

liberalization of several large, previous centrally planned and dirigiste (state-controlled) economies that added significantly to global labor availability and kept prices of manufactures low (a supply-side shock). This increase in labor expanded production for world markets, particularly the United States, where expansionary monetary policies led to bubbles in houses and stocks, which in turn accelerated global demand and made the United States the “consumer of last resort” (demand-side accommodation). The international imbalances generated by that global configuration were at the center of the financial crisis of 2007–2008.

Therefore it seems doubtful that the global growth model of the 1990s and early 2000s can return, and it is not clear what growth dynamics may replace it.<sup>4</sup> The growth convergence models estimated during recent decades that project a possible return to high economic growth may be attributing to factor accumulation growth rates that have in fact been based on the structural changes mentioned, thus overestimating growth going forward.

Other headwinds may keep global growth rates below the ones suggested by convergence models, including the decline of the demographic dividend due to the aging of the world population, which will also further complicate the fiscal position in many industrialized countries; aging of the population will also decrease savings, which will put upward pressure on interest rates; the possible negative impact of climate change on growth (through more natural disasters and/or the need to tax emissions); and greater geopolitical and social conflicts linked to control of natural resources and wider income inequalities (Díaz-Bonilla et al. 2013). Another important question for the future is whether the current process of global economic integration, which has supported higher levels of world growth during the last decades, will continue or eventually slow down. If the latter is the case, then it will work against the high levels of global growth experienced during the last decades (Spence 2011).<sup>5</sup>

These factors have important implications for analyses that tend to project a world with high rates of economic growth and strong demand for food and agricultural goods, leading to higher food prices in real terms. If lower growth is combined with (a) the impact of population aging on food consumption, (b) a decline in meat consumption in industrialized countries, (c) a pattern of meat consumption in developing countries that does not converge with

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4 The short-term acceleration in world growth after 2009 was based on expansionary monetary and fiscal policies in developed and developing countries that cannot be maintained indefinitely.

5 This line of argument does not require a slowdown in technological innovation of the type discussed by Gordon (2012) to justify his low growth projections for the next decades, at least in the United States.

richer countries at the rates expected, and (d) a strong movement toward reduction of waste, then it may not be necessary to increase production by the 60–70 percent usually mentioned, and prices may not be as high as expected (Díaz-Bonilla et al. 2013).

Of course, the trends mentioned and that suggest softer agricultural and food demand growth may meet in the future a more constrained supply response as well, if climate change developments end up being more negative than current estimates or if the technological promises of the new convergence of sciences do not materialize.<sup>6</sup> In that case, a less buoyant demand projection will face a lackluster supply response, with uncertain results on price projections.

One important unknown factor is how long the cycle of technological change spurred by the Green Revolution can continue and be adapted to the daunting challenges presented by the intersection of energy supply, climate change, management of natural resources, and agricultural and food production. Larger investments in public goods, particularly R&D, are clearly needed, which requires maintaining and strengthening fiscal solvency. There are also parallel uncertainties in the case of energy developments. The traditional economic view holds that, except for short-term supply-side shocks (such as geopolitical turmoil in oil-producing countries), higher prices will generate the investments and the technological responses needed to expand supply in the medium to long term. On the other hand, the geological/biophysical view holds that there may be some supply constraints that will be difficult to overcome, and at some point oil production will peak and then decline.

The International Energy Agency (2013), under current policies, anticipates oil prices to be close to US\$120 a barrel in 2020 and \$145 a barrel in 2035 (using 2012 prices), depending on different assumptions.<sup>7</sup> These projections imply prices that by 2035 are, in real terms, close to double the average of

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6 See Committee on a New Biology for the 21st Century (2009) for the promise of the new convergence and integration of the work of biologists, physicists, chemists, computer scientists, engineers, and mathematicians. MIT (2011) describes a “Third Revolution” that combines the first revolution (linked to molecular and cellular biology that helps understand cells at the molecular level, the “hardware”), the second revolution (the study of an organism’s entire genome, which facilitates the understanding of what drives cell processes, the “software”), and current advances in information technology, materials, imaging, nanotechnology, optics and quantum physics, and computing modeling and simulation.

7 These assumptions relate to (1) future energy and environmental policies and their impacts; (2) economic growth in general and demand growth in China, India, the Middle East, and other developing regions; (3) the evolution of supply in non-OPEC countries; (4) technological change; (5) the definition and availability of spare capacity in producing countries; and (6) the projected marginal costs of oil supply and the investments needed to equalize markets in the medium to long term, among other things.

the levels seen during the price spikes of the 1970s, and 10–40 percent above the highs of 2011–2012. The compatibility of these high prices with the sustained growth rates assumed for the global economy is an open question.

On the other hand, the evolution of unconventional sources of energy, pushed by new technologies in the production of shale gas and tight oil, are changing the energy landscape and reducing gas prices in some large markets. The development of this cheaper source of energy in the United States, China, India, and LAC may have important ramifications for world agricultural and food production, considering that these regions are also key agricultural actors. The potential impacts go from the possibility of reducing the costs of fertilizers to some slowdown in GHG emissions. There can also be macroeconomic impacts that affect agricultural and food production in regions such as South America that are now the main net exporters of these products: if countries such as Brazil, and to a lesser degree Argentina, Colombia, and others, become large exporters of energy, their real exchange rates may appreciate (a Dutch disease effect) with a potentially negative effect on the agricultural sector.

Policymakers and analysts in developing countries need to follow these developments closely when considering macroeconomic and sectoral policies and their implications for agricultural production, food security and poverty, management of natural resources, and climate change.





## REFERENCES

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- Abiad, A., E. Detragiache, and T. Tressel. 2008. *A New Database of Financial Reforms*. IMF Working Paper 08/266. Washington, DC: International Monetary Fund.
- Adam, C., and D. Bevan. 2003. "Fiscal Deficits and Growth in Developing Countries." *Journal of Public Economics* 89 (2005): 571–597.
- Adams, D. W., D. H. Graham, and J. von Pischke, ed. 1984. *Undermining Rural Development with Cheap Credit*. Boulder, CO: Westview Press.
- Agenor, P. 1996. "The Labor Market and Economic Adjustment." *IMF Staff Papers* 43: 261–335.
- Agenor, P., and P. J. Montiel. 2008. *Development Macroeconomics*. 3rd ed. Princeton, NJ: Princeton University Press.
- Aghion, P., and P. Howitt. 1998. *Endogenous Growth Theory*. Cambridge, MA: MIT Press.
- Aguiar, M., and G. Gopinath. 2004. *Emerging Market Business Cycles: The Cycle Is the Trend*. NBER Working Paper 10734. Cambridge, MA: National Bureau of Economic Research.
- Alderman, H. 1991. "Food Subsidies and the Poor." In *Essays on Poverty, Equity and Growth*, edited by George Psacharopoulos, chap. 4. Washington, DC: World Bank.
- Alessina, A., and R. Perotti. 1996. "Income Distribution, Political Instability, and Investment." *European Journal of Political Economy* 40: 1203–1228.
- Allcott, H., D. Lederman, and R. López. 2006. *Political Institutions, Inequality, and Agricultural Growth: The Public Expenditure Connection*. Washington, DC: World Bank.

- Al-Riffai, P., B. Dimaranan, and D. Laborde. 2010. *European Union and United States Biofuel Mandates: Impacts on World Markets*. IADB Technical Note IDB-TN-191. Washington, DC: Inter-American Development Bank.
- Anderson, K. 2012. "National Policy Responses to International Food Price Volatility." (W. Martin and S. Nelgen, collaborators.) Presented at G20 Commodities Seminar, Los Cabos, Mexico, May 2–6, 2012. Available at [www.g20.org/images/stories/canalfinan/commodities/5\\_s2\\_k\\_anderson.pdf](http://www.g20.org/images/stories/canalfinan/commodities/5_s2_k_anderson.pdf) (accessed May 2014).
- Anderson, K., J. Cockburn, and W. Martin, eds. 2010. *Agricultural Price Distortions, Inequality, and Poverty*. Washington, DC: World Bank.
- Anderson, K., and T. E. Josling. 2005. *The WTO and Agriculture*. Cheltenham, UK: Edward Elgar Publishing.
- Anderson, K., and W. Martin. 2012. "Export Restrictions and Price Insulation during Commodity Price Booms." *American Journal of Agricultural Economics* 94(2): 422–427.
- Anderson, K., and S. Nelgen. 2013. *Updated National and Global Estimates of Distortions to Agricultural Incentives, 1955 to 2011*. Washington, DC: World Bank.
- Anderson, K., and E. Valenzuela. 2008. *Estimates of Global Distortions to Agricultural Incentives, 1955 to 2007*. Washington, DC: World Bank.
- Ando, A., and F. Modigliani. 1963. "The 'Life-Cycle' Hypothesis of Saving: Aggregate Implications and Tests." *American Economic Review* 53(1): 55–84.
- Andrle, M., A. Berg, E. Berkes, R. A. Morales, R. Portillo, and J. Vlček. 2013. *Money Targeting in a Modern Forecasting and Policy Analysis System: An Application to Kenya*. IMF Working Paper WP/13/239. Washington, DC.
- Anzuini, A., M. J. Lombardi, and P. Pagano. 2010. *The Impact of Monetary Policy Shocks on Commodity Prices*. European Central Bank Working Paper 1232. Frankfurt.
- Aoki, K. 2001. "Optimal Monetary Policy Responses to Relative Price Changes." *Journal of Monetary Economics* 48(1): 55–80.
- Arimond, M., and M. Ruel. 2006. "Dietary Diversity Is Associated with Child Nutritional Status: Evidence from 11 Demographic and Health Surveys." *Journal of Nutrition* 134: 2579–2585.
- Arndt, C., K. Pauw, and J. Thurlow. 2013. "The Economywide Impacts and Risks of Malawi's Farm Input Subsidy Program." Invited paper presented at the 4th International Conference of the African Association

- of Agricultural Economists, September 22–25, 2013, Hammamet, Tunisia.
- Arslanalp, S., F. Bornhorst, S. Gupta, and E. Sze. 2010. *Public Capital and Growth*. IMF Working Paper WP/10/175. Washington, DC.
- AZMJ. 2011. “Cracking the Nut: Overcoming Obstacles to Rural and Agricultural Finance, Lessons from the 2011 Conference.” Presented at the AZMJ Conference, October 2011, Washington, DC.
- Bacha, E. L. 1990. “A Three-Gap Model of Foreign Transfers and the GDP Growth Rate in Developing Countries.” *Journal of Development Economics* 32(2): 279–296.
- Balassa, B. 1964. “The Purchasing Power Parity Doctrine: A Reappraisal.” *Journal of Political Economy* 72: 584–596.
- . 1965. “Tariff Protection in Industrial Countries: An Evaluation.” *Journal of Political Economy* 73: 573–594.
- . 1971. *The Structure of Protection in Developing Countries*. Baltimore: Johns Hopkins University Press.
- . 1977a. *Policy Reform in Developing Countries*. Oxford: Pergamon Press.
- . 1977b. “Revealed Comparative Advantage Revisited: An Analysis of Relative Export Shares of the Industrial Countries, 1953–1971.” *Manchester School of Economics and Social Studies* 45: 327–344.
- . 1984. “Adjustment Policies in Developing Countries: A Reassessment.” *World Development* 12(9): 955–972.
- . 1985. *Change and Challenge in the World Economy*. New York: St. Martin’s Press.
- . 1986a. *Economic Incentives and Agricultural Exports in Developing Countries*. Background Papers, World Development Report 1986. Washington, DC: World Bank.
- . 1986b. “Policy Responses to External Shocks in Developing Countries.” *American Economic Review* 76(2): 75–78.
- . 1988. *Incentive Policies and Agricultural Performance in Sub-Saharan Africa*. Policy, Planning and Research. Development Economics. World Bank Working Paper 77. Washington, DC.
- . 1989. “Outward Orientation.” In *Handbook of Development Economics*, vol. 2, edited by H. Chenery and T. N. Srinivasan, 1645–1689. Amsterdam: North-Holland.
- Balassa, B., and C. Michalopoulos. 1986. “The Extent and the Cost of Protection in Developed-Developing Country Trade.” *Journal of World Trade Law* 20(1): 3–28.

- Baldacci, E., J. McHugh, and I. Petrova. 2011. *Measuring Fiscal Vulnerability and Fiscal Stress: A Proposed Set of Indicators*. IMF Working Paper 11/94. Washington, DC.
- Baldwin, R. E., and G. Cain. 2000. "Shifts in Relative U.S. Wages: The Role of Trade, Technology and Factor Endowments." *Review of Economics and Statistics* 82(4): 580–595.
- Baldwin, R. E., and P. Martin. 1999. *Two Waves of Globalisation: Superficial Similarities, Fundamental Differences*. NBER Working Paper 6904. Cambridge, MA.
- Balogun, E. D. 2007. *Banking Sector Reforms and the Nigerian Economy: Performance, Pitfalls and Future Policy Options*. MPRA Working Paper. Munich: University of Munich.
- Baltzer, K., and H. Hansen. 2011. *Evaluation Study: Agricultural Input Subsidies in Sub-Saharan Africa*. Danida Evaluation Study 2011/2. Copenhagen: Danida.
- Barrett, C. 1999. "The Effects of Real Exchange Rate Depreciation on Stochastic Producer Prices in Low-Income Agriculture." *Agricultural Economics* 20(3): 215–230.
- Barrett, C., and M. Bellemare. 2011. *The G-20's Error: Food Price Volatility Is Not the Problem*. Ithaca, NY: Cornell University Press.
- Barrett, C., M. Carter, and C. P. Timmer. 2010. "A Century-Long Perspective on Agricultural Development." *American Journal of Agricultural Economics* 92(2): 447–468.
- Barro, R. J., and X. Sala-i-Martin. 1995. *Economic Growth*. New York: McGraw-Hill, Inc.
- Batini, N., and D. Laxton. 2006. *Under What Conditions Can Inflation Targeting Be Adopted? The Experience of Emerging Markets*. Central Bank of Chile Working Paper 406. Santiago.
- Baumol, W. J., and R. Towse, eds. 1997. *Baumol's Cost Disease: The Arts and Other Victims*. Cheltenham, UK: Edward Elgar.
- Beintema, N., G. Stads, K. Fuglie, and P. Heisey. 2012. *ASTI Global Assessment of Agricultural R&D Spending*. Agricultural Science and Technology Indicators, Global Forum on Agricultural Research. Washington, DC: IFPRI.
- Benin, S., M. Johnson, E. Abokyi, G. Ahorbo, K. Jimah, G. Nasser, V. Owusu, J. Taabazinga, and A. Tenga. 2013. *Revisiting Agricultural Input and Farm Support Subsidies in Africa: The Case of Ghana's Mechanization, Fertilizer, Block Farms, and Marketing Programs*. IFPRI Discussion Paper 01300. Washington, DC.

- Berg, A., and Y. Miao. 2010. *The Real Exchange Rate and Growth Revisited: The Washington Consensus Strikes Back?* IMF Working Paper 10/58. Washington, DC.
- Bernanke, B., and M. Woodford, eds. 2004. *The Inflation-Targeting Debate*. Chicago: University of Chicago Press.
- Bhagwati, J. 1971. "The Generalized Theory of Distortions and Welfare." In *Trade, Balance of Payments and Growth*, edited by J. Bhagwati, R. Jones, R. Mundell, and J. Vanek. Amsterdam: North-Holland Publishing Company.
- . 1982. "Directly Unproductive Profit Seeking (DUP) Activities." *Journal of Political Economy* 90(5): 988–1002.
- . 2013. "Dawn of a New System." *IMF Finance & Development* 50(4): 9–13.
- Bhagwati, J., A. Panagariya, and T. N. Srinivasan. 1998. *Lectures on International Trade*, 2nd ed. Cambridge, MA: MIT Press.
- Bilginsoy, C. 1997. "A Macroeconomic Analysis of Agricultural Terms of Trade in Turkey, 1952–1990." *Journal of Development Studies* 33(6): 69–87.
- Birdsall, N., and A. Hamoudi. 2002. *Commodity Dependence, Trade, and Growth: When "Openness" Is Not Enough*. Center for Global Development Working Paper 7. Washington, DC.
- Bittencourt, G. A. 2003. "ABRINDO A CAIXA PRETA: O financiamento da agricultura familiar no Brasil." PhD diss., Department of Economic, Space, and Environment, the Economics Institute of the State University of Campinas, São Paulo, Brazil. CAMPINAS – SP. 2003. Available at <http://oatd.org/oatd/record?record=oai%5C:unicamp.br%5C:vtls000307081> (accessed on January 22, 2015).
- Blanchard, O. 2003. "Comments on 'Inflation Targeting in Transition Economies' by Jiri Jonas and Frederic Mishkin." NBER Conference on Inflation Targeting, January 23–26. Available at <http://economics.mit.edu/files/733> (accessed on January 22, 2015).
- Blanchard, O., G. Dell'Ariccia, and P. Mauro. 2010. *Rethinking Macroeconomic Policy*. IMF Staff Position Note 10/03. Washington, DC.
- . 2013. *Rethinking Macro Policy II: Getting Granular*. IMF Discussion Note. SDN/13/03. Washington, DC.
- Blanchard, O., and S. Fischer. 1989. *Lectures on Macroeconomics*. Cambridge, MA: MIT Press.
- Blandford, D. 2013. *International Trade Disciplines and Policy Measures to Address Climate Change Mitigation and Adaptation in*

- Agriculture*. E-15 Initiative. International Center for Trade and Sustainable Development (ICTSD) and International Centre Food and Agricultural Trade Policy Council (IPC). Geneva. December 4, 2013.
- Bleaney, M., and M. Francisco. 2007. "Exchange Rate Regimes, Inflation and Growth in Developing Countries: An Assessment." *The B.E. Journal of Macroeconomics* 7(1): Article 18.
- Bleaney, M., and D. Greenaway. 2001. "The Impact of Terms of Trade and Real Exchange Rate Volatility on Investment and Growth in Sub-Saharan Africa." *Journal of Development Economics* 65(2): 491–500.
- Bloomfield, A. 1957. "Some Problems of Central Banking in Underdeveloped Countries." *Journal of Finance* 12(2): 190–212.
- Borensztein, E., M. S. Khan, P. Wickham, and C. Reinhart. 1994. *The Behavior of Non-Oil Commodity Prices*. IMF Occasional Paper 112. Washington, DC.
- Bouët, A., C. Estrades, and D. Laborde. 2012. *Differential Export Taxes along the Oilseeds Value Chain: A Partial Equilibrium Analysis*. IFPRI Discussion Paper 01236. Washington, DC.
- Bouët, A., and D. Laborde. 2009. *Eight Years of Doha Trade Talks: Where Do We Stand?* IFPRI Brief 61. Washington, DC.
- Bouët, A., and D. Laborde Dubucquet. 2010. *Economics of Export Taxation in a Context of Food Crisis: A Theoretical and CGE Approach Contribution*. IFPRI Discussion Paper 00994. Washington, DC.
- Bourguignon, F., W. H. Branson, and J. de Melo. 1989. *Macroeconomic Adjustment and Income Distribution: A Macro-Micro Simulation Model*. OECD Development Center Working Paper 1 (formerly Technical Paper 1). Paris.
- Bowen, H., E. Leamer, and L. Sveikauskas. 1987. "Multicountry, Multifactor Tests of the Factor Abundance Theory." *American Economic Review* 77: 791–809.
- Brainard, W. C., and J. Tobin. 1968. "Pitfalls in Financial Model Building." *American Economic Review* 58(2): 99–122.
- Bresciani, F., G. Feder, D. O. Gilligan, T. Onchan, and H. G. Jacoby. 2002. "Weathering the Storm: The Impact of the East Asian Crisis on Farm Households in Indonesia and Thailand." *World Bank Observer* 17(1): 1–20.

- Brimmer, A. 1971. "Central Banking and Economic Development: The Record of Innovation." *Journal of Money, Credit and Banking* 3(4): 780–792.
- Brink, L. 2009. "WTO Constraints on Domestic Support in Agriculture: Past and Future." *Canadian Journal of Agricultural Economics* 57: 1–21.
- . 2011. "The WTO Disciplines on Domestic Support." In *WTO Disciplines on Agricultural Support*, edited by D. Orden, D. Blandford, and T. Josling. Cambridge: Cambridge University Press.
- Bruno, M., and W. Easterly. 1995. *Inflation Crises and Long-Run Growth*. NBER Working Paper 5209. Cambridge, MA.
- Burdekin, R., A. Denzau, M. Keil, T. Sitthiyot, and T. Willett. 2000. *When Does Inflation Hurt Economic Growth? Different Nonlinearities for Different Economies*. Working Paper 2000-22. Claremont, CA: Claremont McKenna College.
- Bureau, J. C., and S. Jean. 2013. "Do Yesterday's Disciplines Fit Today's Farm Trade?" In *Agriculture and Food Security Group Proposals and Analysis*, electronic book prepared by the E-15 Initiative. Bali: ICTSD (International Centre for Trade and Sustainable Development), World Economic Forum, and International Policy Council (IPC).
- Calvo, G. 1978. "On the Time Consistency of Optimal Policy in a Monetary Economy." *Econometrica* 46(6): 1411–1428.
- . 1998. "Capital Flows and Capital-Market Crises: The Simple Economics of Sudden Stops." *Journal of Applied Economics* 1(1): 35–54.
- . 2003. "Explaining Sudden Stop, Growth Collapse, and BOP Crisis: The Case of Distortionary Output Taxes." *IMF Staff Paper* 50: 1–20.
- . 2006. *Monetary Policy Challenges in Emerging Markets: Sudden Stop, Liability Dollarization, and Lender of Last Resort*. Inter-American Development Bank (IADB) Working Paper 596. Washington, DC.
- Calvo, G. A., A. Izquierdo, and L.-F. Mejía. 2004. *On the Empirics of Sudden Stops: The Relevance of Balance-Sheet Effects*. NBER Working Paper 10520. Cambridge, MA.
- . 2008. *Systemic Sudden Stops: The Relevance of Balance-Sheet Effects and Financial Integration*. IADB Working Paper 637. Washington, DC.
- Calvo, G., L. Leiderman, and C. M. Reinhart. 1993. "Capital Inflows to Latin America: The Role of External Factors." *IMF Staff Paper* 40 (March): 108–151.



- Calvo, G., and C. M. Reinhart. 2000. *Fear of Floating*. NBER Working Papers 7993. Cambridge, MA.
- Calvo, G., C. M. Reinhart, and C. A. Vegh. 1995. "Targeting the Real Exchange Rate: Theory and Evidence." *Journal of Development Economics* 47 (1995): 97–133.
- Calvo, G., and C. A. Vegh. 1999. "Inflation Stabilization and Balance-of-Payment Crises in Developing Countries." In *Handbook of Macroeconomics*, edited by J. B. Taylor and M. Woodford, vol. 1, chap. 24. Amsterdam: Elsevier.
- Campaigne, J., and T. Rausch. 2010. "Bundling Development Services with Agricultural Finance: The Experience of DrumNet." In *Innovations in Rural and Agriculture Finance*, edited by R. Kloeppinger-Todd and M. Sharma. 2020 Focus Paper 18. Washington, DC: IFPRI and World Bank.
- Canova, F. 1999. "Does Detrending Matter for the Determination of the Reference Cycle and the Selection of Turning Points?" *Economic Journal* 109(452): 126–150.
- Carroll, C. D. 2001. "A Theory of the Consumption Function, with and without Liquidity Constraints." *Journal of Economic Perspectives* 15(3): 23–45.
- Cashin, P. A., L. Cespedes, and R. Sahay. 2002. *Keynes, Cocoa, and Copper: In Search of Commodity Currencies*. IMF Working Paper No. 02/223. Washington, DC.
- Catão, L., and R. Chang. 2010. *World Food Prices and Monetary Policy*. IMF Working Paper WP/10/161, Research Department. Washington, DC.
- Céspedes, L. F., R. Chang, and A. Velasco. 2014. "Is Inflation Targeting Still on Target? The Recent Experience of Latin America." Research Department Publications IDB-WP-384. Washington, DC: Inter-American Development Bank.
- Céspedes, L. F., and A. Velasco. 2011. *Was This Time Different? Fiscal Policy in Commodity Republics*. BIS Working Paper. Switzerland: Bank for International Settlements.
- Chapoto, A., and T. Jayne. 2009. *The Impact of Trade Barriers and Market Interventions on Maize Price Unpredictability: Evidence from Eastern and Southern Africa*. MSU International Development Draft Working Paper 102. East Lansing: Michigan State University.
- Chen, S., and M. Ravallion. 2008. *The Developing World Is Poorer Than We Thought, but No Less Successful in the Fight against Poverty*. World Bank Policy Research Working Paper 4703. Washington, DC.

- Chenery, H., M. Ahluwalia, C. Bell, J. Dulloy, and R. Jolly. 1974. *Redistribution with Growth: A World Bank Research Publication*. Oxford: Oxford University Press.
- Chenery H., S. Robinson, and M. Syrquin. 1986. *Industrialization and Growth: A Comparative Study*. A World Bank Research Publication. Oxford: Oxford University Press.
- Cheng, E., and Z. Xu. 2004. "Rates of Interest, Credit Supply and China's Rural Development." *Savings and Development Quarterly Review* 28(2): 131–156.
- Cheng, F. 2007. "Tariff Escalation in World Agricultural Trade." In *Food Policy for Developing Countries: The Role of Government in the Global Food System*, edited by P. Pinstруп-Andersen and F. Cheng in collaboration with S. E. Frandsen, A. Kuyvenhoven, and J. Von Braun. Ithaca, NY: Cornell University Press.
- Chinn, M. 2005. *A Primer on Real Effective Exchange Rates: Determinants, Overvaluation, Trade Flows and Competitive Devaluation*. NBER Working Paper 11521. Cambridge, MA.
- Chinn, M., and H. Ito. 2008. "A New Measure of Financial Openness." *Journal of Comparative Policy Analysis* 10(3): 309–322.
- Chirinko, R. S., and S. M. Fazzari. 2000. "Market Power and Inflation." *Review of Economics and Statistics* 82(3): 509–513.
- Cho, G., I. M. Sheldon, and S. McCorriston. 2002. "Exchange Rate Uncertainty and Agricultural Trade." *American Journal of Agricultural Economics* 84(4): 931–942.
- Christ, C. 1991. "Pitfalls in Macroeconomic Model Building." In *Economic Models, Estimation, and Socioeconomic Systems: Essays in Honor of Karl A. Fox* (Contributions to Economic Analysis 186), edited by T. J. Kaul and J. K. Sengupta, 257–289. Amsterdam, North-Holland, and New York: Elsevier.
- Christiaensen, L., L. Demery, and J. Kuhl. 2010. *The (Evolving) Role of Agriculture in Poverty Reduction*. United Nations University, World Institute for Development Economics Research Working Paper 2010/36. Helsinki, Finland.
- Christiaensen, L., L. Demery, and S. Paternostro. 2002. *Growth, Distribution, and Poverty in Africa: Messages from the 1990s*. Washington DC: World Bank (mimeo).
- Chudik, A., and J. Mongardini. 2007. *In Search of Equilibrium: Estimating Equilibrium Real Exchange Rates in Sub-Saharan African Countries*. IMF Working Paper 07/90. Washington, DC.

- Cicowicz, M., C. Díaz-Bonilla, and E. Díaz-Bonilla. 2008. "The Impact of Global and Domestic Trade Liberalization on Poverty and Inequality in Argentina." Paper presented at GTAP Eleventh Annual Conference, Helsinki, June 2008.
- Cline, W., and S. Weintraub, eds. 1981. *Economic Stabilization Policy in Developing Countries*. Washington, DC: Brookings Institution.
- Coady D., and E. Skoufias. 2001. *On the Targeting and Redistributive Efficiencies of Alternative Transfer Instruments*. FCND Working Paper 100. Washington, DC: IFPRI.
- Cochrane, W. W. 1958. *Farm Prices: Myth and Reality*. Minneapolis: University of Minnesota Press.
- Coibion, O., Y. Gorodnichenko, L. Kueng, and J. Silvia. 2012. *Innocent Bystanders? Monetary Policy and Inequality in the US*. IMF Working Paper 12/199. Washington, DC.
- Collier, Paul. 2005. "The Macroeconomic Repercussions of Agricultural Shocks and Their Implications for Insurance." In *Insurance against Poverty*, edited by Stefan Dercon, chap. 7. Oxford: Oxford University Press.
- Combes, J. L., X. Debrun, A. Minea, and R. Tapsoba. 2014. *Inflation Targeting and Fiscal Rules: Do Interactions and Sequencing Matter?* IMF Working Paper WP/14/89. Washington, DC.
- Commission on Growth and Development. 2008. *The Growth Report: Strategies for Sustained Growth and Inclusive Development*. Washington, DC: World Bank.
- . 2010. *Post-Crisis Growth in Developing Countries: A Special Report of the Commission on Growth and Development on the Implications of the 2008 Financial Crisis*. Washington, DC: World Bank.
- Committee on a New Biology for the 21st Century. 2009. *A New Biology for the 21st Century: Ensuring the United States Leads the Coming Biology Revolution*. National Research Council. Washington, DC: National Academies Press.
- Corbo, V., and J. de Melo, eds. 1985. "Liberalization with Stabilization in the Southern Cone of Latin America: A Symposium." Special issue of *World Development* 13(8): 863–1015.
- Corden, W. M. 1966. "The Structure of a Tariff System and the Effective Protective Rate." *Journal of Political Economy* 74(3): 221–237.
- . 1990. *Exchange Rate Policy in Developing Countries*. World Bank Policy Research Working Paper 412. Washington, DC.

- Corden, W. M., and J. P. Neary. 1982. "Booming Sector and De-industrialisation in a Small Open Economy." *Economic Journal* 92(368): 825–848.
- Corrales-Leal, W., with M. Sugathan and D. Primack. 2003. "Spaces for Development Policy: Revisiting Special and Differential Treatment." Commissioned for the joint ICTSD, UNCTAD, and UNDP Global Programme International Dialogue on Special and Differential Treatment. May 16. Available at <http://www.ictsd.org/dlogue/2003-05-06/06-05-03-docu.htm> (accessed May 2014).
- Cottarelli, C. 2011. "The Risk Octagon: A Comprehensive Framework for Assessing Sovereign Risks." Presentation given at Sapienza University in Rome. Available at [www.imf.org/external/np/fad/news/2011/docs/Cottarelli1.pdf](http://www.imf.org/external/np/fad/news/2011/docs/Cottarelli1.pdf) (accessed on January 22, 2015).
- Dawe, D. 1996. "A New Look at the Effects of Export Instability on Investment and Growth." *World Development* 24 (December): 1905–1914.
- Deaton, A., and R. Miller. 1995. *International Commodity Prices, Macroeconomic Performance and Politics in Sub-Saharan Africa*. Princeton Studies in International Economics 79. Princeton, NJ: Princeton University Department of Economics.
- Deininger, K., and D. Byerlee. 2011. *The Rise of Large Farms in Land Abundant Countries: Do They Have a Future?* Policy Research Working Paper 5588. Washington, DC: World Bank.
- Deininger, K., and L. Squire. 1997. "Economic Growth and Income Inequality: Reexamining the Links." *Finance and Development* 34(1): 38–41.
- De Janvry, A., N. Key, and E. Sadoulet. 1997. *Agricultural and Rural Development Policy in Latin America: New Directions and New Challenges*. FAO Agricultural Policy and Economic Development Series 2. Rome.
- Delgado, C., J. Hopkins, V. A. Kelly, P. Hazell, A. A. McKenna, P. Gruhn, and C. Courbois. 1998. *Agricultural Growth Linkages in Sub-Saharan Africa*. IFPRI Research Report 107. Washington, DC.
- De Nicolo, G., P. Honohan, and A. Ize. 2003. *Dollarization of the Banking System: Good or Bad?* World Bank Policy Research Working Paper 3116. Washington, DC.
- Dercon, S., and J. Hoddinott. 2005. "Health, Shocks, and Poverty Persistence." In *Against Poverty Insurance*, pt. 3, edited by Stefan Dercon. Oxford: Oxford University Press.

- Dervis, K., J. de Melo, and S. Robinson. 1982. *General Equilibrium Models for Development Policy*. New York: Cambridge University Press.
- Desai, B., and J. W. Mellor. 1993. *Institutional Finance for Agricultural Development: An Analytical Survey of Critical Issues*. Washington, DC: IFPRI.
- Devarajan S., D. Go, J. Lewis, S. Robinson, and P. Sinko. 1994. *Policy Lessons from a Simple Open-Economy Model*. Policy Research Working Paper 1375. Washington, DC: World Bank.
- . 1997. "Simple General Equilibrium Modeling." In *Applied Methods for Trade Policy Analysis: A Handbook*, edited by Joseph F. Francois and Kenneth A. Reinert. Cambridge: Cambridge University Press.
- Devarajan, S., J. D. Lewis, and S. Robinson. 1990. "Policy Lessons from Trade Focused, Two-Sector Models." *Journal of Policy Modeling* 12: 625–657.
- . 1993. "External Shocks, Purchasing Power Parity and the Equilibrium Real Exchange Rate." *World Bank Economic Review* 7: 45–63.
- Diao, X., E. Díaz-Bonilla, S. Robinson, and D. Orden. 2005. *Tell Me Where It Hurts, an' I'll Tell You Who to Call: Industrialized Countries' Agricultural Policies and Developing Countries*. MTID Working Paper 84. Washington, DC: IFPRI.
- Diao, X., P. Dorosh, and S. Rahman. 2007. *Market Opportunities for African Agriculture: A General Equilibrium Examination of Demand-Side Constraints on Agricultural Growth in East and Southern Africa*. IFPRI Research Report Number 154. Washington, DC.
- Diao, X., and T. Roe. 2002. "How the Financial Crisis Affected World Agriculture: A General Equilibrium Perspective." *American Journal of Agricultural Economics* 82: 688–694.
- Diao, X., T. Roe, and R. Doukkali. 2002. *Economy-wide Benefits from Establishing Water User-Right Markets in a Spatially Heterogeneous Agricultural Economy*. IFPRI Discussion Paper. Washington, DC.
- Díaz-Bonilla, E. 1999. "South American Wheat Markets and MERCOSUR." In *The Economics of World Wheat Markets*, edited by J. M. Antle and V. H. Smith, chap. 13. Oxfordshire, UK: CABI.
- . 2001a. "Globalization and Agriculture: Some Facts, Interpretations, and Policy Issues." In *Globalization and the Rural Environment*, edited by O. Solbrig, R. Paarlbert, and F. di Castri, chap. 17. Cambridge, MA: David Rockefeller Center for Latin American Studies and Harvard University Press.

- . 2001b. “Globalization, Poverty, and Food Security.” In *Sustainable Food Security for All by 2020*. Proceedings of an International Conference, September 4–6, 2001, Bonn, Germany.
- . 2008. *Global Macroeconomic Developments and Poverty*. IFPRI Discussion Paper 00766. Washington, DC.
- . 2010a. “Competitive Devaluations and Related Issues.” *EconoMonitor*. Available at [www.economonitor.com/blog/2010/11/competitive-devaluations-and-related-issues/](http://www.economonitor.com/blog/2010/11/competitive-devaluations-and-related-issues/) (accessed on January 22, 2015).
- . 2010b. “Globalisation of Agriculture and Food Crises: Then and Now.” In *Food Crises and the WTO*, edited by B. Karapinar and C. Häberli. Cambridge: Cambridge University Press.
- . 2013. “Agricultural Trade and Food Security: Some Thoughts about a Continuous Debate.” In *Agriculture and Food Security Group Proposals and Analysis*, electronic book prepared by the E-15 Initiative. Bali: ICTSD, World Economic Forum, and International Policy Council (IPC).
- . 2014. *On Food Security Stocks, Peace Clauses, and Permanent Solutions after Bali*. IFPRI Working Paper. Washington, DC.
- Díaz-Bonilla, E., X. Diao, and S. Robinson. 2004. “Thinking Inside the Boxes: Alternative Policies in the Development and Food Security Boxes.” In *Agricultural Policy Reform and the WTO: Where Are We Heading?* edited by G. Anania, M. Bohman, C. Carter, and A. McCalla. Cheltenham, UK: Edward Elgar.
- Díaz-Bonilla, E., S. E. Frandsen, and S. Robinson, eds. 2006. *WTO Negotiations and Agricultural Trade Liberalization: The Effect of Developed Countries’ Policies on Developing Countries*. Wallingford, Oxfordshire, UK: CABI.
- Díaz-Bonilla, E., D. Orden, and A. Kwieciński. 2014. *Enabling Environment for Agricultural Growth and Competitiveness: Evaluation, Indicators and Indices*. OECD Food, Agriculture and Fisheries Paper 67. Paris.
- Díaz-Bonilla, E., and L. Reca. 2000. “Trade and Agroindustrialization in Developing Countries: Trends and Policy Impacts.” *Agricultural Economics* 23(3): 219–229.
- Díaz-Bonilla, E., and S. Robinson, eds. 2001. “Shaping Globalization for Poverty Alleviation and Food Security.” 2020 Focus 8, August 2001. Washington DC: IFPRI.
- . 2010. “Macroeconomics, Macrosectoral Policies, and Agriculture in Developing Countries.” In *Handbook of Agricultural Economics*,

- vol. 4, edited by R. E. Evensen and P. Pingali, 3033–3211. Amsterdam: North-Holland.
- Díaz-Bonilla, E., S. Robinson, M. Thomas, and Y. Yanoma. 2002. *WTO, Agriculture and Developing Countries: A Survey of Issues*. Washington, DC: IFPRI.
- Díaz-Bonilla, E., and J. Ron. 2010. *Food Security, Price Volatility and Trade: Some Reflections for Developing Countries*. ICTSD Programme on Agricultural Trade and Sustainable Development Issue Paper 28. Geneva: International Centre for Trade and Sustainable Development.
- Díaz-Bonilla, E., E. Saini, B. Creamer, G. Henry, and E. Trigo. 2013. *Better to Be Foresighted Than Myopic: A Foresight Framework for Agriculture, Food Security, and R&D in Latin America and the Caribbean*. Cali, Colombia: CIAT.
- Díaz-Bonilla, E., and H. Schamis. 2001. “From Redistribution to Stability: The Evolution of Exchange Rate Policies in Argentina, 1950–1998.” In *The Currency Game: Exchange Rate Politics in Latin America*, edited by J. Frieden and E. Stein, chap. 3. Washington, DC, and Baltimore: Johns Hopkins University Press and Inter-American Development Bank.
- Díaz-Bonilla, E., M. Thomas, and S. Robinson. 2002. *On Boxes, Contents, and Users: Food Security and the WTO Negotiations*. TMD Discussion Paper 82. Washington, DC: IFPRI.
- . 2003. “Trade, Food Security, and the WTO Negotiations: Some Reflections on Boxes and Their Contents.” In *Agricultural Trade and Poverty: Making Policy Analysis Count*. Paris: OECD.
- Díaz-Bonilla, E., M. Thomas, S. Robinson, and A. Cattaneo. 2000. *Food Security and Trade Negotiations in the World Trade Organization: A Cluster Analysis of Country Groups*. IFPRI Discussion Paper 59. Washington, DC.
- Díaz-Bonilla, E., and J. Tin. 2006. “That Was Then but This Is Now: Multifunctionality in Industry and Agriculture.” In *WTO Negotiations and Agricultural Trade Liberalization: The Effect of Developed Countries’ Policies on Developing Countries*, edited by E. Díaz-Bonilla, S. E. Frandsen, and S. Robinson, chap. 11. Wallingford, Oxfordshire, UK: CABI.
- Di Bella, G., M. Lewis, and A. Martin. 2007. *Assessing Competitiveness and Real Exchange Rate Misalignment in Low-Income Countries*. IMF Working Paper 07/201. Washington, DC.

- Dollar, D. 1992. "Outward-Oriented Developing Economies Really Do Grow More Rapidly: Evidence from 95 LDCs, 1976–1985." *Economic Development and Cultural Change* 40(3): 523–544.
- Dollar, D., and A. Kraay. 2001. *Growth is Good for the Poor*. World Bank Development Research Group Working Paper 2587. Washington, DC.
- Dornbusch, R. 1976. "Expectations and Exchange Rate Dynamics." *Journal of Political Economy* 84(6): 1161–1176.
- . 1980. *Open Economy Macroeconomics*. New York: Basic Books.
- Dornbusch, R., and S. Fischer. 1991. "Moderate Inflation." World Bank Policy Research Working Paper 807. Washington, DC.
- Dornbusch, R., and L. Tellez. 1993. "Exchange Rate Policy: Options and Issues." In *Policy Making in the Open Economy: EDI Series in Economic Development*, edited by R. Dornbusch, chap. 5. Oxford: Oxford University Press.
- Dorosh, P. 2008. "Food Price Stabilisation and Food Security: International Experience." *Bulletin of Indonesian Economic Studies* 44(1): 93–114.
- . 2009. "Price Stabilization, International Trade and National Cereal Stocks: World Price Shocks and Policy Response in South Asia." *Food Security* 1: 137–149.
- Dorosh, P., S. Robinson, and H. Ahmed. 2009. *Economic Implications of Foreign Exchange Rationing in Ethiopia*. ESSP2 Discussion Paper 009. Development Strategy and Governance Division, International Food Policy Research Institute, Ethiopia Strategy Support Program 2. Addis Ababa. December 2009.
- Drukker, D., P. Gomis-Porqueras, and P. Hernandez-Verme. 2005. *Threshold Effects in the Relationship between Inflation and Growth: A New Panel-Data Approach*. Paper presented at 11th International Conference on Panel Data, Texas A&M University, College Station, Texas, June 2004.
- Dubas, J. M., B. J. Lee, and N. C. Mark. 2005. *Effective Exchange Rate Classifications and Growth*. NBER Working Paper 11272. Cambridge, MA.
- Durdu, B., E. Mendoza, and M. Terrones. 2007. "Precautionary Demand for Foreign Assets in Sudden Stop Economies: An Assessment of the New Mercantilism." Paper presented at the Conference on New Perspectives on Financial Globalization. Hosted by the International Monetary Fund and Cornell University, Washington, DC, April



- 26–27, 2007. Available at [www.imf.org/External/NP/seminars/eng/2007/finglo/bdemmt.pdf](http://www.imf.org/External/NP/seminars/eng/2007/finglo/bdemmt.pdf) (accessed on January 22, 2015).
- Easterly, W. 1989. *A Consistency Framework for Macroeconomic Analysis*. Country Economics Department, WPS 234. Washington, DC: World Bank.
- Easterly, W., and S. Fischer. 2000. “Inflation and the Poor.” Policy Research Working Paper Series 2335. Washington, DC: World Bank.
- Eastwood, R., and M. Lipton. 2000. “Pro-Poor Growth and Pro-Growth Poverty Reduction: Meaning, Evidence, and Policy Implications.” *Asian Development Review* 18(2): 22–58.
- Ebrill, L., M. Keen, J. P. Bodin, and V. Summers. 2001. *The Modern VAT*. Washington, DC: IMF.
- ECLAC (Economic Commission for Latin America and the Caribbean). 1969. *El Pensamiento de la CEPAL*. Santiago de Chile: Editorial Sudamericana.
- Edwards, S. 1984. *The Order of Liberalization of the Balance of Payments*. World Bank Staff Working Paper 710. Washington, DC.
- . 1989. *Real Exchange Rates, Devaluation and Adjustment: Exchange Rate Policy in Developing Countries*. Cambridge, MA: MIT Press.
- Edwards, S., and S. Teitel, eds. 1986. “Growth, Reform, and Adjustment: Latin America’s Trade and Macroeconomic Policies in the 1970s and 1980s.” Special issue of *Economic Development and Cultural Change* 34: 607–640.
- Effland, A. 2011. *Classifying and Measuring Agricultural Support Identifying Differences between the WTO and OECD Systems*. Economic Research Service Economic Information Bulletin 74. Washington, DC: ERS.
- Eichengreen, B., and J. Sachs. 1984. *Exchange Rates and Economic Recovery in the 1930s*. NBER Working Paper 1498. Cambridge, MA.
- Epstein, Gerald. 2005. *Central Banks as Agents of Economic Development*. Political Economy Research Institute (PERI) Working Paper 104. Amherst, MA: University of Massachusetts.
- Erten, B., and J. A. Ocampo. 2012. *Super-Cycles of Commodity Prices since the Mid-Nineteenth Century*. DESA Working Paper 110. New York: United Nations Department of Economics and Social Affairs.
- Fan, S., ed. 2008. *Public Expenditures, Growth, and Poverty: Lessons from Developing Countries*. Baltimore: Johns Hopkins University Press.
- FAO (Food and Agriculture Organization of the United Nations). 1983. *Approaches to World Food Security*. FAO Economic and Social Development Paper 32. Rome.

- . 1996. “Rome Declaration on World Food Security and World Food Summit Plan of Action.” At World Food Summit, Rome.
- . 1999a. “Cultivating Our Futures—Issues Paper: The Multifunctional Character of Agriculture and Land.” Paper prepared for FAO/Netherlands Conference on the Multifunctional Character of Agriculture and Land. Rome.
- . 1999b. “Food Insecurity: When People Must Live with Hunger and Fear Starvation.” In *The State of the Food Insecurity in the World*. Rome: FAO.
- . 2000. *Multilateral Trade Negotiations on Agriculture: A Resource Manual*. Rome.
- . 2002. *FAO Papers on Selected Issues Relating to the WTO Negotiations on Agriculture*. Rome.
- . 2009a. *The State of Food Insecurity in the World*. Rome: FAO.
- . 2009b. *The State of Agriculture Commodity Markets*. Rome: FAO.
- . 2010. *2000 World Census of Agriculture: Main Results and Metadata by Country (1996–2005)*. FAO Statistical Development. Series 12. Rome.
- . 2012. *The State of Food and Agriculture: Investing in Agriculture for a Better Future*. Rome.
- . 2014. FAOSTAT. FAO database. Available at <http://faostat3.fao.org/home/E> (accessed on January 22, 2015).
- FAO and German Agency for Technical Cooperation (GTZ). 1998. *Agricultural Finance Revisited: Why?* FAO and GTZ Africa Series 1. Rome: FAO.
- Federal Reserve. 2014. *Foreign Exchange Rates—H.10*. Washington, DC. Available at [www.federalreserve.gov/releases/h10/summary/index\\_n\\_m.htm](http://www.federalreserve.gov/releases/h10/summary/index_n_m.htm) (accessed on November 5, 2014).
- Feenstra, R. 1986. “Functional Equivalence between Liquidity Costs and the Utility of Money.” *Journal of Monetary Economics* 17(2): 271–291.
- Fei, J. and G. Ranis. 1966. “Agrarianism, Dualism and Economic Development.” In *Theory and Design of Economic Development*, edited by I. Adelman and E. Thorbecke, chap. 4. Baltimore: Johns Hopkins University Press.
- Fernandez de Cordoba, S., S. Laird, J.-C. Maur, and J. M. Serena. 2006. “Adjustment Costs and Trade Liberalization.” In *Coping with Trade Reforms: A Developing-Country Perspective on the WTO Industrial Tariff Negotiations*, edited by S. Laird and S. Fernandez de Cordoba,

- chap. 2. Geneva: United Nations Conference on Trade and Development; and New York: Palgrave Macmillan.
- Ferrari, A. 2008. *Increasing Access to Rural Finance in Bangladesh: The Forgotten "Missing Middle."* Washington, DC: World Bank.
- Fettig, D. 2008. "The History of a Powerful Paragraph." *Banking and Policy Issues Magazine*. Minneapolis, MN: Federal Reserve Bank of Minneapolis.
- FIAS. 2006a. *Sector Study of the Effective Tax Burden: Rwanda*. Foreign Investment Advisory Service Document 38032. Washington, DC: IFC and World Bank.
- . 2006b. *Sector Study of the Effective Tax Burden: South Africa*. Foreign Investment Advisory Service Document 38033. Washington, DC: IFC and World Bank.
- . 2006c. *Sector Study of the Effective Tax Burden: Tanzania*. Foreign Investment Advisory Service Document 38035. Washington, DC: IFC and World Bank.
- Finger, J. M., and P. Shuler. 1999. "Implementation of the Uruguay Round Commitments: The Development Challenge." Paper presented at the World Bank Conference on Agriculture and the New Trade Agenda: Interests and Options in the WTO 2000 Negotiations, Geneva, October 1–2, 1999.
- Fischer, S. 1993. *The Role of Macroeconomic Factors in Growth*. NBER Working Paper 4565. Cambridge, MA.
- Fishlow, A. 1986. "Lessons from the Past: Capital Markets during the 19th Century and the Interwar Period." In *The Politics of International Debt*, edited by Miles Kahler, 37–93. Ithaca, NY: Cornell University Press.
- Fortin, P. 2003. "The Bank of Canada and the Inflation-Unemployment Trade-Off." In *Macroeconomics, Monetary Policy, and Financial Stability: A Festschrift in Honour of Charles Freedman*, 3–24. Proceedings of a conference held by the Bank of Canada, Ottawa, June 2003.
- Frankel, J. 1984. "Commodity Prices and Money: Lessons from International Finance." *American Journal of Agricultural Economics* 66(5): 560–566.
- . 1986. "Expectations and Commodity Price Dynamics: The Overshooting Model." *American Journal of Agricultural Economics* 68(2): 344–348.
- . 2005. "Peg the Export Price Index: A Proposed Monetary Regime for Small Countries." *Journal of Policy Modeling* 27(4): 495–508.

- . 2006. *The Effect of Monetary Policy on Real Commodity Prices*. NBER Working Paper 12713. Cambridge, MA.
- . 2011. *Monetary Policy in Emerging Markets: A Survey*. CID Working Paper 215. Cambridge, MA.
- Frenkel, J. A., and H. G. Johnson, eds. 1976. *The Monetary Approach to the Balance of Payments*. London: George Allen & Unwin.
- Frieden, J., and E. Stein. 2001. *The Currency Game: Exchange Rate Politics in Latin America*. Distributed by the Johns Hopkins University Press for the Inter-American Development Bank.
- Friedman, M. 1957. *A Theory of the Consumption Function*. Princeton, NJ: Princeton University Press.
- Gale, F., and R. Collender. 2006. *New Directions in China's Agricultural Lending*. Electronic Outlook Report from the Economic Research Service. Washington, DC: ERS.
- Galtier, F., and B. Vindel. 2013. *Managing Food Price Instability in Developing Countries: A Critical Analysis of Strategies and Instruments*. Paris: Centre de coopération internationale en recherche agronomique pour le développement (CIRAD) and Agence Française de Développement (AFD).
- Gardner, B. 1981. "On the Power of Macroeconomic Linkages to Explain Events in US Agriculture." *American Journal of Agricultural Economics* (December): 871–878.
- Gardner, B., and G. Rausser, eds. 2002. *Handbook of Agricultural Economics*. Vols. 2A and 2B. New York: Elsevier.
- Garrett, J. L., and M. Ruel, ed. 2000. *Achieving Urban Food and Nutrition Security in the Developing World*. IFPRI 2020 Focus 3. Washington, DC.
- . 2003. *Stunted Children—Overweight Mother Pairs: An Emerging Policy Concern?* IFPRI Discussion Paper 148. Washington, DC.
- GATT (General Agreement on Tariffs and Trade). 1994. *The Results of the Uruguay Round of Multilateral Trade Negotiations: The Legal Texts*. Geneva: GATT.
- Gelos, G., and Y. Ustyugova. 2012. *Inflation Responses to Commodity Price Shocks: How and Why Do Countries Differ?* IMF Working Paper 12/225. Washington, DC.
- Ghins, L., J. Ilicic-Komorowska, and A. Mas Aparisi. 2013. *MAFAP Methodological Implementing Guides*. Vol. 2, *Analysis of Public Expenditure on Food and Agriculture*. MAFAP Technical Notes Series. Rome: FAO.

- Ghosh, A., and S. Phillips. 1998. *Inflation, Disinflation, and Growth*. IMF Working Paper 98/68. Washington, DC.
- Ghura, D. 1998. *Tax Revenue in Sub-Saharan Africa: Effects of Economic Policies and Corruption*. IMF Working Paper 98/135. Washington, DC.
- Giehler, T. 1999. *Sources of Funds for Agricultural Lending: Agricultural Finance Revisited*. Rome: FAO/GTZ.
- Giehler, T., H. D. Seibel, and S. Karduck. 2005. *Reforming Agricultural Development Banks*. University of Cologne Working Paper. Cologne.
- Gilbert, C. 2011. *Food Reserves in Developing Countries: Trade Policy Options for Improved Food Security*. ICTSD Issue Paper 37. Geneva.
- Giné, X. 2010. "Biometric Technology in Rural Credit Markets: The Case of Malawi." In *Innovations in Rural and Agriculture Finance*, edited by R. Kloeppinger-Todd and M. Sharma. 2020 Focus Paper 18. Washington, DC: IFPRI and World Bank.
- Go, D., S. Robinson, K. Thierfelder, and R. Utz. 2013. *Dutch Disease and Spending Strategies in a Resource-Rich Low-Income Country: The Case of Niger*. World Bank Policy Research Working Paper 6691. Washington, DC.
- Goldstein, M. 2002. *Managed Floating Plus*. Policy Analyses in International Economics 66. Washington, DC: Institute for International Economics.
- Golub, S., and J. Finger. 1979. "The Processing of Primary Commodities: Effects of Developed-Country Tariff Escalation and Developing-Country Export Taxes." *Journal of Political Economy* 87(3): 559–577.
- Gopinath, M. 2012. "WTO Disciplines on Agricultural Support Update: A Comparison of India's WTO Domestic Support Notifications with Shadow Measurements." Washington, DC: IFPRI.
- Gordon, R. 2012. *Is U.S. Economic Growth Over? Faltering Innovation Confronts the Six Headwinds*. NBER Working Paper 18315. Cambridge, MA.
- Gordon, R., and W. Li. 2005. *Tax Structure in Developing Countries: Many Puzzles and a Possible Explanation*. NBER Working Paper 11267. Cambridge, MA.
- Gouel, C. 2013. *Food Price Volatility and Domestic Stabilization Policies in Developing Countries*. NBER Working Paper 18934. Cambridge, MA.

- Gouel, C., and S. Jean. 2012. *Optimal Food Price Stabilization in a Small Open Developing Country*. World Bank Policy Research Working Paper Series 5943. Washington, DC.
- Grandmont, J. M. 2006. *Temporary Equilibrium*. Série des Documents de Travail du CREST (Centre de Recherche en Économie et Statistique) Paper 2006-27. Institut National de la Statistique et des Études Économiques.
- Grosh, M., C. del Ninno, E. Tesliuc, and A. Ouerghi. 2008. *For Protection and Promotion: The Design and Implementation of Effective Safety Nets*. Washington, DC: World Bank.
- Gupta, A. S. 2007. *Determinants of Tax Revenue Efforts in Developing Countries*. IMF Working Paper 07/184. Washington, DC.
- Gupta, P., D. Mishra, and R. Sahay. 2003. *Output Response to Currency Crises*. IMF Working Paper WP/03/230. Washington, DC.
- Habermeier, K., İ. Ötker-Robe, L. Jacome, A. Giustiniani, K. Ishi, David Vávra, T. Kışınbay, and F. Vazquez. 2009. *Inflation Pressures and Monetary Policy Options in Emerging and Developing Countries: A Cross Regional Perspective*. IMF Working Paper WP/09/1. Washington, DC.
- Haddad, L., M. Ruel, and J. L. Garrett. 1999. *Are Urban Poverty and Undernutrition Growing? Some Newly Assembled Evidence*. Food Consumption and Nutrition Division Discussion Paper 63. Washington, DC: IFPRI.
- Haddad, M., and C. Pancaro. 2010. *Can Real Exchange Rate Undervaluation Boost Exports and Growth in Developing Countries? Yes, but Not for Long*. World Bank Economic Premise 20. Washington, DC.
- Haggard, S., and R. Kaufman. 1990. *The Political Economy of Inflation and Stabilization in Middle-Income Countries*. PRE Working Paper 449. Washington, DC: World Bank.
- Haggblade, S., and P. Hazell. 1989. "Agricultural Technology and Farm-Nonfarm Growth Linkages." *Agricultural Economics* 3(4): 345–364.
- . 2010. *Successes in African Agriculture: Lessons for the Future*. IFPRI Issue Brief 63. Washington, DC.
- Haggblade, S., P. Hazell, and P. A. Dorosh. 2007. "Sectoral Growth Linkages between Agriculture and the Rural Non-Farm Economy." In *Transforming the Rural Non-Farm Economy*, edited by S. Haggblade, P. Hazell, and T. Reardon, chap. 7. Baltimore: Johns Hopkins University Press.

- Haggblade, S., P. Hazell, and T. Reardon, ed. 2007. *Transforming the Rural Non-Farm Economy*. Baltimore: Johns Hopkins University Press.
- Hamilton, J. 2011. "Historical Oil Shocks." Department of Economics, University of California at San Diego December 22, 2010. Revised: February 1, 2011. Available at [http://dss.ucsd.edu/~jhamilto/oil\\_history.pdf](http://dss.ucsd.edu/~jhamilto/oil_history.pdf) (accessed on January 22, 2015).
- Hansen, J., M. Sato, and R. Ruedy. 2012. "Perceptions of Climate Change: The New Climate Dice." Submitted for publication to the *Proceedings of the National Academy of Sciences*. Available at <http://globalwarming-sowhat.com/warm--cool-/loaded-temps-dice-since.pdf> (accessed on January 22, 2015).
- Hanson, J. 1983. "Contractionary Devaluation, Substitution in Production and Consumption and the Role of the Labor Market." *Journal of International Economics* 14: 179–189.
- Hausmann, R., D. Rodrik, and A. Velasco. 2005, revised. *Growth Diagnostics*. <https://www.sss.ias.edu/files/pdfs/Rodrik/Research/growth-diagnostics.pdf> (accessed November 2014).
- Hazell, P. 1993. "Implications of Grain Trade Liberalization for LDC Food Security." In *Managing Food Security in Unregulated Markets*, edited by D. Robert. San Francisco: Westview Press.
- Hazell, P., G. Shields, and D. Shields. 2005. "The Nature and Extent of Domestic Sources of Food Price Instability and Risk." Paper presented to the international workshop on Managing Food Price Instability in Low-Income Countries, Washington, DC, February 28–March 1.
- Headey, D. 2013. *The Global Landscape of Poverty, Food Insecurity, and Malnutrition and Implications for Agricultural Development Strategies*. IFPRI Discussion Paper 01303. Washington, DC.
- . 2014. *Food Prices and Poverty Reduction in the Long Run*. Poverty, Health, and Nutrition Division. IFPRI Discussion Paper 01331. Washington, DC.
- Headey, D., and S. Fan. 2010. *Reflections on the Global Food Crisis: How Did It Happen? How Has It Hurt? And How Can We Prevent the Next One?* IFPRI Research Monograph 165. Washington, DC.
- Helfand, S. 2001. "The Distribution of Subsidized Agricultural Credit in Brazil: Do Interest Groups Matter?" *Development and Change* 32(3): 465–490. The Hague: Institute of Social Studies.
- Hendry, D. 1988. "The Encompassing Implications of Feedback versus Feedforward Mechanisms in Econometrics." *Oxford Economic Papers* 40: 132–149.

- . 1989. *PC-GIVE: An Interactive Econometric Modelling System*. Oxford: Oxford Institute of Economics and Statistics.
- Hernandez, M., and M. Torero. 2011. *Fertilizer Market Situation: Market Structure, Consumption and Trade Patterns, and Pricing Behavior*. IFPRI Discussion Paper 01058. Markets, Trade and Institutions Division. Washington, DC.
- Herndon, T., M. Ash, and R. Pollin. 2013. *Does High Public Debt Consistently Stifle Economic Growth? A Critique of Reinhart and Rogoff*. Political Economy Research Institute Working Paper Series 322. April. Amherst: University of Massachusetts.
- Hicks, J. 1939. *Value and Capital*. Clarendon, UK: Oxford University Press.
- Hidrobo, M., J. Hoddinott, A. Peterman, A. Margolies, and V. Moreira. 2012. *Cash, Food, or Vouchers? Evidence from a Randomized Experiment in Northern Ecuador*. IFPRI Discussion Paper 01234. Washington, DC.
- High Level Panel of Experts (HLPE). 2011. *Price Volatility and Food Security: A Report by the High Level Panel of Experts on Food Security and Nutrition*. Rome: Committee on World Food Security.
- Hirschman, A. 1982. "The Rise and Decline of Development Economics." In *The Theory and Experience of Economic Development: Essays in Honor of W. Arthur Lewis*, edited by M. Gersowitz, C. Díaz-Alejandro, G. Ranis, and M. Rosenzweig. London: George Allen and Unwin.
- Hoda, A., and A. Gulati. 2013. *India's Agricultural Trade Policy and Sustainable Development*. ICTSD Issue Paper 49. Geneva.
- Hoddinott, J., D. Gilligan, M. Hidrobo, A. Margolies, S. Roy, S. Sandström, B. Schwab, and J. Upton. 2013. *Enhancing WFP's Capacity and Experience to Design, Implement, Monitor, and Evaluate Vouchers and Cash Transfer Programmes: Study Summary*. IFPRI Project Summary. Washington, DC.
- Hoekman, B., and J. Trachtman. 2007. *Canada-Wheat: Discrimination, Non-Commercial Considerations, and State Trading Enterprises*. Policy Research Working Paper 4337. World Bank, Development Research Group, Trade Team.
- Homem de Melo, F. 1999. "Os Efeitos Negativos da Política Cambial sobre a Agricultura Brasileira [The Negative Effects of the Exchange Rate Policy on the Brazilian Agriculture]." *Economia Aplicada/Brazilian Journal of Applied Economics* 3: 35–46.
- Honohan, P. 2000. *How Interest Rates Changed under Financial Liberalization: A Cross-Country Review*. World Bank Working Paper 2313. Washington, DC.



- Hudson, D., and D. Ethridge. 1999. "Export Taxes and Sectoral Economic Growth: Evidence from Cotton and Yarn Markets in Pakistan." *Agricultural Economics* 20(3): 263–276.
- ICTSD (International Centre for Trade and Sustainable Development). 2009. *Ensuring Trade Policy Supports Food Security Goals: ICTSD Programme on Agricultural Trade and Sustainable Development*. Geneva: International Centre for Trade and Sustainable Development.
- IFPRI, Concern Worldwide, and Welthungerhilfe. 2013. *2013 Global Hunger Report*. Washington, DC.
- Ingo, M., and F. Ng. 1998. *Distortionary Effects of State Trading in Agriculture: Issues for the Next Round of Multilateral Trade Negotiations*. Development Research Group Policy Research Working Paper 1915. Washington, DC: World Bank.
- Inter-American Development Bank. 1995. *Informe del progreso económico y social en Latinoamérica y el Caribe*. Washington, DC: IADB.
- International Energy Agency (IEA). 2011. "World Energy Outlook." Paris.
- . 2012. "Golden Rules for a Golden Age of Gas." World Energy Outlook Special Report. Paris: International Energy Agency.
- . 2013. *World Energy Outlook*. Paris.
- International Energy Forum (IEF). 2012. Introductory paper prepared in consultation with IEA and OPEC for the IEA-IEF-OPEC Symposium on Energy Outlooks. Available at [http://www.iea.org/media/g8/2nd\\_joint\\_iea\\_ief\\_opec\\_symposium\\_on\\_energy\\_outlooks\\_report.pdf](http://www.iea.org/media/g8/2nd_joint_iea_ief_opec_symposium_on_energy_outlooks_report.pdf) (accessed on January 22, 2015).
- International Finance Corporation (IFC) and World Bank. 2006. *Sector Study of the Effective Tax Burden: South Africa*. Washington, DC: Foreign Investment Advisory Service, IFC, and World Bank.
- International Food Policy Research Institute (IFPRI). 2009. *Global Hunger Index*. Washington DC.
- . 2013a. "Agricultural Science and Technology Indicators (ASTI) Data Tool." Washington, DC. Available at [www.asti.cgiar.org/data](http://www.asti.cgiar.org/data) (accessed on January 22, 2015).
- . 2013b. *Global Food Policy Report 2012*. Washington, DC.
- . 2013c. *Statistics of Public Expenditures for Economic Development (SPEED) Database*. Washington, DC. Available at [www.ifpri.org/ourwork/programs/priorities-public-investment/speed-database](http://www.ifpri.org/ourwork/programs/priorities-public-investment/speed-database) (accessed on January 22, 2015).
- International Monetary Fund (IMF). 1986. *Government Finance Statistics Manual*. Washington, DC.

- . 1996. *World Economic Outlook (WEO): Building Institutions*. Washington, DC.
- . 1999. *World Economic Outlook (WEO): International Financial Contagion*. Washington, DC.
- . 2001a. *Government Finance Statistics Manual*. Washington, DC.
- . 2001b. *Morocco: 2001 Article IV Consultation Staff Report*. IMF Country Report 01/205. Washington, DC.
- . 2004. *Public Investment and Fiscal Policy*. Prepared by the Fiscal Affairs Department and the Policy Development and Review Department (in consultation with other departments and in cooperation with the World Bank and the Inter-American Development Bank). Washington, DC.
- . 2005a. *World Economic Outlook (WEO): Building Institutions*. Washington, DC.
- . 2005b. *The Macroeconomics of Managing Increased Aid Inflows: Experiences of Low-Income Countries and Policy Implications*. Prepared by the Policy Development and Review Department (in consultation with the Area, Fiscal, Monetary and Financial Systems, and Research Departments). Washington, DC.
- . 2006. *Financial Soundness Indicators: Compilation Guide*. Washington, DC.
- . 2007a. *The System of Macroeconomic Accounts Statistics: An Overview*. Statistics Department. August 2007.
- . 2007b. *World Economic Outlook (WEO): Spillovers and Cycles in the Global Economy*. Washington, DC.
- . 2007c. “International Financial Statistics.” Available at [www.imfstatistics.org/imf/](http://www.imfstatistics.org/imf/). Database accessed through subscription.
- . 2008a. “Food and Fuel Prices—Recent Developments, Macroeconomic Impact, and Policy Responses.” Available at [www.imf.org/external/np/pp/eng/2008/063008.pdf](http://www.imf.org/external/np/pp/eng/2008/063008.pdf) (accessed on January 22, 2015).
- . 2008b. “Fuel and Food Price Subsidies: Issues and Reform Options,” SM/08/299. Available at [www.imf.org/external/np/pp/eng/2008/090808a.pdf](http://www.imf.org/external/np/pp/eng/2008/090808a.pdf) (accessed on January 22, 2015).
- . 2009. *World Economic Outlook, April*. Washington, DC.
- . 2010a. *International Financial Statistics*. Washington, DC.
- . 2010b. *Strategies for Fiscal Consolidation in the Post-Crisis World*. Washington, DC.

- . 2011. *Revenue Mobilization in Developing Countries*. Washington, DC.
- . 2012a. *Financial Stability Reports (FSR)*. Washington, DC.
- . 2012b. *Annual Report on Exchange Arrangements and Exchange Restrictions*. Washington, DC.
- . 2013a. *Annual Report on Exchange Arrangements and Exchange Restrictions*. Washington, DC.
- . 2013b. *Zambia: Article IV*. Washington, DC.
- . 2013c. “International Financial Statistics (IFS) Database.” Washington, DC. Available at <http://elibrary-data.imf.org/> (accessed on January 22, 2015).
- . 2014a. *Malawi Third and Fourth Reviews under the Extended Credit Facility Arrangement, Request for Waivers for Non-Observance of Performance Criteria, Extension of the Arrangement, Rephasing of Disbursements, and Modification of Performance Criteria—Staff Report; Staff Supplement; Press Release on the Executive Board Discussion; and Statement by the Executive Director for Malawi*. Country Report 14/37. Washington, DC.
- . 2014b. *Conditionality in Evolving Monetary Policy Regimes*. IMF Policy Paper. Washington, DC.
- IPCC (Intergovernmental Panel on Climate Change). 2014. *Climate Change 2014: Impacts, Adaptation, and Vulnerability*. IPCC WGII AR5 Summary for Policymakers. IPCC Phase I Report. Geneva.
- Isaksson, A. 2007. *Determinants of Total Factor Productivity: A Literature Review*. United Nations Industrial Development Organization Staff Working Paper 02/2007. Vienna.
- Isard, P. 2007. *Equilibrium Exchange Rates: Assessment Methodologies*. IMF Working Paper 07/296. Washington, DC.
- Islam, N., and S. Thomas. 1996. *Foodgrain Price Stabilization in Developing Countries: Issues and Experiences in Asia*. Food Policy Review 3. Washington, DC: IFPRI.
- Ito, H., and M. Chinn. 2013. *Notes on the Chinn-Ito Financial Openness Index*. 2011 Update, April. Available at [http://web.pdx.edu/~ito/Readme\\_kaopen2011.pdf](http://web.pdx.edu/~ito/Readme_kaopen2011.pdf) (accessed on January 22, 2015).
- Ivanic, M., and W. Martin. 2014. *Short- and Long-Run Impacts of Food Price Changes on Poverty*. Policy Research Working Paper 7011. Development Research Group, Agriculture and Rural Development Team. Washington, DC: World Bank.

- Ivanic, M., W. Martin, and H. Zaman. 2011. *Estimating the Short-Run Poverty Impacts of the 2010–11 Surge in Food Prices*. Policy Research Working Paper 5633. Washington, DC: World Bank.
- Jayne, T. S., and S. Rashid. 2013. "Input Subsidy Programs in Sub-Saharan Africa: A Synthesis of Recent Evidence." *Agricultural Economics* 44 (2013): 547–562.
- Jensen, H., S. Robinson, and F. Tarp. 2002. *General Equilibrium Measures of Agricultural Policy Bias in Fifteen Developing Countries*. IFPRI Discussion Papers 105. Washington, DC.
- Jha, R. 2007. *Fiscal Policy in Developing Countries: A Synoptic View*. ASARC Working Paper 2007/01. Australia South Asia Research Centre, Division of Economics, Research School of Pacific and Asian Studies, Australian National University. Canberra: Australian National University.
- Johnson, D., and J. Gale. 1947. *Forward Prices for Agriculture*. Chicago: University of Chicago Press.
- Johnson, O. 1984. "On Growth and Inflation in Developing Countries." *International Monetary Fund Staff Papers* 31(4): 636–660.
- . 1987. *The Agricultural Sector and Adjustment Programs Supported by IMF Stand-By Arrangements*. IMF Working Paper 87/57. Washington, DC.
- Johnston, B., and J. Mellor. 1961. "The Role of Agriculture in Economic Development." *American Economic Review* 51(4): 566–593.
- Jones, R. W. 1974. "Trade with Non-Traded Goods: The Anatomy of Interconnected Markets." *Economica* 41: 121–138.
- Jorgenson, D. 1967. "Surplus Agricultural Labor and the Development of a Dual Economy." *Oxford Economic Papers* 19(3): 288–312.
- Josling, T. 2010. *Trade Policy for Food Security: Farm Policies of Developed Countries*. Geneva: International Centre for Trade and Sustainable Development.
- Josling T., S. Tangermann, and T. K. Warley. 1996. *Agriculture in the GATT*. New York: St. Martin's Press.
- Kamas, L. 1986. "Dutch Disease Economics and the Colombian Export Boom." *World Development* 14: 1177–1198.
- Kamin, S. B., and M. Klau. 1998. *Some Multi-country Evidence on the Effects of Real Exchange Rates on Output*. Federal Reserve Board International Finance Discussion Paper 611. Washington, DC.

- Kapur, B. 1976. "Alternative Stabilization Policies for Less-Developed Economies." *Journal of Political Economy* 84(4): 777–796.
- Keen, M. 2012. *Taxation and Development—Again*. IMF Working Paper 12/220. Washington, DC.
- Keen, M., and M. Mansour. 2009. *Revenue Mobilization in Sub-Saharan Africa: Challenges from Globalization*. IMF Working Paper 09/157. Washington, DC.
- Kerr, C., J. T. Dunlop, F. Harbison, and C. A. Myers. 1964. *Industrialism and Industrial Man*. New York: Oxford University Press.
- Kessie, E. 2011. "The Legal Status of Special and Differential Treatment Provisions under WTO Agreements." In *WTO Law and Developing Countries*, edited by George A. Bermann and Petros C. Mavroidis, chap. 1. Cambridge: Cambridge University Press.
- Khadr, A., and K. Schmidt-Hebbe. 1989. *A Method for Macroeconomic Consistency in Current and Constant Prices*. World Bank Working Paper WPS306. Washington, DC.
- Khan, M. H. 2001. "Agricultural Taxation in Developing Countries: A Survey of Issues and Policy." *Agricultural Economics* 24: 315–328.
- Khan, M. H., and M. S. Khan. 1998. *Taxing Agriculture in Pakistan*. IMF Papers on Policy Analysis and Assessment 98/3. Washington, DC.
- Khan, M. S., and A. Senhadji. 2001. "Threshold Effects in the Relationship between Inflation and Growth." *IMF Staff Papers* 48(1): 1–21.
- Kherallah, M., C. Delgado, E. Gabre-Madhin, N. Minot, and M. Johnson. 2002. *Reforming Agricultural Markets in Africa*. Baltimore: Johns Hopkins University Press. Published for IFPRI.
- Kilian, L. 2006. *Not All Oil Price Shocks Are Alike: Disentangling Demand and Supply Shocks in the Crude Oil Market*. CEPR Discussion Paper 5994. London: Centre for Economic Policy Research.
- Klieson, K. L., and W. Poole. 2000. "Agriculture Outcomes and Monetary Policy Actions: Kissin' Cousins?" *Federal Reserve Bank of St. Louis Review* 82(3): 1–12.
- Kloppinger-Todd, R., and M. Sharma, ed. 2010. *Innovations in Rural and Agriculture Finance*. 2020 Focus Paper 18. Washington, DC: IFPRI and World Bank.
- Knudsen, O., and J. Nash. 1990. "Domestic Price Stabilization Schemes in Developing Countries." *Economic Development and Cultural Change* 38(3): 539–558.

- Koester, U., and M. D. Bale. 1990. "The Common Agricultural Policy: A Review of Its Operation and Effects on Developing Countries." *World Bank Research Observer* 5 (January): 95–121.
- Korinek A., and L. Servén. 2010. *Undervaluation through Foreign Reserve Accumulation: Static Losses, Dynamic Growth*. World Bank Policy Research Working Paper 5250. Washington, DC.
- Krueger, A. 1974. "The Political Economy of the Rent-Seeking Society." *American Economic Review* 64(3): 291–303.
- . 1978. *Liberalization Attempts and Consequences*. Cambridge, MA: National Bureau of Economic Research.
- . 1980. *Interactions between Inflation and Trade-Regime Objectives in Stabilization Programs*. NBER Working Paper 475. Cambridge, MA.
- . 1983. "Exchange-Rate Determination." *Cambridge Surveys of Economic Literature*. Cambridge: Cambridge University Press.
- . 1984. "Trade Policies in Developing Countries." In *Handbook of International Economics*, edited by R. Jones and P. Kenen, chap. 11. Amsterdam: North-Holland.
- Krueger, A., M. Schiff, and A. Valdés. 1988. "Agricultural Incentives in Developing Countries: Measuring the Effects of Sectorial and Economywide Policies." *World Bank Economic Review* 2(3): 255–271.
- Krugman, P. 1979. "A Model of Balance-of-Payment Crises." *Journal of Money, Credit and Banking* 11(3): 311–325.
- . 1994. "The Fall and Rise of Development Economics." In *Rethinking the Development Experience*, edited by L. Rodwin and D. Schon, chap. 2. Washington, DC: Brookings Institution Press.
- Krugman, P., and L. Taylor. 1978. "Contractionary Effects of Devaluation." *Journal of International Economics* 8(3): 446–454.
- Kumara, A., K. M. Singhb, and S. Sinhac. 2010. "Institutional Credit to Agriculture Sector in India: Status, Performance and Determinants." *Agricultural Economics Research Review* 23: 253–264.
- Kumhof, M. 2001. *A Critical View of Inflation Targeting: Crises, Limited Sustainability, and Aggregate Shocks*. Central Bank of Chile Working Papers 127. Santiago.
- Kuznets, S. 1966. *Modern Economic Growth*. New Haven, CT: Yale University Press.
- Kydland F., and E. Prescott. 1977. "Rules Rather Than Discretion: The Inconsistency of Optimal Plans." *Journal of Political Economy* 85(3): 473–492.

- Laborde, D., and S. Msangi. 2012. "Biofuels, Environment, and Food: The Story Gets More Complicated." In *2011 Global Food Policy Report*. Washington, DC: IFPRI.
- Lamb, R. 2000. "Food Crops, Exports, and the Short-Run Policy Response of Agriculture in Africa." *Agricultural Economics* 22: 271–298.
- Langley, S., M. Giugale, W. Meyers, and C. Hallahan. 2000. "International Financial Volatility and Agricultural Commodity Trade: A Primer." *American Journal of Agricultural Economics* 82: 695–700.
- Lanyi, A., and P. Saracoglu. 1983. *Interest Rate Policy in Developing Countries*. IMF Occasional Paper 22. Washington, DC.
- Leeper, E. 2010. *Monetary Science, Fiscal Alchemy*. NBER Working Paper 16510. Cambridge, MA.
- Levine, R., and A. Zervos. 1993. *Looking at the Facts: What We Know about Policy and Growth from Cross-Country Analysis*. World Bank Policy Research Working Paper 1115. Washington, DC.
- Levy-Yeyati, E. 2005. *Financial Dollarisation: Evaluating the Consequences*. Business School Working Paper 03/2005. Buenos Aires: Universidad Torcuato Di Tella.
- Levy-Yeyati, E., and F. Sturzenegger. 2003. "To Float or to Fix: Evidence on the Impact of Exchange Rate Regimes on Growth." *American Economic Review* 93(4): 1173–1193.
- . 2007. *Fear of Appreciation*. World Bank Policy Research Working Paper 4387. Washington, DC.
- Lewis, A. 1954. "Economic Development with Unlimited Supplies of Labour." *Manchester School of Economic and Social Studies* 22: 139–191.
- . 1955. *The Theory of Economic Growth*. London: George Allen & Unwin.
- Li, M. 2006. "Inflation and Economic Growth: Threshold Effects and Transmission Mechanisms." Paper presented at the Midwest Macroeconomics Meetings, Iowa City. Available at <http://economics.ca/2006/papers/0176.pdf> (accessed on January 22, 2015).
- Liefert, W., and S. Persaud. 2009. *The Transmission of Exchange Rate Changes to Agricultural Prices*. USDA Economic Research Report 76. Washington, DC.
- Lindland, J. 1997. "The Impact of the Uruguay Round on Tariff Escalation in Agricultural Products." *Food Policy* 22(6): 487–500.
- Lipton, M. 1977. *Why Poor People Stay Poor: Urban Bias in World Development*. Cambridge, MA: Harvard University Press.

- Lipton, M., and R. Paarlberg. 1990. *The Role of the World Bank in Agricultural Development in the 1990s*. Washington, DC: IFPRI.
- Lipton, M., and M. Ravallion. 1995. "Poverty and Policy." In *Handbook of Development Economics*, vol. 3, edited by J. Behrman and T. N. Srinivasan, 2551–2657. Amsterdam: North-Holland.
- Little, I. 1982. *Economic Development: Theory, Policy and International Relations*. New York: Basic Books.
- Little, I., T. Scitovsky, and M. Scott. 1970. *Industry and Trade in Some Developing Countries*. Paris: Organisation for Economic Co-operation and Development.
- Lofgren, H., S. Robinson, and J. Thurlow. 2002. *Macro and Micro Effects of Recent and Potential Shocks to Copper Mining in Zambia*. IFPRI Discussion Paper. Washington, DC.
- Lonie, S. 2010. "M-PESA: Finding New Ways to Serve the Unbanked in Kenya." In *Innovations in Rural and Agriculture Finance*, edited by R. Kloeppinger-Todd and M. Sharma. 2020 Focus Paper 18. Washington, DC: IFPRI and World Bank.
- López-Cordovez, L. 1987. "Crisis, políticas de ajuste y agricultura." *Revista de la CEPAL* 33(12): 29. Naciones Unidas, Santiago de Chile.
- Lowder, S. K., B. Carisma, and J. Skoet. 2012. *Who Invests in Agriculture and How Much? An Empirical Review of the Relative Size of Various Investments in Agriculture in Low- and Middle-Income Countries*. ESA Working paper 12-09. Rome: FAO Agricultural Development Economics Division.
- Lucas, R., Jr. 1976. "Econometric Policy Evaluation: A Critique." In *The Phillips Curve and Labor Markets*, vol. 5, edited by K. Brunner and A. Metzler, 19–46. New York: Carnegie-Rochester Conferences on Public Policy.
- . 1982. "Interest Rates and Currency Prices in a Two Country World." *Journal of Monetary Economy* 10(3): 335–359.
- . 1987. *Models of Business Cycles*. New York: Basil Blackwell.
- . 2003. "Macroeconomic Priorities." *American Economic Review* 93(1): 1–14.
- Luis, A. V. C., and R. Chang. 2010. *World Food Prices and Monetary Policy*. IMF Working Paper WP/10/161. Washington, DC.
- Lustig, N. C. 2000. *Crises and the Poor: Socially Responsible Macroeconomics*. IADB Working Paper 108, Sustainable Development Department, Poverty and Inequality Advisory Unit. Washington, DC.



- Mahajan, V., and K. Vasumathi. 2010. "Combining Extension Services with Agricultural Credit: The Experience of BASIX in India." In *Innovations in Rural and Agriculture Finance*, edited by R. Kloeppinger-Todd and M. Sharma. 2020 Focus Paper 18. Washington, DC: IFPRI and World Bank.
- Mamingi, N. 1996. *How Prices and Macroeconomic Policies Affect Agricultural Supply and the Environment*. World Bank Policy Research Working Paper Series 1645. Washington, DC.
- Martin, W., and K. Anderson. 2011. *Export Restrictions and Price Insulation during Commodity Price Booms*. World Bank Policy Research Working Paper 5645. Washington, DC.
- . 2012. "Export Restrictions and Price Insulation during Commodity Price Booms." *American Journal of Agricultural Economics* 94(2): 422–427.
- Martin, W., and D. Mitra. 1999. *Productivity Growth and Convergence in Agriculture and Manufacturing*. World Bank Policy Research Working Paper 2171. Washington, DC.
- Matthews, A. 1994. "Trade Reform and the Prospects for Processed Food Exports from Developing Countries." *Journal of Agricultural Economics* 45(2): 177–188.
- Mazur, J. 2000. "Labor's New Internationalism." *Foreign Affairs* 79(1): 79–93.
- McCalla, A. F. 2000. *What Developing Countries Want from the WTO*. Paper presented at the Canadian AgriFood Trade Research Network Workshop on Agricultural Trade Liberalization: Can We Make Progress? Quebec City, Canada.
- McCorrison, S., and D. MacLaren. 2006. *The Economic Effects of State Trading Enterprises: Market Access and Market Failure*. Paper presented at the Twenty-Sixth Conference of the International Association of Agricultural Economists. Gold Coast, Queensland, Australia, August 12–18, 2006.
- McCorrison, S., and I. Sheldon. 2004. *Tariff Escalation and the Developing Countries: How Can Market Access Be Improved in the Doha Round of Trade Negotiations?* Paper presented at the American Agricultural Economics Association Annual Meeting, Denver, Colorado, August 1–4. Available at <http://ageconsearch.umn.edu/bitstream/20156/1/sp04mc03.pdf> (accessed on January 22, 2015).
- McGettigan, D., K. Moriyama, J. Noah Ndela Ntsama, F. Painchaud, H. Qu, and C. Steinberg. 2013. *Monetary Policy in Emerging Markets: Taming the Cycle*. IMF Working Paper WP/13/96. Washington, DC.

- McKinnon, R. 1973. *Money and Capital in Economic Development*. Washington, DC: Brookings Institution.
- McMillan, M., and D. Rodrik. 2011. *Globalization, Structural Change and Productivity Growth*. NBER Working Paper. Cambridge, MA.
- McMillan, M., A. P. Zwane, and N. Ashraf. 2007. "My Policies or Yours: Does OECD Support for Agriculture Increase Poverty in Developing Countries?" In *Globalization and Poverty*, edited by Ann E. Harrison, 183–237. Chicago: University of Chicago Press.
- Medina, L. 2010. *The Dynamic Effects of Commodity Prices on Fiscal Performance in Latin America*. IMF Working Paper 10/192. Washington, DC.
- Mendoza Bellido, W. 1994. "Agricultura e Estabilização Macroeconômica No Peru—1990/93." *Pesquisa e Planejamento Econômico* 24(3): 519–551.
- Meyer, R. L. 2011. *Subsidies as an Instrument in Agriculture Finance: A Review*. Joint Discussion Paper: German Federal Ministry of Economic Cooperation and Development (BMZ), Food and Agriculture Organization of the United Nations (FAO), German Agency for International Cooperation (GIZ), International Fund for Agriculture Development (IFAD), World Bank, and United Nations Capital Development Fund (UNCDF).
- Meyer, S., and J. Schmidhuber. 2013. "Has the Treadmill Changed Direction?" In *Agriculture and Food Security Group Proposals and Analysis*, electronic book prepared by the E-15 Initiative. Bali: ICTSD, World Economic Forum, and International Policy Council (IPC).
- Minot, N. 2011. *Transmission of World Food Price Changes to Markets in Sub-Saharan Africa*. IFPRI Discussion Paper 1059. Washington, DC.
- . 2012. *Food Price Volatility in Africa: Has It Really Increased?* IFPRI Discussion Paper 1239. Washington, DC.
- MIT. 2011. *The Third Revolution: The Convergence of the Life Sciences, Physical Sciences and Engineering*. Washington, DC: Massachusetts Institute of Technology.
- Mitrany, D. 1951. *Marx against the Peasant: A Study in Social Dogmatism*. London: George Weidenfeld & Nicolson Ltd.
- Modigliani, F., and R. H. Brumberg. 1954. "Utility Analysis and the Consumption Function: An Interpretation of Cross-Section Data." In *Post-Keynesian Economics*, edited by K. K. Kurihara, 388–436. New Brunswick, NJ: Rutgers University Press.

- Mogues, T., and S. Benin, eds. 2012. *Public Expenditures for Agricultural and Rural Development in Africa*. Oxford: Routledge.
- Mogues, T., B. Yu, S. Fan, and L. McBride. 2012. *The Impacts of Public Investment in and for Agriculture: Synthesis of the Existing Evidence*. IFPRI Discussion Paper 01217. Washington, DC.
- Moore, B., Jr. 1967. *Social Origins of Dictatorship and Democracy: Lord and Peasant in the Making of the Modern World*. London: Penguin Books.
- Morris, M., V. Kelly, R. Kopicki, and D. Byerlee. 2007. *Fertilizer Use in African Agriculture: Lessons Learned and Good Practice Guidelines*. Washington, DC: World Bank.
- Mundell, R. 2002. "Commodity Prices, Exchange Rates and the International Monetary System." Presentation by Robert Mundell at the Consultation on Agricultural Commodity Price Problems, Commodities and Trade Division, Food and Agriculture Organization of the United Nations. Rome, March 25–26. Available at [www.fao.org/docrep/006/Y4344E/y4344e04.htm](http://www.fao.org/docrep/006/Y4344E/y4344e04.htm) (accessed on January 22, 2015).
- Mundlak, Y. 2000. *Agriculture and Economic Growth: Theory and Measurement*. Cambridge, MA: Harvard University Press.
- Mundlak, Y., D. Cavallo, and R. Domenech. 1989. *Agriculture and Economic Growth in Argentina, 1913–84*. IFPRI Research Report 76. Washington, DC.
- Mundlak, Y., D. Larson, and R. Butzer. 1997. *The Determinants of Agricultural Production: A Cross-Country Analysis*. World Bank Policy Research Working Paper Series 1827. Washington, DC.
- . 2008. *Heterogeneous Technology and Panel Data: The Case of the Agricultural Production Function*. World Bank Policy Research Working Paper Series 4536. Washington, DC.
- Murphy, K., A. Shleifer, and R. Vishny. 1989. "Industrialization and the Big Push." *Journal of Political Economy* 97(5): 1003–1026.
- Murphy, S. 2010. *Grain Reserves: A Smart Climate Adaptation Policy*. Washington, DC: IATP.
- Nair, A. 2010. "Rural Leasing: An Alternative to Loans in Financing Income-Producing Assets." In *Innovations in Rural and Agriculture Finance*, edited by R. Kloeppinger-Todd and M. Sharma. 2020 Focus Paper 18. Washington, DC: IFPRI and World Bank.
- Nair, A., and Azeb Fissaha. 2010. "Rural Banking: The Case of Rural and Community Banks in Ghana." In *Innovations in Rural and Agriculture*

- Finance*, edited by R. Kloeppinger-Todd and M. Sharma. 2020 Focus Paper 18. Washington, DC: IFPRI and World Bank.
- Narayan, D., R. Chambers, M. Shah, and P. Petesch. 1999. *Global Synthesis: Consultations with the Poor*. World Bank Working Paper 45350. Washington, DC.
- Nelson, G., M. Rosegrant, A. Palazzo, I. Gray, C. Ingersoll, R. Robertson, S. Tokgoz, T. Zhu, T. Sulser, C. Ringler, S. Msangi, and L. You. 2010. *Food Security, Farming, and Climate Change to 2050: Scenarios, Results, and Policy Options*. Washington, DC: IFPRI.
- New Partnership for Africa's Development (NEPAD). 2004. *NEPAD Study to Explore Further Options for Food-Security Reserve Systems in Africa*. Study carried out by the New Partnership for Africa's Development with technical support from the United Nations World Food Programme, Rome.
- Olivera, J. H. G. 1971. "A Note on Passive Money, Inflation and Economic Growth." *Journal of Money, Credit and Banking* 3(1): 137–144.
- O'Mara, L. P., S. W. Bartley, R. N. Ferry, R. S. Wright, M. F. Calder, and J. Douglas. 1999. "Some Issues Affecting the Macroeconomic Environment for the Agricultural and Resource Sectors: The Case of Fiscal Policy." *Australian Journal of Agricultural and Resource Economics* 43(2): 149–177.
- Orden, D. 1986. "Agriculture, Trade and Macroeconomics: The US Case." *Journal of Policy Modeling* 8(1): 27–51.
- . 2014. "More Protection against Low Prices, While Fixed Payments Ended Decade-Long Shift to Subsidized Crop Insurance Reinforced." Food Security Portal. IFPRI. February 6. Available at [www.foodsecurity-portal.org/new-us-farm-bill-reaffirms-support-producers](http://www.foodsecurity-portal.org/new-us-farm-bill-reaffirms-support-producers) (accessed on January 22, 2015).
- Orden, D., J. Beghin, and G. Henry. 2012. "Key Findings of the NTM-IMPACT Project: The World Economy." Special Issue: *NTMs, Agricultural and Food Trade, and Competitiveness* 35(8): 967–972.
- Orden, D., D. Blandford, and T. Josling, ed. 2011. *WTO Disciplines on Agricultural Support*. Cambridge: Cambridge University Press.
- Orden, D., and D. Roberts. 2007. "Food Regulation and Trade under the WTO: Ten Years in Perspective." *Agricultural Economics, International Association of Agricultural Economists* 37(s1): 103–118.

- Organisation for Economic Co-operation and Development (OECD).  
1997. *The Uruguay Round Agreement on Agriculture and Processed Agricultural Products*. Paris.
- . 2001. *Multifunctionality towards an Analytical Framework*. Paris.
- . 2009. *Agricultural Policies in Emerging Economies: Monitoring and Evaluation*. Paris.
- . 2010. “OECD’S Producer Support Estimate and Related Indicators of Agricultural Support: Concepts, Calculations, Interpretation and Use (The PSE Manual).” Trade and Agriculture Directorate, September 2010. Paris.
- . 2014. “Producer and Consumer Support Estimates Database.” Paris.
- OECD/FAO. 2011. *Agricultural Outlook 2011*. Paris
- OECD/FAO. 2012. *Agricultural Outlook 2012*. Paris.
- OECD/FAO. 2013. *Agricultural Outlook 2013*. Paris.
- Our World Is Not for Sale (OWINFS). 2013. “Stand Firm on Defending India’s Food Security: Nothing Less Will Do for India!” Letter published on December 6, 2013. Available at [www.ourworldisnotforsale.org/en/article/stand-firm-defending-india-s-food-security-nothing-less-will-india](http://www.ourworldisnotforsale.org/en/article/stand-firm-defending-india-s-food-security-nothing-less-will-india) (accessed on January 22, 2015).
- Paarlberg, P., and R. Chambers. 1988. *Macroeconomics, Agriculture and Exchange Rates*. Boulder, CO: Westview Press.
- Paolisso, M. J., K. Hallman, L. Haddad, and S. Regmi. 2001. *Does Cash Crop Adoption Detract from Childcare Provision? Evidence from Rural Nepal*. Food Consumption and Nutrition Division Paper 109. Washington, DC: IFPRI.
- Pardey P., and B. Koo, ed. 2003. *Biotechnology and Genetic Resource Policies: Research at a Glance*. IFPRI. July 2003. Washington, DC.
- Pauw, K., P. Dorosh, and J. Mazunda. 2013. *Exchange Rate Policy and Devaluation in Malawi*. IFPRI Discussion Paper 01253. Washington, DC.
- Pauw, K., and J. Thurlow. 2014. *Malawi’s Farm Input Subsidy Program: Where Do We Go from Here?* Policy Note 18. Washington, DC: IFPRI.
- Paxson, C., and N. Schady. 2004. *Child Health and the 1988–1992 Economic Crisis in Peru*. Policy Research Working Paper 3260. Washington, DC: World Bank.
- Perroni, C., and T. F. Rutherford. 1996. *A Comparison of the Performance of Flexible Functional Forms for Use in Applied General Equilibrium Analysis*. Available at [www.gams.com/solvers/mpsge/domain.htm](http://www.gams.com/solvers/mpsge/domain.htm) (accessed on January 22, 2015).

- Phillips, A. W. H. 1958. "The Relation between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1861–1957." *Economica* 25(2): 283–299.
- PIADAL (Panel Independiente sobre la Agricultura para el Desarrollo de América Latina). 2013. *Agricultura y Desarrollo en América Latina: Gobernanza y Políticas Públicas*. Buenos Aires: Editorial Teseo.
- PILDAT. 2011. *Taxing the Agricultural Income in Pakistan*. PILDAT Briefing Paper 42. Islamabad: Pakistan Institute of Legislative Development and Transparency.
- Pinstrup-Andersen, P., ed. 1988a. *Food Subsidies in Developing Countries: Costs, Benefits, and Policy Options*. Published for the International Food Policy Research Institute. Baltimore: Johns Hopkins University Press.
- . 1988b. "The Social and Economic Effects of Consumer-Oriented Food Subsidies: A Summary of Current Evidence." In *Food Subsidies in Developing Countries: Costs, Benefits, and Policy Options*, edited by P. Pinstrup-Andersen, 3–18. Baltimore: Johns Hopkins University Press.
- . 2007. "Agricultural Research and Policy for Better Health and Nutrition in Developing Countries: A Food Systems Approach." *Agricultural Economics* 37(s1): 187–198.
- Pinstrup-Andersen, P., and H. Alderman. 1988. "The Effectiveness of Consumer-Oriented Food Subsidies in Reaching Rationing and Income Transfer Goals." In *Food Subsidies in Developing Countries: Costs, Benefits, and Policy Options*, edited by P. Pinstrup-Andersen, 21–35. Baltimore: Johns Hopkins University Press.
- Pinstrup-Andersen, P., and T. Mengistu, 2008. "Implications of Globalization for Agricultural Research." In *Globalization of Food and Agriculture and the Poor*, edited by J. Von Braun and E. Díaz-Bonilla, chap. 3. Oxford: Oxford University Press.
- Pollin, R., and A. Zhu. 2005. *Inflation and Economic Growth: A Cross-Country Non-Linear Analysis*. UMASS Working Paper 109. Amherst: Political Economy Research Institute, University of Massachusetts.
- Poulton C., J. Kydd, S. Wiggins, and A. Dorward. 2006. "State Intervention for Food Price Stabilization in Africa: Can It Work?" *Food Policy* 31: 342–356.
- Pourroy, M., B. Carton, and D. Coulibaly. 2012. *Food Prices and Inflation Targeting in Emerging Economies*. CEPII Working Paper 2012-33. Paris.

- Prasad, E., K. Rogoff, S.-J. Wei, and M. A. Kose. 2003. *Effects of Financial Globalization on Developing Countries: Some New Evidence*. IMF Occasional Paper 220. Washington, DC.
- Prebisch, R. 1950. *The Economic Development of Latin America and Its Principal Problems*. New York: United Nations.
- . 1968. "Development Problems of the Peripheral Countries and the Terms of Trade." In *Economics of Trade and Development*, edited by J. D. Theberge. New York: John Wiley and Sons.
- Pyatt, G., and J. Round, eds. 1985. *Social Accounting Matrices: A Basis for Planning*. Washington, DC: World Bank.
- Rajan, R. G., and A. Subramanian. 2006. *What Undermines Aid's Impact on Growth?* Paper presented at the Trade and Growth Conference, Research Department. Hosted by the International Monetary Fund. Washington, DC, January 9, 2006. Available at <https://www.imf.org/external/np/res/seminars/2006/trade/pdf/rajan.pdf> (accessed on January 22, 2015).
- . 2009. *Aid, Dutch Disease, and Manufacturing Growth*. Center for Global Development Working Paper 196. Washington, DC.
- Raju, S. S., and A. Melo. 2003. "Money, Real Output, and Deficit Effects of Coffee Booms." *Colombia Journal of Policy Modeling* 25(9): 963–983.
- Ran, G., F. In, and J. L. Dillon. 1995. "Effects of Agricultural Production Fluctuations on the Chinese Macroeconomy." *Agricultural Economics* 12(1): 69–78.
- Rashid, S., P. Dorosh, M. Malek, and S. Lemma. 2013. "Modern Input Promotion in Sub-Saharan Africa: Insights from Asian Green Revolution." *Agricultural Economics* 44 (2013): 705–721.
- Rashid, S., A. Gulati, and R. Cummings Jr., eds. 2008. *From Parastatals to Private Trade Lessons from Asian Agriculture*. Baltimore: Johns Hopkins University Press.
- Rashid, S., and S. Lemma. 2011. *Strategic Grain Reserves in Ethiopia: Institutional Design and Operational Performance*. IFPRI Discussion Paper 01054. Washington, DC.
- Razin, A., and E. Sadka. 1995. *Population Economics*. Cambridge, MA: MIT Press.
- Rearidon, T., K. Chen, B. Minten, and L. Adriano. 2012. *The Quiet Revolution in Staple Food Value Chains*. Asian Development Bank and International Food Policy Research Institute. Manila.
- Rearidon, T., and P. Timmer. 2012. "The Economics of the Food System Revolution." *Annual Review of Resource Economics* 4: 14.1–14.40.

- Reardon T., P. Timmer, and J. Berdegue. 2004. "The Rapid Rise of Supermarkets in Developing Countries: Induced Organizational, Institutional, and Technological Change in Agrifood Systems." *Journal of Agricultural and Development Economics* 1(2): 168–183.
- Reca, L. 1969. "Determinantes de la Oferta Agropecuaria en el Argentina." *Estudios Sobre la Economía Argentina* 5: 57–65.
- Reca, L., and G. H. Parellada. 2001. "La Agricultura Argentina a Comienzos del Milenio: Logros y Desafíos." *Desarrollo Económico* 40(160): 707–737.
- Reinhart, C., and K. Rogoff. 2004. "The Modern History of Exchange Rate Arrangements: A Reinterpretation." *Quarterly Journal of Economics* 119(1): 1–48.
- . 2009. *This Time Is Different: Eight Centuries of Financial Folly*. Princeton, NJ: Princeton University Press.
- . 2010. *Growth in a Time of Debt*. NBER Working Paper 15639. Cambridge, MA.
- Reinhart, C., K. Rogoff, and M. Savastano. 2003. *Addicted to Dollars*. NBER Working Paper 10015. Cambridge, MA.
- Richter, S. M., S. Boucher, and C. Woodruff. 2006. *The Structure of Rural Financial Markets in Mexico*. Paper presented at the American Agricultural Economics Association Annual Meeting, Long Beach, California, July 23–26, 2006. Available at <http://smye.info/gia-mexico/wp-content/uploads/2009/09/The-Structure-of-Rural-Financial-Markets-in-Mexico.pdf> (accessed on January 22, 2015).
- Roberts, D., D. Orden, and T. Josling. 2004. "Sanitary and Phytosanitary Barriers to Agricultural Trade: Progress, Prospects, and Implications for Developing Countries." In *Agriculture and the New Trade Agenda: Creating a Global Trading Environment for Development*, edited by D. Roberts, D. Orden, and T. Josling, 329–358. Cambridge: Cambridge University Press.
- Robinson, S. 2006. "Macro Models and Multipliers: Leontief, Stone, Keynes, and CGE Models." In *Poverty, Inequality and Development: Essays in Honor of Erik Thorbecke*, edited by A. de Janvry and R. Kanbur, chap. 11. Economic Studies in Inequality, Social Exclusion and Well-Being. New York: Springer.
- Robinson, S., and H. Lofgren. 2005. "Macro Models and Poverty Analysis: Theoretical Tensions and Empirical Practice." *Development Policy Review* 23(3): 267–283.



- Robinson S., and K. Thierfelder. 1996. *The Trade-Wage Debate in a Model with Non-traded Goods*. TMD Discussion Paper 9. Washington, DC: IFPRI.
- . 2006. “The Effects of Domestic Agricultural Reforms and Market Access on Trade and Production in Less Developed Countries.” In *WTO Negotiations and Agricultural Trade Liberalization: The Effect of Developed Countries’ Policies on Developing Countries*, edited by E. Díaz-Bonilla, S. E. Frandsen, and Robinson, chap. 4. Wallingford, Oxfordshire, UK: CABI.
- Rodrik, D. 2008. *The Real Exchange Rate and Economic Growth*. Cambridge, MA: John F. Kennedy School of Government, Harvard University.
- Roger, S. 2009. *Inflation Targeting at 20: Achievements and Challenges*. IMF Working Paper WP/09/236. Washington, DC.
- Rogoff, K., A. M. Husain, A. Mody, R. J. Brooks, and N. Oomes. 2004. *Evolution and Performance of Exchange Rate Regimes*. IMF Occasional Paper 229. Washington, DC.
- Romer, D. 2001. *Advanced Macroeconomics*. New York: McGraw Hill/Irwin.
- Rosegrant, M., J. Koo, N. Cenacchi, C. Ringler, R. Robertson, M. Fisher, C. Cox, K. Garrett, N. Perez, and P. Sabbagh. 2014. *Food Security in a World of Natural Resource Scarcity: The Role of Agricultural Technologies*. Washington, DC: IFPRI.
- Rosegrant, M., C. Ringler, T. Zhu, S. Tokgoz, and P. Bhandary. 2013. “Water and Food in the Bioeconomy: Challenges and Opportunities for Development.” *Agricultural Economics* 44(s1): 139–150.
- Ruel, M., L. Haddad, and J. L. Garret. 1999. *Some Urban Facts of Life*. Food Consumption and Nutrition Division Discussion Paper 64. Washington, DC: IFPRI.
- Saad-Filho, A. 2000. “Inflation Theory: A Critical Literature Review and a New Research Agenda.” *Value, Capitalist Dynamics and Money* 18: 335–362.
- Sachs, J., and A. M. Warner. 1995. *Natural Resource Abundance and Economic Growth*. NBER Working Paper 5398. Cambridge, MA.
- Sala-i-Martin, X. 1997a. “I Just Ran Two Million Regressions.” *American Economic Review* 87(2): 178–183.
- . 1997b. *I Just Ran Four Million Regressions*. NBER Working Paper 6252. Cambridge, MA.
- Salter, W. 1959. “Internal and External Balance: The Role of Price and Expenditure Effects.” *Economic Record* 35: 226–238.

- Samuelson, P. A. 1964. "Theoretical Notes on Trade Problems." *Review of Economics and Statistics* 23: 145–154.
- Samuelson, P. A., and R. M. Solow. 1960. "Analytical Aspects of Anti-Inflation Policy." *American Economic Review* 50(2): 177–194.
- Sarel, M. 1996. "Nonlinear Effects of Inflation on Economic Growth." *IMF Staff Papers* 43(1): 199–215. Washington, DC.
- Sarris, A. 1994. *Agricultural Taxation under Structural Adjustment*. Rome: Food and Agriculture Organization of the United Nations.
- . 2010. "Hedging Cereal Import Price Risks and Institutions to Assure Import Supplies." *FAO Commodity Market Review* (2009–2010): 140–179.
- Schiff, M., and C.E. Montenegro. 1995. *Aggregate Agricultural Supply Response in Developing Countries: A Survey of Selected Issues*. World Bank Policy Research Working Paper. Washington, DC.
- Schiff, M., and A. Valdés. 1992a. "The Political Economy of Agricultural Pricing Policy." In *A Synthesis of the Economics in Developing Countries*, vol. 4. Baltimore: Johns Hopkins University Press.
- . 1992b. *The Plundering of Agriculture in Developing Countries*. Washington, DC: World Bank.
- Schnepf, R. 2013. *Agriculture-Based Biofuels: Overview and Emerging Issues*. Congressional Research Service R41282. Washington, DC.
- Schuh, G. E. 1974. "The Exchange Rate and US Agriculture." *American Journal of Agricultural Economics* 56: 1–13.
- . 1976. "The New Macroeconomics of Agriculture." *American Journal of Agricultural Economics* 58(5): 802–811.
- . 1986. *The United States and the Developing Countries: An Economic Perspective*. Washington, DC: National Planning Association.
- Schuknecht, L. 1999. "Tying Government's Hands in Commodity Taxation." *Journal of African Economies* 8(2): 152–181.
- Schultz, T. W. 1945. *Agriculture in an Unstable Economy*. New York: McGraw-Hill.
- . 1954. "The Instability of Farm Prices Reconsidered." *Journal of Farm Economics* 36(5): 777–786.
- . 1964. *Transforming Traditional Agriculture*. New Haven, CT: Yale University Press.
- . 1979. "The Economics of Being Poor." Prize Lecture to the Memory of Alfred Nobel, December 8, 1979. Available at [http://www.nobel-prize.org/nobel\\_prizes/economic-sciences/laureates/1979/schultz-lecture.html](http://www.nobel-prize.org/nobel_prizes/economic-sciences/laureates/1979/schultz-lecture.html) (accessed on January 22, 2015).

- Scobie, G. 1988. "Macroeconomic and Trade Implications of Consumer-Oriented Food Subsidies." In *Food Subsidies in Developing Countries: Costs, Benefits, and Policy Options*, edited by P. Pinststrup-Andersen, 49–76. Baltimore: Johns Hopkins University Press.
- Sdralevich, C., R. Sab, Y. Zouhar, and G. Albertin. 2014. *Subsidy Reform in the Middle East and North Africa: Recent Progress and Challenges Ahead 2014*. Middle East and Central Asia Department. Washington, DC: IMF.
- Seibel, H. D., T. Giehler, and S. Karduck. 2005. *Reforming Agricultural Development Banks*. Munich: German Agency for Technical Cooperation.
- Seibel, H. D., and P. Schmidt. 2000. *How an Agricultural Development Bank Revolutionized Rural Finance: The Case of Bank Rakyat Indonesia*. University of Cologne, Development Research Center Working Paper 2000, 1. Cologne.
- Sen, A. 1981. *Poverty and Famines: An Essay on Entitlement and Deprivation*. Oxford: Clarendon Press.
- . 1983. "Development: Which Way Now?" *Economic Journal* 93(372): 745–762.
- Shane, M., and William Liefert. 2000. "The International Financial Crisis: Macroeconomic Linkages to Agriculture." *American Journal of Agricultural Economics* 82: 682–687.
- Sharma, R. 2000. "Safeguard Measures." In *Multilateral Trade Negotiations on Agriculture: A Resource Manual*. Module 6. FAO Commodity and Trade Division. Rome.
- Shaw, D. J. 2007. *World Food Security: A History since 1945*. Houndmills, Basingstoke, UK; and New York, USA: Palgrave Macmillan.
- Sidrauski, M. 1967. "Rational Choice and Patterns of Growth in a Monetary Economy." *American Economic Review* 57: 534–544.
- Singer, H. 1950. "The Distribution of Gains between Investing and Borrowing Countries." *American Economic Review* 40: 473–485.
- Sinha, S., M. Lipton, and S. Yaqub. 2002. "Poverty and 'Damaging Fluctuations': How Do They Relate?" *Journal of Asian and African Studies* 37(2): 186–243.
- Skees, J. R., and B. Collier. 2010. "New Approaches for Index Insurance: ENSO Insurance in Peru." In *Innovations in Rural and Agriculture Finance*, edited by R. Kloeppinger-Todd and M. Sharma. 2020 Focus Paper 18. Washington, DC: IFPRI and World Bank.

- Slavov, S. 2011. *De Jure versus De Facto Exchange Rate Regimes in Sub-Saharan Africa*. IMF Working Paper WP/11/198. Washington, DC.
- Smith, L. C. 1998. "Can FAO's Measure of Chronic Undernourishment Be Strengthened?" *Food Policy* 23(5): 425–445.
- Smith, L. C., and L. Haddad. 2000. *Explaining Child Malnutrition in Developing Countries: A Cross-Country Analysis*. IFPRI Research Report 111. Washington, DC.
- SNA 2008. See *System of National Accounts*.
- Solow, R. M. 2005. "Reflections on Growth Theory." In *Handbook of Economic Growth*, vol. 1, edited by P. Aghion and S. Durlauf, 3–10. New York: Elsevier.
- Spatafora, N., and I. Samake. 2012. *Commodity Price Shocks and Fiscal Outcomes*. IMF Working Paper 12/112. Washington, DC.
- Spence, M. 2011. *The Next Convergence: The Future of Economic Growth in a Multispeed World*. New York: Farrar, Straus, and Giroux.
- Spilimbergo, A., S. Symansky, and M. Schindler. 2009. *Fiscal Multipliers*. IMF Staff Position Note 09/11. Washington, DC.
- Stiglitz, J. E. 2008. "The Failure of Inflation Targeting." Project Syndicate: May 6, 2008. Available at [www.project-syndicate.org/commentary/the-failure-of-inflation-targeting](http://www.project-syndicate.org/commentary/the-failure-of-inflation-targeting) (accessed on January 22, 2015).
- Stock, J. S., and M. Watson. 1988. "Variable Trends in Economic Time Series." *Journal of Economic Perspectives* 2(3): 147–174.
- Stockhammer, E. 2008. "Is the Nairu Theory a Monetarist, New Keynesian, Post Keynesian or a Marxist Theory?" *Metroeconomica* 59: 3.
- Stockman, A. C. 1981. "Anticipated Inflation and the Capital Stock in a Cash-in-Advance Economy." *Journal of Monetary Economics* 8: 387–393.
- Subbarao, D. 2012. "Agricultural Credit—Accomplishments and Challenges." Speech by Dr. Duvvuri Subbarao, governor of the Reserve Bank of India, at the 30-year anniversary celebration of NABARD, Mumbai, July 12. Available at [www.bis.org/review/r120713a.pdf](http://www.bis.org/review/r120713a.pdf) (accessed on January 22, 2015).
- Sumner, D. A. 2000. "Agricultural Trade Policy and Food Security." *Quarterly Journal of International Agriculture* 39(4): 395–409.
- Swan, T. 1960. "Economic Control in a Dependent Economy." *Economic Record* 36: 51–66.
- Swinnen, J. F. M., and H. R. Gow. 1999. "Agricultural Credit Problems and Policies during the Transition to a Market Economy in Central and Eastern Europe." *Food Policy* 24: 21–47.

- System of National Accounts (SNA)*. 2008. Prepared by the European Commission, the International Monetary Fund, the Organisation for Economic Co-operation and Development, the United Nations, and the World Bank. Available at <http://unstats.un.org/unsd/nationalaccount/docs/SNA2008.pdf> (accessed on January 22, 2015).
- Talvi, E., and C. Végh, 2005. *Tax Base Variability and Procyclical Fiscal Policy*. NBER Working Paper 7499. Cambridge, MA.
- Tangermann, S. 2002. "Agriculture on the Way to Firm International Trading Rules." In *The Political Economy of International Trade Law: Essays in Honor of Robert E. Hudec*, edited by Daniel L. M. Kennedy and James D. Southwick. Cambridge: Cambridge University Press.
- . 2011. *Policy Solutions to Agricultural Market Volatility: A Synthesis*. International Centre for Trade and Sustainable Development. ICTSD Issue Paper 33. Geneva.
- . 2013. *A Post-Bali Food Security Agenda. The E-15 Initiative: Strengthening the Multilateral Trading System*. Report prepared for ICTSD Agriculture and Food Security Group, Bali. Available at [www.ictsd.org/sites/default/files/research/AG\\_Policy\\_ok.pdf](http://www.ictsd.org/sites/default/files/research/AG_Policy_ok.pdf) (accessed on January 22, 2015).
- Taylor, L. 1979. *Macroeconomic Models for Developing Countries*. New York: McGraw-Hill.
- . 1984. *Structuralist Macroeconomics: Applicable Models for the Third World*. New York: Basic Books.
- . 2004. *Reconstructing Macroeconomics*. Cambridge, MA: Harvard University Press.
- Temple, J., and L. Wößmann. 2006. *Dualism and Cross-Country Growth Regressions*. IFO Working Paper. Munich: IFO Institute for Economic Research at the University of Munich.
- Thiele, R. 2002a. *The Bias against Agriculture in Sub-Saharan Africa: Has It Survived 20 Years of Structural Adjustment Programs?* Kiel Working Papers 1102. Kiel Institute for the World Economy.
- . 2002b. *Price Incentives, Non-price Factors, and Agricultural Production in Sub-Saharan Africa: A Cointegration Analysis*. Kiel Working Papers 1123. Kiel Institute for the World Economy.
- Thomas, V., M. Dailami, A. Dhareshwar, D. Kaufmann, N. Kishor, R. López, and Y. Wang. 2000. *The Quality of Growth*. Oxford/Washington, DC: Oxford University Press/World Bank.

- Thompson, R. 1988. "US Macroeconomic Policy and Agriculture." In *Macroeconomics, Agriculture and Exchange Rates*, edited by P. Paarlberg and R. Chambers, 219–226. Boulder, CO: Westview Press.
- Thompson, W., and G. Tallard. 2010. *Potential Market Effects of Selected Policy Options in Emerging Economies to Address Future Commodity Price Surges*. OECD Food, Agriculture and Fisheries Papers 35. Paris.
- Timmer, C.P. 1989. "Food Price Policy: The Rationale for Government Intervention." *Food Policy* 14(1): 17–27.
- . 1991. "Food Price Stabilization: Rationale, Design, and Implementation." In *Reforming Economic Systems*, edited by Dwight H. Perkins and Michael Roemer, 219–259. Cambridge, MA: Harvard University Press.
- . 1994. *Dutch Disease and Agriculture in Indonesia: The Policy Approach*. Harvard Institute for International Development Paper 490. Cambridge, MA: Harvard University Press.
- Timmer, C. P., W. P. Falcon, and S. R. Pearson. 1983. *Food Policy Analysis*. Baltimore: Johns Hopkins University Press.
- Tinbergen, J. 1952. *On the Theory of Economic Policy*. Amsterdam: North-Holland Publishing Company.
- Tobin, J. 1969. "A General Equilibrium Approach to Monetary Theory." *Journal of Money, Credit, and Banking* 1(1): 15–29.
- Torero, M. 2012. "Riding the Rollercoaster." In *2011 Global Food Policy Report*, 15–24. Washington, DC: IFPRI.
- Transparency International. 2006. *Handbook for Curbing Corruption in Public Procurement*. Available at [www.transparency.org/whatwedo/publication/handbook\\_for\\_curbing\\_corruption\\_in\\_public\\_procurement](http://www.transparency.org/whatwedo/publication/handbook_for_curbing_corruption_in_public_procurement) (accessed on November 29, 2014).
- Tsangarides, C. G., D. Ghura, and C. A. Leite. 2000. *Is Growth Enough? Macroeconomic Policy and Poverty Reduction*. IMF Working Paper 02/118. Washington, DC.
- Tullock, G. 1967. "The Welfare Costs of Tariffs, Monopolies, and Theft." *Economic Inquiry* 5(3): 224–232.
- Tytell, I., and S. J. Wei. 2004. *Does Financial Globalization Induce Better Macroeconomic Policies?* IMF Working Paper 04/84. Washington, DC.
- UNCTAD (United Nations Conference on Trade and Development). 2004. *UNCTAD Handbook of Statistics, 2004*. Geneva.
- UNIDO (United Nations Industrial Development Organization). 2013. *The Structure and Growth Pattern of Agro-Industry of African Countries*.

- Development Policy, Statistics and Research Branch Working Paper 9/2012. Vienna.
- Uribe, M., and V. Z. Yue. 2003. *Country Spreads and Emerging Countries: Who Drives Whom?* NBER Working Paper No. 10018. Cambridge, MA.
- USDA/Economic Research Service. 2001. *Agricultural Policy Reform in the WTO: The Road Ahead*. Agricultural Economic Report 802. Washington, DC: USDA/ERS.
- . 2010. *WTO Export Subsidy Notifications*. Washington, DC: USDA/ERS.
- Usui, N. 1997. “Dutch Disease and Policy Adjustments to the Oil Boom: A Comparative Study of Indonesia and Mexico.” *Resource Policy* 23(4): 151–162.
- Valdés, A., and W. Foster. 2012. *Net Food-Importing Developing Countries: Who They Are, and Policy Options for Global Price Volatility*. ICTSD Programme on Agricultural Trade and Sustainable Development Issue Paper 43. Geneva.
- Van Blarcom, B., O. Knudsen, and J. Nash. 1993. *The Reform of Public Expenditures for Agriculture*. World Bank Discussion Paper 216. Washington, DC.
- Van Empel, G. 2010. “Brief 4—Rural Banking: The Rabobank Approach.” In *Innovations in Rural and Agriculture Finance*. 2020 Focus Paper 18, edited by Renate Kloeppinger-Todd and Manohar Sharma. Washington, DC: IFPRI and World Bank.
- Van Wijnbergen, S. 1983. “Interest Rate Management in LDCs.” *Journal of Monetary Economics* 12(3): 433–452.
- . 1984. “The ‘Dutch Disease’: A Disease after All?” *Economic Journal* 94: 41–55.
- Végh, C. A. 2013. *Open Economy Macroeconomics in Developing Countries*. Cambridge, MA: MIT Press.
- Végh, C. A., and G. Vuletin. 2012. *How Is Tax Policy Conducted over the Business Cycle?* NBER Working Paper 17753, Cambridge, MA.
- Von Braun, J. 2007. *The World Food Situation: New Driving Forces and Required Actions*. IFPRI Food Policy Report 18. Washington, DC.
- . 2008. “When Food Makes Fuel: The Promises and Challenges of Biofuels.” In *Biofuels, Energy and Agriculture: Powering towards or away from Food Security? Proceedings of the Thirteenth Annual Development Conference*, edited by A. G. Brown. Canberra, Australia: ATSE Crawford Fund.

- Von Braun, J., and E. Díaz-Bonilla, ed. 2008. *Globalization of Food and Agriculture and the Poor*. Oxford: Oxford University Press.
- Von Braun, J., and M. Torero. 2009. *Implementing Physical and Virtual Food Reserves to Protect the Poor and Prevent Market Failure*. IFPRI Policy Brief 10. Washington, DC.
- Walsh, J. P. 2011. *Reconsidering the Role of Food Prices in Inflation*. IMF Working Paper WP/11/71. Washington, DC.
- Warr, P. 2013. *Food Security, Agriculture, and Poverty in Asia*. ReSAKKS Asia Working Paper 1. Washington, DC: IFPRI.
- Weimer, D., and A. Vining. 2011. *Policy Analysis*. Boston: Longman.
- Wenner, M. D., and F. Proenza. 1999. *Rural Finance in Latin America and the Caribbean: Challenges and Opportunities*. Inter-American Development Bank, Sustainable Development Department, Microenterprise Unit Working Paper. Washington, DC.
- Wiedmaier-Pfister, M., and B. Klein. 2010. "Microinsurance Innovations in Rural Finance." In *Innovations in Rural and Agriculture Finance*, edited by R. Kloeppinger-Todd and M. Sharma. 2020 Focus Paper 18. Washington, DC: IFPRI and World Bank.
- Winters, Alan. 2005. "The European Agricultural Trade Policies and Poverty." *European Review of Agricultural Economics* 2(3): 319–346.
- Wood, A. 1988. *Global Trends in Real Exchange Rates, 1960 to 1984*. World Bank Discussion Paper. Washington, DC.
- . 1998. "Globalisation and the Rise in Labour Market Inequalities." *Economic Journal* 108: 1463–1482.
- Wood, A., and J. Mayer. 2009. *Has China De-industrialised Other Developing Countries?* Working Paper 175, Queen Elizabeth House, Oxford University, and UN Conference on Trade and Development.
- Woodford, M. 2003. *Interest and Prices: Foundations of a Theory of Monetary Policy*. Princeton, NJ: Princeton University Press.
- . 2006. *Rules for Monetary Policy*. NBER Report: Research Summary Spring 2006. Cambridge, MA.
- World Bank. 1986. *World Development Report*. New York: Oxford University Press.
- . 1990. *World Development Report 1990: Poverty*. Washington, DC.
- . 2000. *Global Economic Prospects*. Washington, DC.
- . 2001. *Memorandum of the President of the International Bank for Reconstruction and Development and the International Finance Corporation to the Executive Directors on a Country Assistance Strategy*



- of the World Bank Group for the Kingdom of Morocco*. World Bank Document Report 2115-MOR. Washington, DC.
- . 2005. *Managing Food Price Risks and Instability in an Environment of Market Liberalization*. Agriculture and Rural Development Department Report 32727-GLB. Washington, DC.
- . 2006. *World Development Report*. New York: Oxford University Press.
- . 2007a. *Fiscal Policy for Growth and Development: Further Analysis and Lessons from Country Studies*. Development Committee (Joint Ministerial Committee of the Boards of Governors of the Bank and the Fund on the Transfer of Real Resources to Developing Countries). DC2007-0004. March 28, 2007. Washington, DC.
- . 2007b. *Paraguay: Real Property Tax Key to Fiscal Decentralization and Better Land Use*. Volume 1, *Main Report: Poverty Reduction and Economic Management, Latin America and the Caribbean Region*. World Bank Report 37456-PA. Washington, DC.
- . 2007c. *World Development Report 2008: Agriculture for Development*. Washington, DC.
- . 2009a. *Global Economic Prospects 2009: Commodities at the Crossroads*. Washington, DC.
- . 2009b. *Swimming against the Tide: How Developing Countries Are Coping with the Global Crisis*. Background paper prepared by World Bank staff for the G20 Finance Ministers and Central Bank Governors Meeting, Horsham, England, March 13–14, 2009. Washington, DC.
- . 2009c. *Uganda: Making Finance Work*. Washington, DC.
- . 2010. *Global Economic Prospects. Crisis, Finance, and Growth*. Washington, DC.
- . 2011. *Practitioners' Toolkit for Agriculture Public Expenditure Analysis*. Report No. 60015-GLB. Washington, DC.
- . 2012. *Using Public Foodgrain Stocks to Enhance Food Security*. Report 71280. Washington, DC.
- . 2014. "World Development Indicators (WDI) Database." Available at <http://databank.worldbank.org/data/views/variableSelection/select-variables.aspx?source=world-development-indicators> (accessed on January 22, 2015).
- World Bank and Development Research Center of the State Council (China). 2013. *China 2030: Building a Modern, Harmonious, and Creative Society*. Washington, DC: World Bank.

- World Food Program (WFP). 2010. *Food Aid information System*. Rome: WFP.
- World Trade Organization (WTO). 2003. *The WTO Agreements Series 3: Agriculture*. Geneva.
- . 2008. *Revised Draft Modalities for Agriculture*. TN/AG/W/4/Rev.4, December 6. Geneva. Available at [www.wto.org/english/tratop\\_e/agric\\_e/chair\\_texts08\\_e.htm](http://www.wto.org/english/tratop_e/agric_e/chair_texts08_e.htm) (accessed on January 22, 2015).
- . 2012. *World Trade Report 2012: Trade and Public Policies: A Closer Look at Non-tariff Measures in the 21st Century*. Geneva.
- . 2013a. *World Trade Report 2013: Factors Shaping the Future of World Trade*. Geneva.
- . 2013b. *Report (2013) of the Working Party on State Trading Enterprises*. G/L/1046. October 9. Status of Notifications Submitted by WTO Members under Article XVII:4(A) of the GATT 1994 and Paragraph 1 of the Understanding on the Interpretation of Article XVII of the GATT 1994G/STR/10. Geneva.
- Yeats, J. 1974. "Effective Protection in the United States, European Economic Community and Japan." *Quarterly Review of Economics and Business* 14 (Summer 1974): 41–50.
- Zahniser, S. 2012. *Commodity Markets and the USDA Agricultural Projections to 2020*. Workshop on Future Challenges and Opportunities for Latin America and the Caribbean. March. Washington, DC: IADB–CIAT.



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2015 marks the 40th anniversary of the International Food Policy Research Institute (IFPRI). IFPRI's vision is to have a world free of hunger and malnutrition, yet the world's population will grow from more than 7 billion people presently to more than 8 billion by 2025. Ending hunger and malnutrition will require innovative ideas, research, and policies.

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Cover design: Deirdre Launt/IFPRI

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ISBN-13: 978-0-89629-859-0

