

19. Keynes and the Classics: Notes on the Monetary Theory of Production*

Heinrich Bortis

INTRODUCTION

This chapter deals with the *principles of long-period* classical–Keynesian political economy, which encompasses a monetary theory of production. Dealing with principles raises deep-going methodological problems and may lead to misunderstandings. Most importantly in this chapter it will be suggested that theorising on classical–Keynesian lines at the most fundamental level should be done on the basis of the labour value *principle*. Seemingly, this is to think little of the efforts that have been, rightly, made by Sraffa and the Sraffians to overcome the obvious fact that the labour *theory* of value only holds in very specific circumstances, that is, if the ratio of fixed to circulating capital is the same in all sectors of production. In this chapter it will be suggested, however, that labour values and prices of production are not exclusive, but intimately linked and hence complementary. Both are valid at different levels of abstraction. In fact, the labour values are essential or constitutive to prices, and the prices of production bring them into concrete existence though in modified form. This very simple point touches upon most controversial issues and justifies some introductory remarks on method.

Very broadly and tentatively, one may distinguish between two different, but complementary concepts of social science, which comprises economics and political economy. The first, conventional, notion of science considers the theoretical economist as a model builder, possibly in view of establishing testable propositions. He endeavours to *explain* economic phenomena starting from given premises and engages in the search for empirical regularities within economic phenomena. Even at the macroeconomic level, theoretical explanation is frequently complemented by empirical means, with the Phillips curve, the work done on the Keynesian consumption function,

and the close association between price levels and quantities of money perhaps being most prominent. At the sectoral and microeconomic level, explanatory models and empirical investigations abound. However, scientific work always rests upon fundamental principles, which, as a rule, are taken for granted. Neoclassical analysis is based upon the marginal principle; Keynesians rely upon the principle of effective demand. This leads to a second notion of science. Here the theorist attempts to distil principles or fundamentals in view of *understanding* how socio-economic systems essentially function. For example, the question is about the fundamental forces governing prices, distributional outcomes or employment levels. In this sense, Ricardo wrote on the principles of political economy, Marshall on the principles of economics. Based upon the principle of effective demand, Keynes aimed at establishing a general theory of employment, interest and money. In a sense principles – the marginal principle, the surplus principle, the principle of effective demand – form the basis upon which theoretical work dealing with phenomena takes place. As such, principles have a metatheoretical character. Principles are not about visible characteristics of phenomena to be brought to the open by theories but represent the fundamental forces (probably) constituting phenomena like prices, distributional outcomes or employment levels. In fact, one should not hesitate to say that the principles underlying the great theoretical systems are metaphysical since they tell us what is (probably) essential for our object of enquiry, that is, the economy and its relation to society as a whole. In Bortis (1997) the two concepts of science have been associated respectively with pure and applied theory, relying thus upon Keynes, who made this distinction in a more specific context in his *Treatise on Money* (Keynes, 1930/1971): Volume one is on the *pure* theory of money, Volume two on the *applied* theory of money.

In this chapter we shall adopt the second notion of science, and this introductory section is about a few characteristics of pure theory. We shall use the expressions *metatheoretical* or *metaphysical* to designate the preoccupation with *principles* underlying some specific approach to economic phenomena, for instance neoclassical or classical–Keynesian. As already suggested, principles represent the essential elements underlying a certain phenomenon, or the constitutive elements of an object. As such, principles also denote the fundamental and ultimate causal forces governing phenomena like prices, employment levels, and distributional outcomes, for example. To distil such principles the whole of society and man must be considered, and all the information available must be examined, scientific and non-scientific, theoretical and empirical and historical, whereby the objectively given material is dealt with by reason based upon a metaphysical vision that, in turn, is associated with intuition. This implies, as, in our view, Keynes suggested, that science and metaphysics interact: principles guide

scientific work, and the results of science eventually modify the scientist's fundamental outlook and may induce him to adopt another approach in his scientific work, based upon a different set of principles. The notion of principles is closely associated with Aristotle's essentialist theory of knowledge: the human mind does not remain at the surface of phenomena but tries to understand the essential or constitutive forces behind, perhaps better, inside, the phenomena. Here, the distinction between essentials and accidentals is crucial as is the comprehensive point of view implying that all the relevant information – with the history of economic thought perhaps being most important – has to be taken into account if a complex problem is investigated (for example, the formation of prices or the determination of involuntary unemployment). Only what is considered to be essential or constitutive to a phenomenon is included in the model, which is a picture, in fact a *reconstruction* or *recreation* of what *probably constitutes* a phenomenon (for example, prices, quantities and employment levels in political economy). This recreation is performed by reason interacting with intuition and is analogous to the recreation of constitutive aspects of nature by the late Cézanne by the means of colour or to the representation of essential information for the user of the underground through a map. Consequently, metatheories or sets of principles have *not* to be realistic in the scientific sense, since they are not reflections or copies (*Abbilder*) of certain spheres of the real world that can eventually be associated with testable propositions. In their being reconstructions of essential aspects of real world phenomena, principles illuminate these phenomena from inside and initiate the formation of empirically testable theories. In this sense, Walras's general equilibrium model contributes to understanding how Adam Smith's invisible hand might work in principle. With the Walrasian model in the background neoclassical economists have built simplified textbook theories of value, distribution and employment upon the marginal principle, which is behind all demand and supply curves. In many instances, the Cobb–Douglas production function or Samuelson's surrogate production function are used to elucidate the implications of the marginal principle – the Walrasian model is too complex for an easily understandable exposition of the neoclassical principles and their implications. Ricardo attempted to establish the principles of value and distribution in line with the social and circular process of production, that is, the labour value principle and the surplus principle. Keynes endeavoured to derive principles embodying the essential features of the phenomena of employment, interest and money occurring in monetary production economies. A striking instance is the *logical* theory of the multiplier, which states how output and employment are governed in principle in monetary economies (Keynes, 1936/1973, p. 122). Sraffa developed the concept of the standard commodity to set out the fundamental principles of value and distribution in the classical approach in

an immediately evident way. The classical–Keynesian model to be set forth in this chapter is also a set of principles and represents, as such, a piece of pure theory independent of space and time picturing how the relevant causal forces work in principle in a monetary production economy.

Owing to the existence of differing sets of principles associated with specific approaches to economic problems, the question as to the choice of the approach arises. The vision of man and of society – a metaphysical concept – seems to be most important in determining what is considered essential and what is accidental (Bortis, 1997, Ch. 2). Therefore, the neoclassical economist will arrive at principles differing from those of the classical–Keynesian political economist. Regarding distribution, the former will put the marginal principle to the fore, the latter the surplus principle. The difference between the exchange-based neoclassical approach and the production and labour based classical system are brilliantly set forth at the level of principles in Pasinetti (1986a). The fact that different sets of principles coexist implies that sets of principles cannot be proved or disproved by conventional scientific methods: one cannot conclusively prove whether liberalism is superior to middle-way humanism (Bortis, 1997, Ch. 2) or to socialism, or not. In a sense, conventional science is based upon *deductive* reasoning starting from *given* premises that, eventually, lead to the setting up of testable propositions. When dealing with principles this type of reasoning has to be replaced by reasoning aiming at essentials and based on *inference*. The premises now comprise information located in various spheres of the real world, taken in the broadest sense. The point of view must be global, and a vision is required to broadly classify the information considered. The knowledge so obtained is bound to be probable to a greater or less degree, depending mainly upon the robustness of the vision and of the quality of the information considered. The logic of probability set out by Keynes (1921/1988) provides the formal basis to reconcile metaphysics and science: scientific results complemented by the vision are used to distil (metaphysical) principles that, in turn, provide a broad framework for scientific work. The immense impetus given by the principle of effective demand underlying Keynes's *General Theory* to macroeconomic reasoning and to empirical macroeconomic work is a striking instance. This suggests that Keynes's conception of metaphysics is not speculative or dogmatic but modern, in the sense that full account is taken of the results of sciences. One can only establish the (probably) essential features of specific real world phenomena (for example, prices, distributional outcomes, employment levels), if, as far as is humanly possible, account is taken of all the relevant information, theoretical and empirical-cum-historical, most importantly, the history of economic thought. This incidentally implies that all serious scientific work is important. From the metaphysical standpoint, theories are essentially complementary. For example, even for the classical–Keynesian

political economist, Walras's general equilibrium theory is of immense importance, because this theory greatly helps to understand the implications of Adam Smith's invisible hand and the conclusions that should eventually be drawn for further theoretical work and for policy making.

In this chapter we attempt to set forth the essential features of a monetary production economy along classical–Keynesian lines, that is, the social process of production, the surplus principle of distribution and the importance of the uniform rate of profits to organise an economy, the labour principle of value, the determination of employment through effective demand, and last, but not least, the crucial importance of money to run the socio-economic system of production and exchange. Regarding method and content the starting point is provided by Pasinetti's outstanding work on the 'Theory of value – a source of alternative paradigms in economic analysis' (Pasinetti, 1986a). Here the fundamental differences between exchange-based neoclassical pure theory and production or labour-based classical theory is set forth at the level of *principles*, illuminating thus the basic options in economic theory open at present. In this chapter we suggest that the classical principles ought to be elaborated and to be brought together with Keynes's, adapted to the classical long-period method. The classical–Keynesian set of principles set out in this chapter are intended to constitute a preparatory and tentative contribution to an alternative to the neoclassical Walrasian system. Moreover, the classical–Keynesian principles set out here ought to strengthen the theoretical foundations of the system of middle-way political economy, tentatively sketched and put into a wider context in Bortis (1997). Finally, it is hoped that the principles suggested in this chapter may contribute to enhancing the coherence of heterodox economic thinking – comprising for example Keynesian, post-Keynesian and humanist Marxist strands – by providing a fundamental theoretical framework.

The Problem

In his celebrated article entitled 'Mr. Keynes and the "classics"', Hicks (1937) associated Keynes's theory of employment, interest and money (Keynes, 1936/1973) with neoclassical economics – classical theory in Keynes's terms – which, fundamentally, is based on exchange. This combination of theoretical approaches, summarised by the IS–LM diagram, subsequently gave rise to Samuelson's neoclassical synthesis, combining exchange-based Marshallian marginalist equilibrium theory and Keynes's theory of effective demand. In retrospect these developments seem unfortunate since they distorted Keynes's original intention to work out a monetary theory of production (Keynes, 1933/1973) associating his theory of effective demand and involuntary unemployment with *money and finance*

in relation with the social process of production. It must be mentioned, however, that Keynes greatly favoured the development of the neoclassical synthesis because he kept the Marshallian framework to the largest possible extent, presumably for reasons of persuasion. Moreover, Keynes naturally thought in Marshallian terms because Alfred Marshall had been his teacher.

Classical political economy in the sense proper, that is, Ricardo's system of economic theory, precisely puts the social process of production to the fore. There is a division of labour and final commodities are produced with labour using commodities taken from nature. Therefore, traditional classical theory would seem to be a natural complement of Keynes's monetary theory of employment, because a monetary theory of production, implying fixed prices (the classical natural prices for example) and quantity adjustments, might potentially obtain. In fact, Keynes, in spite of his critical stance towards Say's Law, had considerable sympathy for classical political economy, even in the *General Theory*. Indeed, direct and indirect labour produces the social product, which is measured by labour commanded (Keynes, 1936/1973, pp. 37–45); capital or past labour constitutes the environment within which labour works (*ibid.*, p. 213).

Thus, considering the content of theories, it seems not entirely fanciful to attempt to combine the classical (Ricardian) theory of value and distribution, which is rooted in production, and Keynes's theory of employment, interest and money conceived of as a part of a monetary theory of production. But such an undertaking raises a serious methodological problem (Bortis, 1997, pp. 103–17). Most importantly, Ricardian political economy is, fundamentally, of a long-period nature. Ricardo mostly abstracts from temporary and rapidly changing elements of reality, for example market prices, and uniquely considers stable, that is, constant or slowly changing, elements of socio-economic reality, namely, technology and institutions, which partly *govern* behaviour with near-certainty. This implies considering long-period equilibrium situations: market prices coincide with the prices of production and profit rates are the same in all sectors. Contrariwise, Keynes's general theory of employment is of a short-period nature. Productive capacities are given. Their utilisation depends on short-period effective demand. In the present, money is held and investment decisions are taken on the basis of short- and of long-period expectations respectively, which are continually revised when moving into an uncertain future. Put in a nutshell, Ricardo's long-period theory is – like Quesnay's, Leontief's and Sraffa's theories – about the functioning of the socio-economic system, that is, the technological and institutional system; Keynes's theory deals with the behaviour of producers and consumers in the short run and the coordination

of this behaviour by the socio-economic system through effective demand.

These opposing views may be brought together on the basis of an appropriate analytical framework. The problem is to adapt the behavioural elements of Keynes's short-period theory to a long-period institutional basis and to combine it with long-period classical system theory. This should result in a classical–Keynesian system of economic theory of which classical and Keynesian theory would constitute different aspects (for a preparatory and tentative attempt to set up such a system see Bortis, 1997). Three points, related to system and behaviour, to money and saving, and to investment respectively, are relevant for adapting Keynes's short-period theory to the long run in order to make it compatible with classical long-period theory.

The institutional system – the material basis and the institutional superstructure – and the behaviour of individuals within this system are complementary, and there is mutual interaction. This is the main tenet of Bortis (1997). In principle, the institutional system only determines global magnitudes or magnitudes that depend upon the system as a whole. Behaviour, however, refers to specific instances. For example, in a classical–Keynesian view, the system governs output and employment as a whole, behaviour determines who is employed or unemployed or which enterprises survive in the long term and which enterprises are squeezed out of the system. Since institutions and technology are associated with duration, they constitute in a natural way the persistent or slowly evolving factors governing long-period prices and quantities in classical–Keynesian political economy (Bortis, 1997, Chs 3–4). The long-period considerations of this chapter therefore constitute a synthesis of classical and Keynesian institutionalism at the level of principles. The central problem to be dealt with hereafter is about the functioning of the institutional–technological system regarding the determination of long-period prices and quantities (see also Bortis, 1997, Ch. 3 and Ch. 4, pp. 142–204). The analyses of business cycles and of the functioning of markets, which are at the level of behaviour (Bortis, 1997, pp. 204–35), are just alluded to.

The relationship between money and uncertainty, and the associated theory of interest, enabled Keynes to establish the principle of effective demand. Saving depends primarily on actual income, which is something *certain*, not on the rate of interest associated with future consumption, which is in turn dependent on future incomes and prices, all of which are *highly uncertain*. This leads straightaway to 'the logical theory of the multiplier, which holds goods continuously, without time-lag, at all moments of time' (Keynes, 1936/1973, p. 122). Hence the causal forces associated with the multiplier principle are independent of the length of the time-interval

considered and, consequently, this principle – as any principle by the way – may also be applied to the long run, which means determination of prices and quantities by technology and institutions, that is, by persistent and slowly changing factors (Bortis, 1997, Ch. 4). Incidentally, the multiplier principle is associated with a specific aspect of Keynes's monetary theory of production: autonomous expenditures set economic activity into motion and final goods are exchanged against money, which represents effective demand. The latter governs the scale of economic activity and, hence, the extent of involuntary unemployment.

In a monetary production economy, money is of fundamental importance, not primarily as a store of value, but because money is necessary to run the system of social production and circulation as well as for the expansion of this system through net investment. Indeed, all the production, investment and consumption plans are set up in terms of money. Goods are always exchanged against money, which means that there is circulation of goods and money.

To establish a Keynesian theory of employment, implying the existence of involuntary unemployment, one must show that the neoclassical price mechanism is unable to bring about a tendency towards full employment. In the neoclassical view uncertainty plays, in principle, no role since, ideally, the behaviour of producers and consumers is *governed* by the law of supply and demand. In an underemployment situation, real wages would decline, profits and investment increase; simultaneously labour would be substituted for capital. A strong tendency towards full employment would arise. It is here that the significance of the capital theory debate emerges (Harcourt, 1972). No 'well-behaved' demand curves for 'factors of production' necessarily exist if the process of production is of a social nature, that is, if production of commodities goes on by means of commodities *à la* Sraffa–Leontief. In this case it is, in principle, impossible always to associate larger quantities of capital with lower interest rates, and vice versa. Moreover, no persistent tendency towards full employment exists. Hence the exchange-based law of supply and demand cannot provide a solution to the great problems of economic theory if production is a social process. This clears the way for the classical–Keynesian multiplier approach to output and employment determination, which is based upon fixed prices and quantity adjustments.

Further, Keynes treats investment at a behavioural and psychological level: the fate of each investment project is uncertain, and investment decisions are based on long-period expectations, which are governed, in varying degrees, either by optimism or by pessimism. The aggregate of

investment decisions governs the level of investment, which, together with other autonomous variables, determines short-period employment *via* the multiplier. Obviously, in the short run, only the income effect of investment is relevant since, by definition, the capital stock is given.

The post Keynesian (Kaleckian) medium-term theory of investment is also based upon an interaction between entrepreneurial behaviour and the functioning of the system: higher volumes of investment are associated with larger profits and profit rates that, in turn, induce entrepreneurs to invest more, and vice versa. There is thus an interaction, a double-sided relationship, between investment and profits. If left unfettered, this mechanism may be completely unstable: the upswing will come to an end at the full-employment ceiling and the downswing will touch the bottom at the lowest possible level of employment, which obtains at zero gross investment; incidentally, this mechanism was pictured by Hicks (1950), who put to use Harrod's (1939) multiplier–accelerator model.

The treatment of investment in the long run is associated with the fact that capitalist systems are not completely unstable. Cyclical movements seem to take place around a remarkably stable long-period trend, as suggested by the near-constant average unemployment rates over longer periods of time in many countries. Such long-period trends may, of course, change their position as time goes by. In any case, as Garegnani (1983, p. 78) has emphasised, the position of the trend is crucially important since it matters whether cyclical fluctuations take place around a trend implying a relatively high or a relatively low level of permanent or long-period unemployment.

The clue for inserting investment in an appropriate way into a synthesis of the proportions-based classical theory of value and distribution with Keynes's theory of employment dealing with the scale of economic activity lies in the notion of long-period equilibrium (Bortis, 1997, pp. 75–103). The conventional view starts from a disequilibrium situation in the present, which, in a stationary state, would work out and produce an eventual tendency towards a future equilibrium situation. This equilibrium concept is untenable once historical time is introduced as Joan Robinson emphasised time and again (Robinson, 1956): an economy cannot get into an equilibrium if there is uncertainty about the future and if, as a consequence, expectations are liable to disappointment. The equilibrium position must, therefore, be sought in the present. The first step is to abstract from temporary and rapidly changing short- and medium-term elements of reality, that is, behavioural elements related to markets and to business cycles (Bortis, 1997, p. 106, scheme 3). This is to dig deeper to bring into the open the permanent or slowly evolving elements of the real world made up of the technological and

economic structure, that is, the material basis of a society, and the social, political, legal and cultural superstructure erected thereupon. Technology and institutions represent the stable features of social reality the classical economists, Ricardo in the main, had in mind when they conceived of labour values (and prices of production) as the natural and fundamental prices from which actual or market prices temporarily deviate (Ricardo, 1821/1951, p. 88). The classical notion of equilibrium prices and quantities, as implied in the price and quantity systems (18) and (25), complemented by the supermultiplier relation (40), is, therefore, a *system equilibrium*, not a market equilibrium. The latter conceives of the market as an autonomous subsystem surrounded by a social, political and legal framework. The former, however, implies that prices and quantities are directly or indirectly governed by the entire socio-economic system, that is, by technology and institutions, which form a structured entity. This is the main tenet of Bortis (1997).

To conceive of the long run as being situated in the present has already been envisaged by Marshall. In fact, Robertson (1956, p. 16), relying on Guillebaud, mentions that ‘Marshall used the term “the long period” in two quite distinct senses, one which stands realistically for any period in which there is time for *substantial* alterations to be made in the size of plant, and one in which it stands conceptually for the Never-never land of unrealized tendency’. In Bortis (1997, pp. 81–9), it is suggested that, appearances notwithstanding, Marshall’s second definition of ‘the long period’ is relevant for long-period analysis, not the first one. Indeed, with the usual first meaning of this notion, the long-period equilibrium is located in the future and would come about if the persistent economic forces could work out undisturbed, that is, if there was a stationary state or a steadily growing one. This first of the Marshallian definitions is largely irrelevant because ‘in the long run we are all dead’; moreover, there are no ‘stationary conditions and steady states’; and, finally, there are the results of the capital theoretic discussion: lower factor prices cannot, in principle, be associated with larger factor quantities. The second meaning of ‘the long period’, however, allows us to locate the long-period equilibrium in the *present* and to associate it with an institutionally governed system equilibrium (Bortis, 1997, Chs 3–4). This takes us back to the classics and Marx, whose approach to economic problems has proved so immensely fruitful.

The institutional system equilibrium is thus located in the present. This has important implications for the treatment of uncertainty in relation with saving and future consumption on the one hand and with investment and future earnings on the other. Indeed, it has been suggested above that saving depends on actual income, which is a known magnitude, and that investment

is governed by the difference between realised profits and normal (satisfactory) profits, which are also known. Now, Keynes (1936/1973, p. 148) argues thus regarding uncertainty:

It would be foolish, in forming our expectations, to attach great weight to matters which are very uncertain. It is reasonable, therefore, to be guided to a considerable degree by the facts about which we feel somewhat confident. . . For this reason the facts of the existing situation enter, in a sense disproportionately, into the formation of our long-term expectations; our usual practice being to take the existing situation and to project it into the future, modified only to the extent that we have more or less definite reasons for expecting a change.

Now, institutions and technology are precisely facts of the existing situation on which we have little reasons for expecting a change or on which the direction of change is broadly known, as is the case with technology, where moreover changes occur, as a rule, at the margin. Regarding investment, the difference between the normal (satisfactory) rate of profits and the realised rate of profits, constitutes a *given* fact that is very important for investment decisions, and the importance of this fact increases if the difference is larger and more durable (Bortis, 1997, pp. 207–14). In a sense, then, *Keynesian long-period analysis* could be called *Keynesian Institutionalism*, which differs from the traditional system-based institutionalism, of the German Historical School in the main, by its explicit theoretical foundations.

The output and employment trend may be conceived of as a (hidden) fully-adjusted situation characterised by normal prices and quantities and normal degrees of capacity utilisation (Bortis, 1997, pp. 75–89, 142–204). Normal or long-period prices and quantities, *including investment volumes*, depend on the entire institutional system, that is, on the material basis and the institutional superstructure. As such, normal prices and quantities constitute a system equilibrium. Since normal output does not, as a rule, correspond to full-employment output, permanent involuntary unemployment obtains. Normal prices are, in turn, governed by the conditions of production and distributional arrangements. The latter imply that normal prices are, in principle, associated with an equal (target) profit rate, r^* , which entrepreneurs consider satisfactory and that, therefore, enters their price calculation. In the sense of Sraffa the magnitude of the normal profit rate is governed by the basic rate of interest set by the central bank.

Cycles around the trend are shaped by an interaction of the income and of the capacity effect of investment (ibid., pp. 204–20). The income effect, based upon Kalecki's double-sided relationship between investment and profits, brings about the upswings and downswings; the capacity effect

explains the turning points. In fact, in the course of the upswing, driven by the income effect of investment, capacities gradually rise above the long-period trend level of effective demand, with the realised profit rate (r) exceeding the normal rate (r^*). As the capacity effect works out, r starts to diminish and falls below r^* , because output exceeds long-period effective demand, initiating thus the downswing, and vice versa.

In this view, the uniform profit rate, associated to the notion of normal prices, emerges as an ingenious device to deal with long-period uncertainty: if the realised profit rate exceeds the uniform normal rate, entrepreneurs invest more, and vice versa (ibid., pp. 207–14). This very simple device allows disposing of the concept of the ‘marginal efficiency of capital’, which is associated with uncertainty and expectations. Indeed, investment decisions are now decisively based on comparisons between the *objectively given* realised and normal profit rates, which enables us to evacuate largely the subjective and psychological elements of Keynes’s analysis that Sraffa disliked so intensely, and provides a very strong link between Sraffa and Keynes. In fact, Keynes (1936/1973, p. 148) himself argues ‘that the facts of the existing situation enter, in a sense disproportionately, into the formation of our long-term expectations; our usual practice being to take the existing situation and to project it into the future, modified only to the extent that we have more or less definite reasons for expecting a change’. Moreover, Keynes made an important step towards Sraffa’s uniform rate of profit in Chapter 17 of the *General Theory*, where, in long-period equilibrium, all own rates of interest are equal with the own rate of money ruling the roost. Significantly, the notion of the *own rate of interest* is Sraffa’s, who developed it when criticising Hayek’s *Prices and Production* in 1932 (Roncaglia, 2000, pp. 26–9). Hence, it is Chapter 17 of the *General Theory*, based upon the concept of the own rate of interest, which has to be stripped of marginalist remnants and the uniform, long-period, own rate of interest would have to be associated with the surplus principle and to be explained by institutional factors with central bank policy playing a crucial role, as Sraffa has indeed suggested.

Taking up the notions of realised and normal profits implies going back to Keynes’s *Treatise on Money* (Keynes, 1930/1971). Here we also find the normal prices that are at the centre of Sraffa’s work and that can be built into Pasinetti’s vertically integrated system. The normal prices are, in principle, independent of output levels and are, as such, the natural complement to the Keynesian fix-price theory of output and employment, where movements towards underemployment equilibria are based upon quantity adjustments. Hence theorising in the spirit of Sraffa and Keynes also implies bringing

Keynes's *Treatise on Money* closer to his *General Theory*.

This point has important consequences for the nature of long-period investment. Indeed, in the long run, r must equal r^* , hence the income effect of investment based upon Kalecki's double-sided investment–profit relationship is not relevant here. Only the capacity effect is significant. As we shall see later on, autonomous variables – government expenditures and exports – set economic activity in the consumption and investment goods sectors into motion to govern a long-period equilibrium. This implies that, if the long run is considered, *investment*, like consumption, must be *induced*, depending upon the capital stock required to produce long-period output (Bortis, 1997, pp. 81–9, 144). In the long run, employment and output are governed by long-period, institutionally determined, effective demand, which grows at the rate of growth of the autonomous variables, that is, government expenditures and exports. Net investment leads to an expansion of the capital stock and hence to growth; replacement investment is required to maintain the existing capital stock. Hence, in the long run, investment is linked to the social production *system*. This definitely clears the way for bringing together the classical theory of social and circular production, and the associated theory of value and distribution, and Keynes's monetary theory of output and employment determination on the basis of Pasinetti's vertically integrated model, which implies the horizontal and circular interindustry model.

The Labour Value Principle and the Uniform Rate of Profits

At a fundamental level the labour values and the uniform rate of profits are both essential features of a monetary production economy. This gives rise to three kinds of problems we want to deal with briefly in this section: the labour value principle and the uniform rate of profits, the meaning of labour values, and the social significance of the uniform rate of profits.

First, to put to use simultaneously the labour value principle *and* the uniform rate of profits requires abstracting from specific conditions of production that are considered accidental features of a monetary production economy if fundamentals or principles are considered. This abstraction is carried out later on and is maintained throughout this chapter in order to put to the fore in a simple and widely accessible form the fundamental forces at work in a monetary production economy. We may recall that this way of proceeding is legitimate since our investigation is at the level of essentials or principles and the corresponding pure theory is not a reflection but a reconstruction of what is regarded essential to prices and other economic

phenomena.

Secondly, we use the labour value principle in a broad humanist sense, not in the spirit of class struggle as was certainly largely justified in the nineteenth century. In a monetary production economy labour values are obviously essential to prices. This does not mean, however, adopting a labour *theory* of value, which evidently does not hold at the level of appearances. In fact, labour values are modified through the conditions of production leading to prices of production that, in turn, deviate from market prices. Hence observed prices are not proportional to labour values, which, however, constitute the essence of prices. It is in this sense that we put to use the labour value *principle*, which holds at the fundamental level of analysis, where only essentials are considered and accidentals – market conditions and conditions of production – are abstracted from. Further, the labour value principle and the associated surplus principle allow us to deal in a comprehensive way with the problem of distributive justice associated with the structure of wages, profits and rents, and with the size of the surplus comprising profits, ability rents and land rents. The labour value principle may also be associated in a straightforward way to the study of social relations, for example between people working in the profit and non-profit sectors respectively. Also, at the level of principles, part of the social surplus over ordinary wages is due to additional labour time of the persons working in the profit sector. This is the *quantitative* part of the surplus. More importantly, however, is the *qualitative* part of the social surplus made up of the surplus wages, exceeding ordinary wages. Surplus wages are due to special abilities, of some artisans, managers, surgeons, or lawyers for instance. In part, profits may also be interpreted as a reward for good management (on the social importance of profits see also Bortis, 1997, pp. 158–75).

In this chapter the somewhat antiquated notions of productive (surplus producing) labour and unproductive labour (paid out of the surplus) are replaced by the more modern terms ‘profit sector’ and ‘non-profit sector’ associated with the agents working in these sectors.

To conclude it has to be emphasised that in a humanist view the social surplus has nothing to do with exploitation. The surplus is socially necessary because its use ought to maintain, and improve, the orderly function of society as a whole and, thereby, to create the preconditions for surplus creation. In a sense there is an interaction between the creation of value and surplus value in the profit sector and the use of the surplus. Both may mutually enhance each other if the surplus is used in a socially appropriate way. Socially inappropriate uses of the surplus (for example through

corruption) may, however, lead to a deterioration of the socio-economic situation in the sense that labour productivity stagnates or even decreases while involuntary unemployment increases.

Third, in a monetary production economy a socially appropriate profit rate – compatible with full employment (see below) – has, as a result, nothing to do with exploitation. At a fundamental level the uniform (normal, target, satisfactory) profit rate is a highly important social institution that greatly contributes to the good and proper functioning of a monetary production economy. This classical notion is also fundamentally important for the project of combining Keynesian and Sraffian (classical) elements of analysis. The importance of the normal rate of profits for investment under uncertainty has been alluded to in the introductory section. Moreover, the uniform profit rate (r^*) is a powerful social tool to organise competition in the classical sense: capital circulates between sectors to bring about a tendency towards the equal profit rate; simultaneously, these capital flows steered by r^* tend to create a tendency toward a fully adjusted situation, that is, stock equilibrium, characterised by normal prices and quantities. As such, r^* and the normal prices contribute to governing structures or *proportions* between vertically integrated final goods sectors and, subsequently, in horizontal interindustry models. Most importantly, the normal rate of profits r^* and distribution in general are a crucial determinant of the *scale* of economic activity as suggested in Bortis (1997, pp. 142–204). Finally, interests and profits, seen as parts of the social surplus, may be associated without difficulties with a theory of *endogenous* money.

The normal rate of profits and profits in general are also important for micro-cum-macro reasons (see also Bortis, 1997, pp. 158–75). Profits provide a source of own funds for investment. At a given normal rate of profits, firms introducing better techniques of production and/or new products strengthen their competitive position. Moreover, in a Schumpeterian vein, these firms will get profits above the normal level, which constitute a kind of ability rent. In this sense, profits are also a reward for good management. Finally, the rate of profit usually contains a risk-premium.

Hence the normal rate of profits renders decentralised decision taking regarding prices and quantities possible and is, as such, fundamental for the orderly functioning of a monetary production economy. The associated normal prices do not stand in contradiction to the labour values but render these operable, though in an imperfect way. Indeed, labour values are basic principles that cannot be rendered operable in the real world directly, that is, in their pure form. In the real world we need workable, though imperfect,

approximations to labour values and associated profit rates. These are given by normal prices and the normal rate of profits. This implies that there is no contradiction between Ricardian–Marxian labour values and Sraffian prices of production. In the latter, differing conditions of production, which are abstracted from in the former, are taken into account in order to render labour values operable. The practical advantages of the prices of production are immense, because decentralised decision taking regarding prices and quantities is now possible. Normal prices, in fact, emerge from the normal cost calculation carried out within individual firms. These represent historical realisations of the theoretical normal prices of the Sraffa type, which are principles. Firms may also decide on the quality of products and on the techniques of production to be used. However, labour values would have to be calculated by the central planning bureau and to be imposed upon firms. In principle the vector of direct labour has to be multiplied by the Leontief inverse (relations (4) and (5) below). Such calculations are necessarily more or less imprecise. As a consequence, a heavily distorted price system comes into being, which is still more distorted through subsidies. Some firms realise ‘profits’, others make losses, which, perhaps, partly explain the interfirm debt–credit relations that occurred in the socialist economies. Moreover, the introduction of new products and new production technologies as a rule disturbs the plan; hence the technological stagnation above all in the consumer goods industries in socialist economies and the fact that product quality frequently was not in line with consumers’ wants, which, in turn, led to stocks piling up. All this suggests that Sraffa’s prices of production are not only very important theoretically because they provide a neat solution to the transformation problem if production is seen as a social and circular process. Sraffa prices are also of immense practical relevance (on this see also Harcourt (1981)).

Finally, it should be noted that the labour value principle and the uniform profit rate are probably the most appropriate starting points for social ethical considerations. We may indeed start, as Pasinetti does, from a natural state of affairs where two important social ethical postulates are, in principle, fulfilled: first, distributive justice is brought about through an ethically appropriate wage structure and a socially appropriate uniform rate of profits; second, there is full employment in the sense that there is no system-caused involuntary unemployment (there may be, however, structural unemployment due to disproportions between sectors of production). Socio-economic reality may now be seen as an alienated deviation from the social ethical norm (Bortis, 1997, pp. 39–53). The latter serves as a reference and a starting point to study specific problems. For example, if there is heavy

involuntary unemployment, there may be a pressure on the wages of less qualified workers. Consequently, profits may get associated with exploitation. Such deviations from the ethically desirable *natural* state may become institutionalised and hence *normal*. Inversely, the natural state of affairs may be appropriately considered the ethically desirable form of the (alienated) normal state. In theoretical work this means that the same variables and parameters may refer to an alienated or to a natural state of affairs. Looked at in this way all the scientific work in the social sciences, be it theoretical, empirical or historical now involves an ethical dimension. As Keynes reminded us, social sciences are *essentially* moral sciences.

Some Crucial Issues

In this chapter we attempt to elaborate the principles underlying long-period classical–Keynesian political economy, that is, the pure theory of a monetary production economy, and, as a by-product, to strengthen the analytical basis of the classical–Keynesian system that, in a tentative and preparatory way, is presented and put into a wider context in Bortis (1997). Among other features, this chapter intends to clarify somewhat the analytical links existing between horizontal Sraffa–Leontief interindustry land models and vertically integrated Ricardo–Pasinetti labour models. These links are taken for granted in Bortis (1997), which is based on the intuitive insight that Keynes and Sraffa somehow belong to a wider theoretical system.

This view has of course been upheld in an analytically rigorous form by Pasinetti since the 1950s. However, Pasinetti (1986b, pp. 3–4) looks at the Keynes–Sraffa issue from another angle and his aim is different in that he focuses on structural change:

Sraffa's *Production of Commodities* is centered on theories connected with the price system (mainly theories of value and distribution). It does not deal with the economics of physical quantities, which are taken as given. This is the major aspect of differentiation from the theories which, from Keynes to the post-Keynesians have (quite independently from Sraffa) shared the same critical attitude to prevailing theory and have pursued the same aim of reconstructing economic theory along the lines of the old classical economists. Keynes and the post-Keynesians, in striking contrast with Sraffa, have concentrated on movements of macro-economic magnitudes through time, while neglecting the relations at the interindustry stage and normally taking the price structure as given.

Pasinetti (*ibid.*, p. 4) then goes on to say that he is

going to adopt an approach to economic reality which is the same as Sraffa's, but [is] considering an economy which is moving through time. [The aim is to go] *beyond* Sraffa's assumption of given physical quantities and thus reach out for a link, and a harmonization along classical lines, with the economic theory that has stemmed from Keynesian and post-Keynesian analysis.

Pasinetti's analysis is based on the fact that an 'economic system may be considered from different points of view. [One is Sraffa's approach emphasising] the circularity of the production process. [The second aspect] is the point of view of effective demand [from which] one can investigate the final product and immediately relate it to its direct and indirect [labour] requirements' (ibid., pp. 10–11). And Pasinetti (ibid., p. 14) concludes:

The vertically integrated concepts thus emerge as becoming essential precisely at the point of going over to dynamic analysis. . . . There is therefore complementarity (not incompatibility!) between vertically integrated sectoral analysis and inter-industry analysis. [The] appropriate combination of the two approaches, or more specifically the finding of an appropriate way of, alternatively, going back and forth, from one approach to the other, that one can pave the way to a truly modern version of classical economic analysis – an economic analysis that may encompass, at the same time, the circular process of production and the evolution of economic systems through time.

The crucial point is that Pasinetti (ibid., pp. 14–16) sees that this conclusion, obtained

through a chain of arguments starting from Sraffa, can also be reached by starting from the other end, i.e. from a Keynesian analysis. [It] is not difficult to realize that what has allowed Keynesian and post-Keynesian analysis to deal with technical (in striking contrast with inter-industry) analysis is precisely the fact that, by being conceived in macro-economic terms, it had necessarily to be conceived in vertically integrated terms. Unfortunately Keynesian analysis, though capable in principle of overcoming the limitations of given technical coefficients, when extended to the long run, has not been carried beyond the stage of macro-economic analysis.

But there is no need for Keynesian dynamic analysis to be carried out only in macro-economic terms. The singling out of the concept of vertically integrated sectors allows the possibility of its complete disintegration into as many sectors as there are final goods. And this allows the possibility of breaking it down to a complete scheme of structural dynamics.

Here therefore is the clear way to analytical development. It has become a common place by now that Keynesian analysis must be developed beyond its macroeconomic original conception, . . . namely in its being broken down into as many vertically integrated sectors as there are final commodities. The analytical device of the sub-systems can then complete the so much sought-after relations and links with the field of investigation concerning the circular process of

production.

It is well known how immensely fruitful Pasinetti's (1981) *Structural Change and Economic Growth* has been since its appearance more than twenty years ago. For example, we gain, in a classical environment and in a structurally changing economy, profound insights into the nature of technical change (pp. 61 ff. and 206 ff.), the basic functions of the price system (pp. 133 ff.), the significance of the rate of interest (Ch. 8), the meaning and the implications of the choice of techniques (pp. 188 ff.), and one could go on.

This very brief sketch of Pasinetti's work enables us to situate broadly this chapter, and Bortis (1997), with respect to Pasinetti's writings. In general terms, we have insisted on the fact that Pasinetti's combination of interindustry analysis and vertical integration provides the analytical basis for bringing together classical and Keynesian elements of economic analysis. This idea has been presented in Bortis (1997), where, however, the classical side has been taken for granted and, consequently, has not been elaborated (Bortis, 1997, Ch. 3), whilst the Keynesian long-period employment side has been put to the fore (ibid., Ch. 4). In this chapter, therefore, we attempt to clarify and to strengthen the *classical* analytical basis of Bortis (1997), in view of providing an outline of a more complete classical–Keynesian system of political economy. This system should provide the starting point for an alternative to the Walrasian–neoclassical framework. Needless to say, given the immense complexity of the problem, the present contribution is bound to remain tentative and preparatory, as is the whole of Bortis (1997).

Our aim, then, is to elaborate a classical–Keynesian system of political economy in which all the great problems of political economy are dealt with, most importantly distribution, value, employment and money. This means that our purpose differs from Pasinetti's (1981) endeavour to deal with *Structural Change and Economic Growth*. The difference of aims entails a difference of method. *Specifically, we want to maintain, in opposition to Pasinetti, a Keynesian aggregate macroeconomics in order to be able to deal with the scale of economic activity, that is, with the level of employment.* Moreover, Keynesian macroeconomics has, in turn, to be combined with *classical macroeconomics, dealing with proportions and structures*, which enable us to picture the *social process of production*, which is basic in classical political economy, and to tackle the issues of *value and distribution within this process*. Here, the labour value *principle* is of fundamental importance, as is the uniform rate of profits as a most powerful tool to organise a monetary production economy. The analytically difficult task consists, therefore, in combining the labour value principle and the uniform

profit rate, which are both *essential* features of a monetary production economy. At the level of principles or metatheory this can only be done within a vertically integrated framework if the analysis is to be kept manageable. Relaxing this assumption and introducing prices of production is a matter of economic science operating through theories. In a classical–Keynesian framework the theoretical results will not modify qualitatively the conclusions reached at the level of principles. By contrast, the neoclassical principles derived from Samuelson’s (1962) surrogate production function break down once we leave the realm of labour values.

To deal with these problems, proportions and structures are, in the spirit of Ricardo and Marx, dealt with in the simplest possible way. It is, in fact, assumed that the *proportion* of circulating to fixed capital is the *same* in all sectors, although the *absolute* quantities of labour embodied in fixed and circulating capital respectively *differ* between final good sectors. This assumption, which will be justified later on, and the fact that the *same quantity of labour* may be embodied in *qualitatively very different goods*, ensure the *heterogeneity* of the various consumption and capital goods. Simultaneously, the fundamental importance of labour appears in a pure form. Only labour values are *essential* to price, not the *accidental* conditions of production and exchange, which merely modify the labour values and lead to prices of production and to market prices. This is not to say that the latter are unimportant. Prices of production – and the associated uniform profit rate – and market prices render labour values *operable* in the real world, although in a modified form. Particularly, the uniform rate of profits is a powerful tool to organise monetary production economies, because decentralised decision making regarding prices and quantities is rendered possible and competition may be organised in an orderly way. The labour value principle, however, is part of a system of pure theory enabling us to deal with essential aspects of a monetary production economy.

Hence to postulate uniform ratios of fixed to circulating capital and, consequently, the labour principle of value is *not* to criticise the *scientific* work done, by Sraffa, Pasinetti, Steedman and others, on the basis of non-uniform ratios of fixed to circulating capital, quite the contrary. In fact, these authors deal with economic phenomena and their models must be realistic in the sense that they reflect these phenomena. However, this chapter is on principles, that is, on the fundamental forces governing economic phenomena. Principles illuminate phenomena from inside and, as such, need *not* reflect these in a realistic way.

Specifically, in this chapter we consider the *principles* governing the economic aspects of the socio-economic-cum-political *system* made up of

institutions and technology. Institutions and technology form a system because the various social and individualistic institutions are complementary and broadly ordered through the famous classical–Marxian ‘material basis – social superstructure’ scheme. To deal with socio-economic system outcomes at the level of principles implies abstracting from the vagaries of the market and even from historical realisations of the conditions of production, which means that the prices of production are proportional to labour values. Hence our analysis is of a long-period nature: only permanent or slowly-evolving factors (technology and institutions) are considered, abstracting thus from more or less rapidly changing short- and medium-term *behavioural* elements associated with the market place or with business cycles respectively.

In this chapter, as in Bortis (1997), we oppose exchange between individuals and production as a social and circular process. It is natural, therefore, that we *start* from the exchange/production dichotomy that is set forth in Pasinetti’s (1986a) ‘Theory of value: a source of alternative paradigms in economic analysis’, specifically his labour or production model (*ibid.*, pp. 421–7). This model is completed by the neat integration of interindustry and vertically integrated models in Pasinetti (1981, pp. 109–12).

It should be mentioned that our analytical treatment of employment differs from Pasinetti’s. Indeed, we consider that condition (16) in Pasinetti (1986a, p. 422) must always be fulfilled, at any level of employment, because it guarantees non-trivial solutions. Involuntary unemployment must enter, consequently, in the form of an employment scalar, smaller than unity, which the quantity vector in the system (14) in Pasinetti (1986a, p. 422) has to be multiplied with (see also Bortis, 1997, pp. 150–2). Such a treatment of employment completes, in our view, Pasinetti’s preoccupation with *structural change* in a very useful way, because the employment level heavily determines the social climate within which structural change goes on. For example, with massive involuntary unemployment prevailing structural changes will be resisted precisely because of the fear of even more unemployment.

Starting, then, from Pasinetti (1981, pp. 109–12; 1986a), this chapter on Keynes and the classics is written in the *spirit* of Sraffa and Keynes, who, respectively, represent the surplus principle and the principle of effective demand, and the theoretical implications of these principles. No precise literal correspondence with these authors is sought; this, incidentally, would be impossible as noted above.

Based on the classical–Keynesian model of a monetary production

economy sketched in this chapter, one may subsequently attempt to work out a comprehensive alternative to the Walrasian exchange-based model (for a tentative and preparatory contribution to classical–Keynesian political economy in a wider context see Bortis, 1997). Starting from the suggestions made in this introduction, in the next two sections we consider the classical view of production as a circular, social, and vertically integrated process (second section), and its implications for the pure theory of distribution and value (third section). While this theory implies dealing with *proportions* (relative prices) and *shares* (in a given income), Keynes’s theory of employment deals with the scale aspect of economic activity where absolute (money) prices and quantities are put to the fore. This leads to defining *classical* and *Keynesian* macroeconomics (fourth section). It has already been mentioned that the former is about proportions within production and circulation (for example proportions between industries and sectors, relative prices and income shares), while the latter is about the scale of economic activity associated with certain levels of employment and involuntary unemployment. In the fifth section the problems of value and distribution are addressed within a framework of classical macroeconomics, which pictures the social process of production and the associated circulation of intermediate and final goods at a given scale of economic activity. The sixth section is about Keynesian macroeconomics, which deals with the forces governing the scale of economic activity, that is, output and employment levels, with proportions given. In the seventh section some extensions of the basic model are briefly considered; for example, the relation between values, prices of production and market prices is very briefly touched upon. The concluding section alludes to the fundamental importance of the modern founders of classical–Keynesian political economy, Keynes and Sraffa, who, together with Kalecki, are the great figures of Shackle’s *Years of High Theory*.

Hence classical and Keynesian macroeconomics are to be combined to yield a *monetary theory of production* as envisaged in Keynes (1933/1973), in contrast to the neoclassical real exchange model. The monetary theory of production implies that *money is essential* in a modern economy, because the social process of production and the processes of circulation simply could not go on without money, as Davidson and others have emphasised time and again. The basic reasons are that in a monetary production economy consumption, production and investment plans are always in terms of money; production and investment take time and monetary outlays and receipts do not coincide; in the sphere of exchange, commodities are always exchanged against money.

Moreover, since our analysis is at the level of pure theory, we do not consider concrete institutional set-ups but only examine how the institutional and technological system works in principle. This implies that the long-period equilibrium is in the *present* and that the corresponding prices and quantities are all governed by technology and institutions, which represent the permanent or slowly evolving factors of classical political economy (Bortis, 1997, pp. 84–9, 103–17). Dealing with principles means representing probable (Keynes, 1921/1988) causal relations in their pure form or setting up pure theories, *independent* of historical realisations. Therefore, there are *no leads and lags* to be found here. These would only appear in applied models picturing historical realisations of principles; here, such realisations are merely used to illustrate the principles or pure theories in some instances.

THE STARTING POINT: THE SOCIAL PROCESS OF PRODUCTION

The way in which classical and Keynesian elements of political economy must be combined emerges from the very nature of the social process of production. Indeed, Marx suggested conceiving of this process as an interaction between man (labour) and nature (land). In this interaction labour is evidently the active element while land is passive. In the seventeenth century already William Petty suggested that ‘labour is the father of value, and land the mother’. The land and labour features of production give rise to distinguishing *three* kinds of basic goods, absolutely necessary for production: land basics, labour basics, and labour–land basics. *Land basics* are primary products taken from nature, for example iron ore or crude oil, which are made ready for productive use in the form of steel or petrol respectively. Subsequently, land basics or primary goods are used to produce intermediate products: wheat, flour, leather, bricks for instance. Primary products and intermediate products represent part of the means of production that are converted into final products, specifically: bread, shoes, houses, various machines and equipment; generally: private consumption goods, private and public capital goods, and goods making up for state or public consumption. *Labour basics* are *final* products and correspond to the socially necessary consumption goods required to maintain the persons who are active in the ‘profit sector’ and who, through the social surplus, enable to build up and to maintain a ‘non-profit sector’, including the state, that is, the political institutions. Finally, *labour–land basics* are machine tools, that is,

machines to make machines, representing past labour, and enable the labour force operating in the 'profit sector' to enter into contact and interact with nature through the social process of production, that is, to extract primary goods, nature or land basics, with the aim of transforming them, passing through intermediate products, into final products, including labour basics. The primary land basics move between industries in horizontal interindustry models to produce, in a first stage, primary goods entering the production of all goods, as is pictured by *Sraffa's model* in which *inputs and outputs coincide*. Since the output of land basics enters the production of all intermediate and final goods, necessary technical relations exist between land basics and the final output. The prices of nature basics are thus determining the prices of final products. Hence the fundamental relations between value and distribution may be studied within the social process of production of *primary products or land basics* as Sraffa (1960), with intuitive insight and analytical ability, did indeed on the basis of a model implying non-uniform compositions of capital. In fact, land basics contain, potentially, all final outputs, including labour basics, that is, necessary consumption goods.

The output of land basics is, in a second stage, taken up to produce all intermediate goods. In a third stage, primary and intermediate goods are transformed into final goods consisting of labour basics, labour-land basics and non-basics. The latter make up the social surplus: gross investment, consumption exceeding the socially necessary consumption of the workers and employees of the 'profit sector', comprising the necessary consumption of the 'non-profit sector' and the non-necessary consumption of the entire population, social and state consumption (for example for cultural purposes in the broadest sense).

This view of production – primary products are, passing through intermediate products, transformed into final goods – explains the triangular structure of the Leontief matrix in which Sraffa's land basics are located in the upper left corner. Land basics are produced with land basics and hence the corresponding transaction table and the coefficient matrix form a square matrix. The output of primary goods is distributed to the industries producing intermediate and final goods. Intermediate goods require as inputs land basics and other intermediate goods. The corresponding coefficients form another square matrix beginning at the lower right-hand corner of the Sraffa land basics matrix. Final goods are produced with land basics and intermediate goods. Therefore, primary products enter the production of all goods; intermediate products enter the production of other intermediate goods and of final goods. The latter are only outputs. Hence for intermediate

goods some positions to the left of the main Leontief diagonal are positive. By definition, for final goods only the net output vector contains positive elements. The broadly triangular structure of the Leontief matrix thus emerges, with zero positions dominating to the left of the main diagonal.

The vector of net outputs has zero positions for primary and intermediate products. The lower part of this vector is occupied by the final outputs. These are made up of private and public investment (capital) and consumption goods. For each product, primary, intermediate and final goods, there is a specific capital good. Moreover, among the capital goods there is a particular type, that is, machine tools or machines to make machines, a point emphasised by Lowe (1976). Machine tools are, in association with labour, capable of reproducing themselves and of producing the corresponding investment goods for each industry, that is, for all primary, intermediate and final goods industries. *Obviously, the machine-tool sector is of basic importance for the social process of production.* As suggested, this sector enables man (labour) to enter into contact and to interact with nature (incidentally, in traditional societies, this role was held by the blacksmith, who always occupied a privileged position in pre-modern societies because it is he who produced the tools and the weapons). Because of their fundamental importance in the social process of production machine tools may, therefore, conveniently be called labour–land basics. The presence of the machine-tool sector also implies Sraffian ‘production of commodities by means of commodities’, not only among the processes linking primary and intermediate goods to final goods, but also on the *final* product side. The basic two-sector model put to use in the capital-theory debate – a capital good (machine tool) sector producing a capital good for itself and for the consumption goods sector – is a striking example (Garegnani, 1970; Harcourt, 1972).

The second type of final goods consists of consumption goods. These are of three broad types: necessary consumption goods, non-necessary consumption goods and goods for social and state consumption.

Historically, the *nature* aspect of production associated with the notion of land basics was put to the fore in the fundamental ‘zigzag’ *tableau économique* of Quesnay (*le grand tableau ou tableau fondamental* reproduced and explained in Oncken, 1902, pp. 386–402) and subsequently taken up in the interindustry models of Leontief and Sraffa. The *labour* aspect of production is set out in Ricardo’s vertically integrated labour model, elaborated by Pasinetti (1981; 1986a). Labour basics also appear in the vertically integrated two-sector (consumption and investment goods) models of Smith (1776/1976, Book III), Marx (1867–94/1973–4, vol. II, Chs

20–21), Robinson (1956) and Kalecki (1971).

In this framework, we may remark that only labour and land are, in their capacity as basic and original ‘factors’ of production, capable of producing a surplus. By the help of his *tableau économique*, Quesnay attempted to show that only land produces a surplus. Ricardo, however, argued that both land and labour concur in producing the surplus. Nevertheless, his fundamental prices are labour values because rent is eliminated by an ingenious device. Indeed, Ricardo argues that prices are formed where the conditions of production are most difficult. Here rent is zero and labour time, uniquely, determines value. As a consequence land rents are of a differential nature, arising in more favourable conditions of production. It is this Ricardian device of determining value that is adopted in this chapter. This is done by introducing the notion of the mark-up over ordinary or normal wages. This mark-up allows to include various elements in the social surplus: normal profit, profit higher than normal (for example, owing to outstanding management), land rent, and, very importantly, labour rents that accrue on account of exceptional abilities in the main. The issue of value and distribution within the framework of the social process of production is taken up in the next section.

SOCIAL PRODUCTION, VALUE AND DISTRIBUTION

The social process of production is of immense complexity, and so are the problems of value and distribution, which are closely associated with this process. The complexity of the social process of production appears from its two aspects. In horizontal models of the Sraffa–Leontief type primary and intermediate products move between industries to enable, in association with direct labour and fixed capital (past labour), the production of final goods. In vertical production models labour is put to the fore. At the different stages of production labour uses up primary and intermediate goods to produce final goods.

In order to represent the essentials of social production and the associated processes of value and distribution, that is, to bring to the open the fundamental causal forces at work, all accidental elements have to be left aside. Most importantly, we consider a vertically integrated economy and the conditions of production are assumed to be such that the labour value principle emerges. A very simple fundamental (metaphysical) model picturing essentials will emerge and the conclusions obtained from this model will not be qualitatively modified if the simplifying assumptions are

given up to carry out studies at the scientific level. However, the metaphysical model will provide a foundation and a framework for scientific activities. According to Aristotle, metaphysics is the ordering science.

Let us now consider how the processes of price formation and distribution take place *in principle* within the framework of the social process of production. In this process Sraffa–Leontief interindustry prices are transformed into Ricardo–Pasinetti vertically integrated prices proportional to direct and indirect labour.

The starting point is a Leontief price system:

$$pA + w_n n_d k = p \quad (1)$$

where A is the broadly triangular Leontief coefficient matrix sketched in the previous section. The coefficients:

$$a_{ij} = x_{ij}/X_j \quad (2)$$

indicate the amount of good i required to produce a unit of good j . p is the (row) price vector. Firstly, we have the prices of primary goods or land basics, subsequently the prices of intermediate products, which are followed by the prices of final products, that is, private and public consumption and investment (capital) goods.

The expression:

$$w_n n_d k \quad (3)$$

denotes value added and its distribution between wages and gross profits. (We use the symbol k instead of the profit rate and the value of the different capital goods in order to be able to include at a later stage land and labour rent elements – in the case of labour, ability rents – in excess of ordinary wages w_n .) n_d is the (row) vector of direct labour per unit of output for all products, primary, intermediate and final, in this order. Complex labour is reduced to simple labour through the existing wage structure, where the determination of the socially appropriate wage structure constitutes a most complex problem of social ethics. w_n is a scalar denoting the wage rate per unit of simple labour time in terms of money, and k is the mark-up on labour costs such as to ensure a satisfactory (target or normal) rate of profits on fixed capital and to allow for the depreciation of equipments. The mark-up, k , is the same in all industries and sectors. This implies *abstracting from specific conditions of production*, which means that the *proportion* between

the value of fixed capital and the wage bill (circulating capital) are postulated the same in all sectors, although *absolute magnitudes diverge*. The implications of this procedure of abstraction will be brought out below.

Starting from the Leontief interindustry price system the Ricardo–Pasinetti price system based on vertical integration can now be derived. Relation (1) may be rewritten as:

$$p(I-A) = w_n n_d k$$

where I is a unit matrix (the main diagonal is made up of the element ‘1’, all other positions of this square matrix are ‘0’).

Multiplying on both sides by the Leontief inverse, $(I-A)^{-1}$, and transposing this matrix as well as the vectors p and n_d , which now become *column* vectors, yields:

$$p = w_n [(I-A)^{-1}]' n_d k \quad (4)$$

The relation:

$$n = [(I-A)^{-1}]' n_d \quad (5)$$

indicates that the column vector of vertically integrated labour n is derived from multiplying the column vector of direct labour n_d by the *transposed* Leontief inverse. This procedure may be called the Pasinetti transformation (Pasinetti, 1981, pp. 109–12). Each line of the transposed Leontief inverse contains the quantities of *all* goods required *directly and indirectly* to produce a unit of the good considered. As a result, each n_i designates the total amount of labour required to produce one unit of a primary, intermediate or final good.

Combining relations (4) and (5) yields the Ricardo–Pasinetti prices for final outputs based upon vertical integration:

$$p = w_n n k \quad (6)$$

Before going on, the implications and the meaning of abstracting from specific conditions of production have to be explained, first technically and then as to the wider meaning. From relations (11) and (16), it emerges that the direct and indirect labour used to produce a consumption (or a primary or intermediate) good, n_i , and the capital good used to produce it, n_{iK} , must be the same, in fact equal to unity as implied in relation (16). Technically, this

means that *for each good* (consumption, intermediate or primary good) *the corresponding capital good row of the transposed Leontief inverse in the equation system (4) must be multiplied by a specific coefficient so as to make the corresponding ratio n_{iK}/n_i equal to unity* (ratios smaller or greater than unity would also be possible), bearing in mind that the absolute values of n_{iK} and n_i may differ widely. This very simple device allows doing analytical work at the level of basic principles while at the same time maintaining the presence of heterogeneous goods that is required to allow for the social character of the process of production. The heterogeneity of goods is also ensured by the fact that a certain quantity of abstract labour may produce widely differing goods. Hence, on the one hand, the abstraction from specific conditions of production to bring out essentials leaves all the crucial characteristics making up the social and circular process of production intact. On the other hand, it is intuitively evident that reintroducing differing conditions of production – that is, differing n_{iK}/n_i – for scientific purposes would not basically alter the conclusions. Precisely, with classical–Keynesian theory the fundamental principles remain intact when the level of abstraction is lowered to tackle real world problems at the level of phenomena. We shall see that this is not the case with neoclassical theory (on this see also Bortis, 1997, pp. 289–90). Finally, in the above abstraction procedure some coefficients will be greater than unity and others will be smaller than unity. Hence a value of 1 for n_{iK}/n_i appears as a broad average of real world production conditions.

It has already been suggested that to abstract from specific conditions of production means passing from scientific models to metaphysical models (metamodels) embodying principles. Abstracting from all accidentals, which in this instance also comprise the historically variable conditions of production, enables the theorist to state the principles in the simplest possible way and to draw conclusions that are immediately evident and are, as such, generally accessible to a wider audience, for example historians and policy makers. This evidently favours the integration of political economy into a wider framework of social theory and policy.

As suggested, the crucial point is that the conclusions drawn from the set of principles (the metaphysical model) will remain valid if the model is made more realistic (if, for example, differing conditions of production are considered or if the mark-up is not only on wages but also on intermediate and primary products, as would be the case if production is not vertically integrated). This emerges from the price system (1). Indeed, if the proportions between circulating and fixed capital were not uniform, the scalar k in relations (1) and (3) would have to be replaced by a square matrix

containing the various sectoral mark-ups on the main diagonal with zero positions elsewhere. Or, when the economy is not vertically integrated, the mark-up would be on wages *and* intermediates and primaries; the price system (1) would become:

$$[pA + w_n n_d]k = p$$

The model would become immensely complicated while the conclusions would only be quantitatively, and not qualitatively, modified.

The *macroeconomic* counterpart of the sectoral price system obtains if we multiply in relation (6) the column vectors p and n by the quantity (row) vector q :

$$Y = w_n N k \quad (6.A)$$

where Y is the nominal gross national product and N the number of workers and employees in the ‘profit sector’ if we interpret w_n as the average wage rate.

In the second place, p_c , the money price of a bundle of necessary consumption goods, is selected as a *numéraire*. This implies that the real social product is $Q = Y/p_c$, a certain number of bundles of necessary consumption goods. We now obtain the Kalecki–Weintraub price equation put to use by Bortis (1997):

$$p_c = w_n n k = w_n (1/A) k \quad (7)$$

Overall labour productivity, A , is the inverse of the macroeconomic labour coefficient, n , with $A = Q/N$ and $n = N/Q$, where N is the labour force active in the ‘profit sector’. The social product may be measured most appropriately in terms of (productive) labour embodied if the capital composition is uniform. Indeed, if in relation (7) both sides are multiplied by Q and divided through $w_n k$, the social product is measured by N , which may be interpreted as labour time. As already suggested, this procedure implies that the ‘reduction problem’ is solved; as a consequence w_n represents the value created by a unit of simple labour.

If the ratios of fixed to circulating capital were different, k would have to be interpreted as the weighted average of the sectoral mark-ups. In this case, the social product would simply have to be measured in terms of the above-mentioned bundle of labour basics (necessary consumption goods) having a money price p_c . Indeed the simplifying assumption of uniform compositions

of capital can be given up whenever the analytical aim pursued requires this, for example if one deals with structures and structural change as does Pasinetti (1981).

The prices (6) and (7) refer only to produced goods and, as such, reflect the social effort that has been made to produce them. This effort is represented by vertically integrated labour coefficients, n_i for each good i , in the system (6) and its macroeconomic equivalent n in (7). The effort made to produce good i starts with the production of primary goods, with value added being n_{iP} , and, passing through intermediate products (value added is n_{iI}), terminates with the final products, with direct labour in the last stage of production being n_{iD} . Hence:

$$n_i = n_{iP} + n_{iI} + n_{iD} \quad (8)$$

and

$$n = n_P + n_I + n_D \quad (9)$$

for all final goods if the n 's in (9) are conceived of as vectors and for the economy as a whole, in relation with the social product, if the n 's in (9) are seen as scalars.

Combining (9) with (7) yields:

$$p_c = w_n(n_P + n_I + n_D) k \quad (10)$$

This relation implies that, with vertical integration of the social process of production, value added in primary and intermediate goods sectors is also *variable* capital in Marx's sense, which greatly simplifies the presentation of price formation. In fact, with vertical integration, labour values enter the final product in a logically distinct sequence, starting with the value added in the fundamental layer of primary goods or land basics, going through the intermediate layer and ending up with the final product layer.

The price equations (6), (7) and (10) further imply that distribution is a social and political process synthesised by the mark-up, k . Indeed, equation (7) implies a wages share $1/k$ and a property share $1-(1/k)$ (made up of profits and of land and labour rents). The social forces determining k are the relative strength of employers and workers, eventually represented by associations, the amount of involuntary unemployment; the political element comes in through state intervention. The above price equations imply that prices and the price level depend upon technology, synthesised by n and A ,

and distribution, represented by w_n and k . Specifically, distribution is logically prior to production and price formation. These latter processes can only start if a structure of money wages and a rate of profits are given.

The process of distribution occurs at each layer where the social effort of value creation is performed, as can be seen from relation (10).¹

These remarks on the nature of prices allow us to assess the influence of land and labour basics on prices. If the conditions of extracting land basics get more difficult, the corresponding labour coefficient for primaries, n_p , will increase, and, as a consequence, the prices of all intermediate and final products will rise. This will reduce real wages and may trigger distributional conflicts, as indeed happened whenever oil prices rose sharply. The latter implies that labour basics are price determining through income distribution. The wage–price spiral is a case in point.

Two issues remain to be addressed in this section: the significance of the mark-up, k , and the fundamental importance of the machine-tool sector. To bring out the meaning of the mark-up, k , we start by considering the price equations for consumption goods, taking account of the fact that each private or public consumption good is produced by vertically integrated labour assisted by a specific capital good (the same holds for all other goods: private and public investment goods, primary and intermediate goods). The price equation for a consumption good can be written as follows:

$$p_{ic} = w_n n_{ic} + r (w_n n_{iK} k)$$

or:

$$p_{ic} = w_n n_{ic} [1 + (r w_n n_{iK} k) / (w_n n_{ic})]$$

and:

$$p_{ic} = w_n n_{ic} [1 + (r n_{iK} k) / n_{ic}] \quad (11)$$

Since we abstract from the differing conditions of production to bring out the basic principles, the proportions of fixed to circulating capital, n_{iK}/n_{ic} , are the same in all sectors, although absolute magnitudes may differ as is required with heterogeneous goods. As suggested above, this implies that the mark-up on circulating capital, k , is the same in all industries and sectors. Hence the expression in square brackets of relation (11) equals k , which allows us to bring out the economic meaning of the mark-up more precisely *for the case when property incomes consist of profits only*:

$$k = 1 + (r n_{iK} k)/n_i$$

Hence:

$$k = n_i/(n_i - r n_{iK}) \quad (12)$$

$$1/k = (n_i - r n_{iK})/n_i = 1 - r (n_{iK}/n_i) \quad (13)$$

and for the economy as a whole:

$$1/k = (n - r n_K)/n = 1 - r (n_K/n) \quad (14)$$

Relations (13) and (14) tell us that all values are created by labour active in the ‘profit sector’ and that profits are proportional to past labour embodied in fixed capital goods. Moreover, since according to relation (7) the real wage is in terms of necessary consumption goods (labour basics), distribution must be regulated in the labour-basics sector, with the price and distribution equations having the same structure as relations (11) and (13). At this stage, it has to be repeated that normal profits have nothing to do with exploitation but are socially necessary (see also Bortis, 1997, pp. 158–75).

The price equations for the capital goods entering the production of consumption goods, primary and intermediate goods, have exactly the same structure as the price equations for the consumption goods represented by relation (11):

$$p_{iK} = w_n n_{iK} [1 + (r n_{iK^*} k)/n_{iK}] \quad (15)$$

There is one important difference, however. In producing the capital goods required to produce consumption goods, labour is assisted by a specific capital good, that is, machine tools or machines to make machines (Lowe, 1976). In expression (15) this specific capital good is marked with a star (K^*). Hence machine tools assist labour in producing all the capital goods required (in the production of each consumption good labour is assisted by a specific capital good). *However, machine tools also assist labour to produce machine tools.* Hence we have a final fundamental equation:

$$p_{iK^*} = w_n n_{iK^*} [1 + (r n_{iK^{**}} k)/n_{iK^*}] \quad (16)$$

This relation fixes the proportion between the value of fixed and circulating capital that must hold in all price equations, that is, $n_{iK^{**}}/n_{iK^*}$. We should recall here that we abstract from the conditions of production in order to put

to the fore two essential features of a monetary production economy, that is, the uniform profit rate and the fact that all value is created by labour. However, the uniform ratio between fixed and circulating capital is not chosen arbitrarily. This ratio is determined in the basic *technology-determining* sector of a monetary production economy, that is, the machine tool sector. In a way, this is in analogy to the Ricardian proposition that the rate of profits is governed in the agricultural sector, which produces the necessary consumption goods.

According to relation (16) the ratio of fixed to circulating capital may be unity with absolute values being the same, which would simplify all the price equations set forth above. However, this proportion need not be unity, and absolute values of fixed and circulating capital may vary since machine tools may produce machine tools of differing shapes. But even if the absolute values in all the n_{ik}/n_i proportions were the same, the heterogeneity of produced goods would be possible since machine tools are capable of producing capital goods, including machine tools, of different *qualitative* shapes, which, in turn, can produce qualitatively different consumption goods, always in association with labour of course. In fact, the same *quantity* of labour may be associated with very different qualitative realisations in the form of heterogeneous goods. This is in analogy to Pasinetti (1981), where the vertically integrated labour coefficients are associated with differing and changing structures.

The treatment of value and distribution within the social, circular and vertically-integrated process of production suggested here and in the previous section enables us to deal with three problems associated, in our opinion, with Sraffa's model of circular production, value and distribution. Firstly, the notion of land basics or primary products enables us to deal with the problem that, with Sraffa, inputs equal output. Indeed, in the upper left-hand corner of the Leontief matrix, iron ore is transformed into steel, crude oil into petrol, and so on; the outputs of land basics are subsequently transferred to all intermediate and final goods sectors. Secondly, treating fixed capital goods as final products, all produced by machine tools and labour, rather than treating fixed capital goods as joint products, renders the whole analysis of value and distribution within social and circular production much easier; specifically, profits may now be calculated on fixed capital by way of a mark-up on circulating capital, which includes direct wage costs and the costs of intermediate and primary goods, which also become wage costs if there is vertical integration. Thirdly, the social and circular process of production implies, in fact, production of commodities by means of commodities *and labour*. This means that the feature of circularity appears in

three instances in the social process of production. In the first place, there is production of primary commodities by primary commodities and labour in the upper-left Sraffa corner of the Leontief system. Secondly, in the realm of final products, there is production of commodities by means of commodities in the capital goods sector, where all specific capital goods are produced by machine tools, which also produce and reproduce themselves. Thirdly, and perhaps most importantly, necessary consumption good, which are final goods, have to move the all, even to the most remote corners, of the social and circular production system, because of the fact that there is production of commodities by means of commodities and labour, a fact pictured by relation (5) above, which indicates the Pasinetti operation of calculating vertically-integrated labour by multiplying the transposed Leontief inverse by the vector of direct labour.

PROPORTIONS AND SCALE: CLASSICAL AND KEYNESIAN MACROECONOMICS

Classical and Keynesian macroeconomics represent two aspects of the social process of production and of the associated processes of circulation of money, means of production and final goods respectively. It has already been suggested that classical macroeconomics deals with *proportions* in relation with the social and circular process of production and with the associated theories of values and distribution at a *given scale* of economic activity. Keynesian macroeconomics, however, treats of the *scale* of output and employment, that is, economic activity, with *proportions given*. This is valid only at the level of principles. In the real world, set in historical time, proportions will vary if activity changes.

The classical and Keynesian elements of economic analysis may now be brought together within the wider framework of a monetary theory of production. The essential feature of a monetary production economy is neatly represented at the outset of the second volume of Marx's *Kapital* (p. 31):

$$M - C \dots P \dots C' - M' \quad (17)$$

In the first stage, producers dispose of money and finance, M (G in original) and buy means of production, that is, commodities and labour force, C (W in original). These are transformed into final products, C' (W'), in the vertically integrated labour view of the social process of production, P , which implies

the horizontal land aspect of production. The final goods, C' , are transformed into money, M' (G'). At this second stage of circulation, M' – effective demand in money terms – governs C' , the amount of final goods that may be exchanged against money.

The classical proportions aspect emerges, in the first place, in the sphere of distribution. Before production can start, distribution must be regulated: the normal (satisfactory, target) profit rate used in the price calculation of firms, and a wages structure, ideally based upon an evaluation of work places, must be given. Hence a Ricardian touch comes in through the primacy of income distribution, which indeed emerges as the primary and fundamental problem of classical–Keynesian political economy. In a wider view the determination of the wage, profit, and rent structures and the corresponding shares in national income is a central problem of distributive justice, which, in turn, forms the kernel of social or political ethics.

As production goes on, normal absolute prices and money incomes are formed. This gives rise to a new set of proportions, that is, relative prices and shares in a given income. The spending of incomes determines another set of proportions: absolute and relative quantities, the latter giving rise to specific proportions that must hold between final product sectors, for example between the consumption and the investment goods sectors (hence if wages are entirely consumed and profits saved and equal investment, the wage bill in the investment goods sector must equal profits in the consumption goods sector). Fundamentally, that is, at the level of principles, proportions must be such that the processes of production and circulation pictured by scheme (17) may go on smoothly; specifically, entrepreneurs must be able to cover the costs of production and to realise the normal rate of profits. This represents a Sraffian element in classical macroeconomics.

The classical proportions aspect is in direct relation with the *circuit* of monetary flows and of final goods flows, which take place between producers and private and public consumers. The breadth of the circuit is given. This implies that the scale of economic activity, measured in terms of employment, is also given; economic activity may go on at an employment level of 70, 80 or 90 per cent, for example, implying corresponding levels of involuntary unemployment.

It is evident from scheme (17) that money is absolutely necessary to run the system of social production and circulation. There is not exchange of goods against goods, but always goods against money. For example, when the steel sector delivers steel to the machine-tools sector, the steel sector does not get machine tools in return, but money. This gives rise to flows of commodities and money in the opposite direction, that is, to circuits of goods

and money. It has already been suggested that the surplus principle – interest as part of the social surplus – that is implied in scheme (17), seems naturally associated with a theory of *endogenous* money.

Long-period Keynesian macroeconomics is, precisely, about the *scale of economic activity*, that is, *the breadth of the circuit*, with proportions in principle given.² Keynesian models, whether comprising one or several sectors, are necessarily based upon vertical integration, which puts the labour aspect of production to the fore. The result of the social process of production is the social product, which, as a consequence, contains final goods only. The processes of distribution and formation of values or prices that go on within the vertically integrated process of production are now completed and the process of circulation of final goods and of money may start. The latter gives rise to real and monetary flows between enterprises, households, the social sphere (where most diverse associations are located, mostly non-profit organisations) and the state.

It is at the second stage of the process of circulation, $C' - M'$ in scheme (17), that the scale aspect of classical–Keynesian political economy emerges: *the level of economic activity, that is, the scale of output (C' , to wit, the social product, Q) and of the associated level of employment (N), is governed by effective demand (M').* The employment level so determined is associated with a definite level of involuntary, system-governed unemployment.

This very simple monetary theory of production implies that the social processes of production and circulation could not go on without money, which is an indispensable measure and representative of value and an equally indispensable means of transaction. All public and private consumption and investment plans realised in historical time are in terms of money, which represents the link between the past and the future. However, in a monetary production economy (Keynes, 1933/1973) with extensive division of labour and, consequently, with social production, there are no exchanges of goods against goods, as is the case in a real exchange economy, but always goods against money. For example, the steel industry delivers steel to most parts of the machine industry without buying the machines produced there. Or, workers occupied in the machine industries do not exchange labour time for machines; in fact, these workers ‘exchange’ their salaries against goods that they have not directly produced, for example necessary consumption goods. In a way, one could conceive of an exchange of input values (labour time) C , represented by M , against output values C' , and its counterpart in money terms M' , within the two processes of circulation set forth in scheme (17), whereby money *represents* value. Since

$M' > M$ in this scheme, a surplus value amounting to $M' - M$ must have been produced within the social process of production, P , as Marx has argued at the outset of the first volume of his *Kapital*. Hence workers are remunerated in money form for their contribution to the productive effort in the social process of production. Money wages represent, in turn, a claim on a part of the common result of production that can be chosen freely. As a consequence, the social process of production within which final goods embodying value (labour time) are created could not function without money, which represents these values and enables thus their circulation; as such money – which includes, of course, the financial sector – is also a social institution.

Hence the vertically-integrated production model, which implies the horizontal interindustry model (as developed in the two previous sections) and the associated processes of circulation synthesise classical and Keynesian pieces of analysis and represent, as such, a monetary theory of production. For analytical purposes, it is appropriate to abstract from differences in the conditions of production such that these are similar but not equal in the various sectors and industries. In fact, while the ratio between the value of fixed capital and of circulating capital – consisting of wages only in a vertically integrated model as emerges from relations (4) to (7) – is assumed to be the same in all sectors and industries, the absolute magnitudes of these capitals are postulated to be different. This allows for the existence of heterogeneous goods. Given these specific proportions between fixed and circulating capital, all economic activities now stand in a direct relation to labour: the fundamental prices are labour values; profits and rents arise because the labour force in the ‘profit sector’ produces a quantitative and qualitative surplus value (qualitative surplus value arises in the form of surplus wages due to specific abilities, for instance). This in turn implies that the social product is measured by labour time. Hence the postulate of equal ratios between fixed and circulating capitals, not absolute magnitudes thereof, allows us, in a Ricardian–Marxian vein, to discuss fundamentals, that is, the essential features related to production, value, distribution, employment and money in a very simple way. Different conditions of production, cyclical movements of prices and quantities, and the vagaries of the market are merely associated with historically variable forms of appearance (*Erscheinungsformen*) of invariable basic principles. For instance, the Sraffian prices of production, themselves principles, though non-fundamental, show how the fundamental Ricardian labour values can be historically realised through prices based upon normal cost calculation.

THE PROPORTIONS ASPECT OF CLASSICAL–KEYNESIAN POLITICAL ECONOMY

Complementarity is a fundamental feature of the social process of production. The social product is the result of a common effort of all industries and sectors. These come into being on account of the division of labour that, in principle, is rendered possible by the different dispositions and abilities of the social individuals associated with their social nature. Between the various sectors and industries given but not invariable proportions must prevail if the process of production is to go on in an orderly way. This requires cooperation between producers. Coordination is also required at the level of the firm; some coordination may be required at the level of industries through producers' organisations, or even at the macroeconomic level regarding distributional issues in the main, for example wage structures or the level of the normal profit rate or the hierarchy of profit rates.

The essentially social character of production implies that, at a fundamental level, all the great problems of political economy, namely, value, distribution, employment, accumulation and growth are also social, in a way macroeconomic, problems. In this section it is suggested that value and distribution are associated with the proportions aspect of production; in the next section employment is shown to be related with the scale aspect. The analytical starting point is provided by Pasinetti's (1981; 1986a) vertically-integrated labour system, which, as suggested in the fourth section, implies the Leontief–Sraffa nature-based horizontal model.

Before going on, a definitional problem concerning the terms *normal* and *natural* has to be clarified. In fact, Sraffa's system exhibits *normal* variables and Pasinetti's model contains *natural* variables (see also Bortis, 1997, pp. 47–53, 86–7). Pasinetti's *natural* system characterises an economy with ethically desirable properties: there is full employment and the income distribution implied might reflect the principle of distributive justice. In fact, the variables and parameters appearing below are formally, but not materially, equivalent to Pasinetti's and reflect ethically imperfect real world situations. For example, permanent involuntary unemployment and a very unequal – ethically inappropriate – distribution of incomes may prevail. Since we attempt to come to grips with the fundamental causal forces at work, we speak in a Sraffian vein of *normal* variables and parameters in this framework, which implies that the 'natural' is the 'normal' in its ethically desirable form. Given this, it is suggested below that Pasinetti's vertically

integrated approach can be associated with a theoretical system comprising normal variables, specifically, a uniform profit rate and normal prices.

Based upon a vertically integrated framework and taking account of the previous sections, the main purpose of this section is to picture the determination of prices and quantities within the social, and circular, processes of production and circulation. In fact, as we shall see below, the proportions model only determines *relative* prices and quantities (see on this Pasinetti, 1981, p. 23, fn. 30). Absolute prices and quantities are, at first, arbitrary and are fixed once the money wage level and the level of employment are determined. This implication of the circulation model is a first justification to speak of the proportions aspect of political economy. In the first place, this implication means that the level of money wages – governing absolute prices – and the level of effective demand – governing quantities – are determined outside the technical–economic sphere, that is, in the social and political realm. Relative prices are important for the determination of the wage structure, which is independent of the absolute wage level. However, when the determination of the social surplus and of the scale of activity is considered, *absolute* prices and quantities move to the fore, as is natural in a monetary production economy where all economic calculations are in money terms and where commodities are always exchanged against money.

The social and circular process of production stands at the heart of a monetary production economy and is complemented by the processes of circulation of goods (means of production and final goods) and money (see scheme (17)). The economy is looked at from the point of view of vertical integration. This means that final products are linked to labour, which now stands for direct and indirect labour, the latter being used to produce primary and intermediate goods. It has already been suggested that the vertical (Ricardo–Pasinetti) view of the social process of production implies the horizontal or interindustry aspect of production as pictured by Sraffa's and Leontief's models; at each vertical stage of production the horizontal aspect of production is implied.

It has also been mentioned that the social process of production can only start if distribution is already determined. Indeed, *the regulation of distribution is a precondition for production, and for price and income formation*. The structure of money wages and the normal (target, satisfactory) profit or hierarchy of profit rates both enable monetary costs and hence prices to come into being. With monetary costs given, firms are able to carry out price calculations. In fact, the wage structure and the normal profit rate are both required to represent the efforts undertaken within

the social process of production in the form of prices of production, to regulate distribution at each stage of the vertically integrated process that transforms primary products into final goods and, simultaneously, to organise the social process of production, that is, to bring about the appropriate structures or proportions, and to render possible competition in the classical sense, that is, to create a tendency of realised profit rates towards a uniform profit rate. For these reasons the average money wage rate, w_n , and the mark-up, k , which is, in turn, governed by the normal rate of profits, must be predetermined and, consequently, appear at the end of the price vector in system (18) below. Indeed, once distribution is determined, the prices of intermediate products at each stage of vertical production leading from primary to final products are known, and so are the final product prices p_i ($i = 1, \dots, m$) appearing in this system. In the fundamental model exhibiting principles, these prices are proportional to labour values and reflect the social effort that has been made to produce the final goods.

Incomes are thus formed simultaneously with prices. This leads to *monetary* flows associated with the formation and the spending of incomes. These aspects of the process of production are exhibited by the price system (18), which, like all the other equations and equation systems set forth in this section, is taken in a slightly elaborated form from Pasinetti (1986a) and also follows from the third section above.

$$\begin{bmatrix} 1 & 0 & \cdots & 0 & -n_1 \\ 0 & 1 & \cdots & 0 & -n_2 \\ \vdots & \vdots & \ddots & \vdots & \vdots \\ 0 & 0 & \cdots & 1 & -n_m \\ -c_1 & -c_2 & \cdots & -c_m & 1 \end{bmatrix} \times \begin{bmatrix} p_1 \\ p_2 \\ \vdots \\ p_m \\ w_n k \end{bmatrix} = 0 \quad (18)$$

The number of final goods produced in an economy is m . These goods are for private and state consumption and investment. Some of them may be exported, and imports may be equal to, fall short of or exceed exports. As suggested in the fourth section, the final goods consist of labour basics (necessary consumption goods), labour-land basics (machine tools) and non-basics.³ The p_1, \dots, p_m represent the corresponding prices of production. The average nominal income produced by a worker (a labour unit) in the ‘profit sector’ is $w_n k$, which equals nominal average labour productivity pA . w_n is the money wage rate and k the mark-up over prime costs at normal capacity utilisation. In a vertically integrated economy wage costs equal prime costs since labour comprises direct and indirect labour. p is the money price of a

bundle of necessary consumption goods and stands, as such, for the general price level. $A = Q/N$ is labour productivity in real terms. The size of the social product, Q , is expressed by the number of bundles of necessary consumptions goods and N is the labour force in the ‘profit sector’. In this sector a qualitative and quantitative surplus over wages occurs, which, in nominal terms, equals $w_n(k-1)$ and accrues to capital, in the form of profits, and to land owners and to specially skilled or organised labour, in the form of rents. Since working time is assumed to be given, N stands either for the number of workers and employees or for working time measured in hours, in months, or in years. As already suggested, those working in the ‘non-profit sector’ in the widest sense (for example civil servants, teachers in state schools, entertainers and artists), while not economically productive, are of course socially and politically productive; if appropriately organised, the ‘non-profit sector’ ought to contribute to the good and proper running of society and of the state. This point has been particularly emphasised by the political economists of the German Historical school in the late nineteenth and in the early twentieth century.

The $n_i (= N_i/Q_{if})$ are the vertically integrated labour coefficients comprising direct and indirect labour time, N_i , for example man years, in relation to the full-employment output (Q_{if}) of good i . The indirect part of N_i is embodied in primary and intermediate products. The $c_i (= Q_{if}/N_f)$ represent demand coefficients, which indicate how the average nominal income, $w_n k$, or total income in real terms, N_f , that is, in terms of labour time, is spent. Part of income is consumed, and part is paid in taxes and saved. Since saving equals investment in long-period equilibrium (Bortis, 1997, pp. 81–9), the demand coefficients c_i relate to the demand for private and public consumption and investment goods.

Multiplying the first m rows in system (18) yields a corresponding number of sectoral price equations. These equations picture the formation of prices within enterprises and the payment of incomes to households. The price equations contained in system (18) are all based on vertical integration and, therefore, correspond to the equation system (6):

$$p_i = w_n n_i k = w_n (1/A_i) k \quad (19)$$

with $i = 1, 2, \dots, m$ and where A_i is sectoral labour productivity Q_i/N_i .

These prices represent the *essential* features of the classical theory of value and distribution. In their being proportional to the quantity of labour embodied directly and indirectly in the production of one unit of output, they reflect the *social effort* that has been made to produce a commodity. Hence

prices, fundamentally, are not indicators of scarcity as is the case with exchange-based neoclassical theory. In the classical view, goods can always be produced if the labour required is devoted to the production of these goods – this is a tenet of Pasinetti's work. To this a Keynesian argument adds: with the scale of economic activity being governed by effective demand (see below), the possibility of permanent involuntary unemployment arises. In such a situation it would be possible to produce more of all commodities if effective demand increased. It is plain that it is entirely inappropriate to speak of the prices as scarcity indicators while part of the fundamental factor of production, that is, labour, remains idle.

In relations (19), the level of money wages, w_n , determines the value of the various commodities in money terms. Money prices and money wages are proportional and this has implications for the theory of inflation: distributional conflicts may give rise to wage–price spirals. With prices given, workers and employees in the profit sector may attempt to increase the wages share through imposing higher money wages. This would reduce the mark-up, k . If entrepreneurs want to maintain their income share, determined by the prevailing normal rate of profits for example, they will put up prices, starting thus the wage–price spiral.

The labour value principle gives rise to a distributional issue associated with the notion of distributive justice. This emerges from the set of relative prices that can be derived from the absolute prices (19):

$$p_i/p_j = n_i/n_j \quad (19.A)$$

Here, the distribution aspect is associated with the evaluation of labour and, consequently, with the wage structure, which, in turn, represents a particular dimension of distributive justice. With the technical conditions of production and the socially necessary direct and indirect labour time given, a rise in n_i/n_j signifies that labour producing good i is valued relatively higher than labour in sector j . As a consequence, the money wage rate i will rise relative to the rate j . It should be evident that the determination of the wage structure is an immensely complex issue of distributive justice, with various factors playing a role, the evaluation of work places within enterprises and trade-union activity perhaps being the most important. Presumably, the most important factor leading to a distortion of the wage structure is involuntary unemployment, as is indicated by the emergence of the working poor and of precarious work places in times of prolonged crisis.

In the system of absolute prices (19) the determination of the surplus over wages (k) is associated with another dimension of distributive justice, that is,

the determination of various shares in a given income. Since, in a Ricardian vein, price formation relates to the most difficult conditions of production, the surplus over normal or ordinary wages w_n is made up of various elements: normal profits and differential rents, that is, rents on land, but also rents on special skills, for instance of sportsmen, physicians and lawyers, and privileges associated with the corporative organisation of certain professions. Hence the mark-up, k , governs the share of ordinary wages and of various surplus shares in income.

In the second and third sections we have also suggested that, in a Ricardian–Sraffian vein, distribution must be regulated in the sectors producing basic goods: land basics (raw materials, energy resources and agricultural primary products), labour basics (necessary consumption goods) and labour–land basics (machine tools, that is, machines to make machines). Basic goods are required in the production of all goods. Their prices exert, therefore, a determining influence on the prices of non-basics, which, as a result, are determined by the conditions of production in the basic sectors. This also holds for distribution. For example, the profit rate determined in the basic goods sectors will govern profit rates in the non-basic sectors.

The distributional aspects just considered imply that *long-period* distribution – the shares of wages, profits and rents in the *given* income and their structures – is entirely governed by institutions, for example trade-unions, entrepreneurial and professional associations, the government including the civil service, and habits and customs that have developed historically. Hence the surplus principle of distribution is associated with a complex social process involving *part–whole relationships* between parts of society (individuals and social groups) and society as a whole. Distribution must be of a social nature since production, as pictured by the Sraffa–Leontief model set forth above, is essentially a social process. Since part–whole relationships are crucial, the determination of shares in a given income and of wage structures embody relations between parts of society and society as a whole. Consequently, the *wage rate* for some kind of work is a *share* in a *given* national income, determined by effective demand, and *not* the price of labour that, eventually, brings about an equilibrium between supply and demand in the labour market in general or on some specific labour market.

The prices of production are also of a social nature since they are determined by distributional arrangements reflected in the money wage rate, w_n , by the mark-up, k , and by the (social) conditions of production pictured by the triangular Leontief matrix sketched in the third section and synthesised through vertical integration by the labour coefficient, n_i , or

labour productivity, A_i . This appears clearly from price equations (4) to (7). Hence, in the classical approach to economic problems, value and distribution are macroeconomic, not microeconomic, phenomena. The reason is that with the production of each good the *whole* production system enters the scene. This is perhaps the main tenet of classical macroeconomics.

The strategic position of distribution in economic theory and reality emerges from system (18). Only once a wage structure and the surplus over wages (k) are fixed, can the problems of value (equations 19 and 37) and employment (equation 40) be tackled. This expresses the Ricardian–Sraffian idea that the regulation of distribution is logically prior to the determination of value, and Keynes’s view that distribution is, *via* consumption, a crucial determinant of employment and capital accumulation. Ricardo (1821/1951, p. 5) was certainly right when he claimed that to ‘determine the laws which regulate . . . distribution, is the principal problem of political economy’. In another context a similar point was made by Keynes (1936/1973, pp. 372–3): ‘The outstanding faults of the economic society in which we live are its failure to provide for full employment and its arbitrary and inequitable distribution of wealth and incomes. . . . [U]p to the point where full employment prevails, the growth of capital depends not at all on a low propensity to consume but is, on the contrary, held back by it’.

As suggested above, the classical theory of value and distribution implies the *creation of incomes* in the social process of production and their subsequent *distribution*. This emerges from the system of equations (19), which are derived from system (18). The last equation of this system, namely,

$$c_1 p_1 + c_2 p_2 + \dots + c_m p_m = w_n k \quad (20)$$

indicates in what proportions incomes are spent on the various goods. The c_i coefficients (defined by expression (26) below) represent the fractions of real income – measured in terms of labour time, man-years N_f for example – spent for a certain quantity of each good i (if N_f is interpreted as a number of workers and employees (labour units), the c_i would represent per capita demand for a specific good). The $c_i p_i$ coefficients are expenditures in money terms on the various goods and services per person employed in the profit sector, indicating the way in which average money income, $w_n k$, is spent. This becomes immediately evident if in relation (20) the definition of c_i (relation (26) below) is taken into account:

$$\sum_{i=1}^m c_i p_i = \sum_{i=1}^m \frac{Q_{if}}{N_f} p_i = w_n k \quad (21)$$

As such, equations (20) and (21) picture yet another part of the flows of money, goods and services in a monetary production economy. The average income, $w_n k$, is consumed, paid in taxes and saved, and subsequently spent on private and public consumption goods and on investment goods, whereby both consumption and investment may be financed in part by the financial sector with saving passively adjusting. In this process, the enterprise sector delivers goods and provides services, and receives the sales receipts. In these processes proportions between sectors are established.

The economic meaning of relation (21) emerges more clearly if the equations for p_i (relation (19) above) are taken into account:

$$\sum_{i=1}^m \frac{N_i}{N_f} w_n k = w_n k \quad (22)$$

$$\sum_{i=1}^m \frac{N_i}{N_f} w_n k N_f = w_n k N_f = Y \quad (23)$$

$$\sum_{i=1}^m \frac{N_i}{N_f} = 1 \quad (24)$$

These definitions, together with definition (20), tell us that the spending of average income (relation 22) or total income (relation 23) governs the distribution of the labour force across the various sectors of production (relation 24). The last two terms of relation (23) indicate the relationship between nominal income, Y , and real income, N_f . The latter obtains if the former is divided through the average money income, $w_n k$, which *represents* the total value per person employed in the profit sector in terms of money. Relation (20) indicates that the distribution of the labour force depends upon the demand coefficients, c_i , and the labour coefficients, n_i , that are contained in the prices, p_i . Both types of coefficients may, of course, change in concrete historical situations. The demand coefficients, c_i , vary in the long run because of changes in consumer preferences and in public spending *with the demand for investment goods passively adjusting*. The labour coefficients, n_i , decline because of technical progress: less direct and indirect labour is required to produce a unit of some good i . As a result, with a given effective demand and hence given output, technical progress is bound to lead

to a reduction of employment. Involuntary unemployment can only be avoided if money wages rise in line with labour productivity. This confirms the conclusions following from the so-called *Freisetzungstheorie*, which suggests that technical progress may lead to technological unemployment. Already Ricardo (1821/1951, Ch. 31) had argued that the introduction of new and better machinery may be harmful to the working class. Capitalists, in fact, choose those techniques that yield the highest net income (profits); at the same time gross income (wages plus profits) may decline, which implies that the wage fund declines and fewer labourers may be put to work.

The *quantity* flows of a monetary production economy are captured by the equation system (25), which depicts proportions. From this system it emerges that the scale of activity, governed by the employment level N , is arbitrary. In accordance with Pasinetti (1981) we assume that full employment prevails. This assumption will be given up in the next section, where Keynes's principle of effective demand comes in to determine the long-period scale of economic activity.

$$\begin{bmatrix} 1 & 0 & \cdots & 0 & -c_1 \\ 0 & 1 & \cdots & 0 & -c_2 \\ \vdots & \vdots & \ddots & \vdots & \vdots \\ 0 & 0 & \cdots & 1 & -c_m \\ -n_1 & -n_2 & \cdots & -n_m & 1 \end{bmatrix} \times \begin{bmatrix} Q_{1f} \\ Q_{2f} \\ \vdots \\ Q_{mf} \\ N_f \end{bmatrix} = 0 \quad (25)$$

Here N_f represents the – full employment – *labour force in the profit sector*. The (full employment) quantity of profit-sector labour (N_f) represents the pivot of the quantity system. N seen as labour time has, in fact, two aspects. On the one hand, N_f , as *labour commanded*, measures the value of output or the level of incomes, which, as suggested above, implies that the nominal social product must be divided by $w_n k$ or pA (that is, nominal average income, which equals labour productivity in money terms) to obtain a measure of the real social product in terms of labour. This is appropriate from the social point of view since profit-sector labour creates all value, *including* surplus value. Moreover, this procedure is in line with the Ricardian–Sraffian tenet that distribution must be regulated *before* the problem of value can be addressed (the nominal average, w_n , and, thus, the wages structure and the normal or target profit rate and, consequently, the mark-up, k , must be known before production can start). While labour time (value) is the real measure of output, *money represents value* and is, as such,

a social institution that enables the social processes of production and circulation to function at all. To be able to fulfil its social function, money must be legally anchored; specifically, the obligation to accept money as the ultimate means of payment or of clearing debts must be legally fixed. Hence money is not ‘the most easily exchangeable commodity’ of the neoclassical real-exchange model, but a socio-economic and legal institution established by the state.

The spending coefficients c_i indicate how full-employment (real) income N_f is spent and thus determines the full-employment quantities Q_{if} of private and public consumption and investment goods, that is, the structure of production, which is also a matter of proportions:

$$Q_{if} = c_i N_f \quad (26)$$

with $i = 1, 2, \dots, m$.

Equation (26) implies that in a monetary production economy *goods valued at labour time (Q_{if}) are, ultimately, exchanged against labour time (real income measured in labour time)*, not against other goods, as is the case in the neoclassical exchange model. In a way, profit-sector labour, assisted by past labour (capital), represents the economic basis of a society that produces the social surplus. As a result, effective demand originates from four sources: households, firms, society, and the state. The quantity system (25) seen together with the price system (18) renders visible the social role of *money*, which, as suggested above, *represents* the values created by productive labour and is, as such, a social institution that renders possible the social processes of production and circulation of goods and services within society at large.

On the other hand, N_f represents *labour embodied* in the quantities of the various goods produced and, consequently, in the social product. The vertically integrated coefficients of direct and indirect labour (n_i) and the quantities demanded (determined by relation (21)) govern the distribution of labour between the different sectors of production.

$$n_1 Q_{1f} + n_2 Q_{2f} + \dots + n_m Q_{mf} = \sum_{i=1}^m N_i = N_f \quad (27)$$

where the

$$n_i = N_i / Q_{if} \quad (28)$$

represent the labour coefficients, that is, the amount of direct and indirect labour required to produce a unit of output. As such, labour embodied represents the *social effort* required to produce the final goods and hence the social product.

In this view, N_f not only stands for productive labour, but also for the economic sphere of society. Indeed N_f represents the material basis of a society with social production as its core. The social surplus enables society to accumulate capital, to realise technical progress through saving labour and to erect a social, political, legal and cultural superstructure. This is reflected by the fact that the goods appearing in system (25) and in definitions (26) and (27) include private and public consumption and investment goods.

Mathematically, the dependence of one equation on the others implies that the determinant of the equation systems (18) and (25) is zero (this condition has been established by Pasinetti (1981, for example on p. 32)):

$$c_1 n_1 + c_2 n_2 + \dots + c_m n_m - 1 = 0 \quad (29)$$

If account is taken of the definition of the c_i and n_i coefficients (definitions (26) and (28)), this condition indicates, once again, the distribution of labour across the vertically integrated sectors of production:

$$N_1/N_f + N_2/N_f + \dots + N_m/N_f = 1 \quad (30)$$

The sectoral distribution of profit-sector labour emerges as the basic element of socio-economic structure and of the proportions aspect of classical–Keynesian political economy. According to condition (29) this distribution depends upon demand (c_i) and upon direct and indirect labour requirements (n_i). This conclusion also follows from definitions (20) to (24).

Working at the level of principles greatly simplifies the discussion of extremely complex macroeconomic issues, as Ricardo, Marx and Keynes clearly perceived. For example, in his *General Theory* Keynes (1936/1973, p. 41) states: ‘In dealing with the theory of employment [and with the associated problems of measuring aggregate output and the aggregate price level] I propose . . . to make use of only two fundamental units of quantity, namely quantities of money-value and quantities of employment’. Later on, he expresses his sympathy ‘with the pre-classical doctrine that everything is produced by labour, aided by what used to be called art and is now called technique, by natural resources . . . , and by the results of past labour, embodied in assets’ (ibid., p. 213). Hence, to abstract from specific

conditions of production enables us to discuss the great problems of political economy on the basis of principles, that is, at the level of labour values. If the level of abstraction is lowered, labour values are modified (see Bortis, 1997, pp. 125–9). For example, if differing conditions of production are considered, Ricardian labour values become Sraffian prices of production, which, in turn, differ from market prices. In fact, starting from labour values the prices of production can be exactly calculated (Pasinetti, 1977, pp. 122–50). *At the level of principles, that is, at the level of pure theory*, there is, in our view, absolutely no contradiction between Ricardo and Sraffa; in the same way there is no contradiction at all between volumes I and II of Marx's *Kapital* and volume III of this work. We are faced here with analyses of the same issues at different levels of abstraction. In this view, Sraffa shows how labour values – the essence of prices – are brought into concrete existence with unequal conditions of production and equal profit rates. However, it is of crucial importance that, in a Marxian vein, upper-layer phenomena, prices of production, market prices, wages, profits and rents (Bortis, 1997, pp. 103–17), ‘can only be understood properly if the fundamentals (value and surplus value) have been grasped’ (ibid., p. 127). Hence principles (fundamentals or essentials) illuminate the extremely complex appearances (*Erscheinungsformen*) of monetary production economies from inside, so to speak.

To conclude it may be mentioned that the way of abstracting has different consequences for different theoretical approaches. In fact, to abstract from specific conditions of production and to work on the basis of the labour principle of value is *simplifying* for classical–Keynesian theory, but *crucial* for neoclassical theory (Bortis, 1996, pp. 141–5; 1997, pp. 289–90). Introducing non-uniform compositions of capital associated with an equal rate of profits only modifies the labour principle of value (*values* now become Sraffian *prices of production*) and leaves the conclusions drawn from it intact. The marginalist theory of value, distribution and employment built upon a surrogate production function implying the same conditions of production everywhere (Samuelson, 1962) does no longer hold, however, once unequal conditions of production are combined with an equal rate of profits: lower factor prices are no longer necessarily associated with larger factor quantities, and vice versa, and the marginal product of capital no longer equals the rate of profits. This is the result of the capital-theory debate (Harcourt, 1972).

THE SCALE ASPECT OF CLASSICAL–KEYNESIAN

POLITICAL ECONOMY

The conditions (29) or (30) guarantee economically meaningful solutions for the equation systems (18) and (25), that is, positive prices and quantities. They also imply that *the proportions, that is, relative prices and quantities, are, in principle, independent of the scale of economic activity* (Pasinetti, 1981, p. 23, fn. 30; pp. 32–3). However, the independence of proportions from scale not only holds for the vertically-integrated labour model of Pasinetti (1981; 1986a) but also for Sraffa's horizontal, interindustry nature model. Indeed, Sraffa (1960, p. v) emphasises that 'no changes in output . . . are considered', a point on which Roncaglia (2000, pp. 48–51) insists. The independence of the proportions and of the scale aspect in social production and circulation provides the clue for bringing together classical and Keynesian elements of economic theory on a long-period basis (Bortis, 1997, pp. 150–2). Indeed, if the quantity vector in system (25) is multiplied by a scalar smaller than unity, say $1-u$ (u being the ratio of involuntary unemployment to the productive full-employment labour force), all the quantities are reduced correspondingly and a permanent involuntary unemployment of $100u$ per cent would come into being, while all the formal properties of the quantity system would be preserved. This means that the coefficient matrix of the quantity system (25) would remain formally unchanged and that the vector of *normal* quantities would now be given by:

$$[Q_1, Q_2, \dots, Q_m, N] \quad (31)$$

with:

$$N < N_f \quad (32)$$

Let us recall here that N stands for *profit-sector* employment. Given this, condition (32) indicates the possibility of normal or long-period equilibrium employment being below full employment, that is, the possibility of long-period or permanent involuntary unemployment, which is determined by the socio-economic system, that is, all the institutions pertaining to the economic basis of a society, and to the political, legal, social and cultural superstructure erected on this basis. Hence, the *normal* quantities and prices entering the present analysis are embedded in the real world and differ from Pasinetti's *natural* quantities and prices, which relate to an ethically desirable situation. Given this, all the magnitudes considered in this section are, in a classical vein, governed by technology and institutions and are, as such, constant or slowly evolving if the real world set in historical time is

taken into the picture (see Bortis, 1997, pp. 199–204). But let us recall, once again, that our suggestions are located at the level of principles, independent of space and time.

The employment scalar $(1-u)$ or, conversely, the long-period unemployment rate (u) are defined as follows:

$$1 - u = N/N_f \quad (33)$$

$$u = (N_f - N)/N_f \quad (34)$$

where N is the institutionally governed long-period equilibrium employment to which corresponds a long-period equilibrium output, Q , smaller than the full-employment output, Q_f . Since N is linked to Q through labour productivity at any moment of time ($Q = AN$), these definitions could also be written in terms of Q . At this stage, we may mention that two conditions must be fulfilled at the profit-sector employment level N_f : first, entrepreneurs realise the normal (target, satisfactory) profit rate, and, second, given a certain ratio of profit sector to non-profit sector employment, there is no involuntary unemployment in a society. Hence $N_f - N$ only refers to involuntary unemployment in the profit sector that falls short of overall or social involuntary unemployment. Now, if for some reason N increases, involuntary unemployment will diminish in the profit *and* in the non-profit sector since the rising social surplus will allow additional employment in the latter. This is, of course, valid only at the level of principles. In the real world employment may first rise in the non-profit sector, for example if the state launches a public work programme. In principle, the spending of the incomes thus created will, through multiplier effects, lead to an overproportional increase in employment in the profit sector (see the supermultiplier relation (40) and Bortis, 1997, Ch. 4).

The determinants of N and Q emerge from a macroeconomic equilibrium condition in which the various *demand components govern* normal output Q , that is, supply, and hence normal employment N . This implies that output and employment are governed by effective demand (for a tentative explanation of this proposition see Bortis, 1997, Chs 3–5).

$$AN = Q = wN + c_s(P + R) + I + G + X - tM \quad (35)$$

Q is real output – the social product – measured in terms of a bundle of necessary consumption goods; Q is made up of private and public consumption and investment goods, that is, of the same goods that are listed in the output vector of the quantity system (25). N is labour employed in the

profit sector, A is labour productivity (Q/N), w is the real wage rate w_n/p_c (w_n stands for the money wage rate and p_c for the normal price of a bundle of necessary consumption goods). The wage bill wN is entirely consumed; c_s is the fraction of the social surplus $P+R$ consumed (P represents profits, including interest, and R represents rents accruing to landowners and to labour on account of special skills or social arrangements, for instance corporative organisations), I is gross investment, G represents government expenditures, X stands for exports, M for imports and t indicates the terms of trade.

Imports M are of two broad types both of which are related to economic activity, that is, to output Q or to income Y (with $Q=Y$ in principle):

$$M = bQ = M_1 + M_2$$

with:

$$\begin{aligned} M_1 &= b_1 Q \\ M_2 &= b_2 Q \end{aligned}$$

hence:

$$M = bQ = M_1 + M_2 = b_1 Q + b_2 Q = (b_1 + b_2)Q \quad (36)$$

M_1 are necessary imports required in the process of production. These goods are land basics, labour basics and labour–land basics (machine tools *and* the various capital goods produced with machine tools and labour). Necessary imports are, then, part of the necessary goods entering directly or indirectly as inputs in the production of all goods; necessary consumption goods, raw materials and machines to make machines are the cases in point. M_2 are non-necessary imports related to consumption out of the social surplus.

The macroeconomic (Kalecki–Weintraub) price equation implied in relation (35) is analogous to the sectoral price equations (6) and (19) and equals (7) as derived from combining the interindustry and vertically integrated approach to social production:

$$p_c = (w_n/A)k \quad (37)$$

This very simple price equation has two important properties. Firstly, it is based on vertical integration, which implies that all the costs of production ultimately become labour costs. Secondly, this simple mark-up equation is directly linked with the surplus principle of income distribution, the wage

and property shares being:

$$\begin{aligned} W / Y &= 1 / k \\ (P + R) / Y &= 1 - (1 / k) \end{aligned} \quad (38)$$

Given technology, as synthesised by overall labour productivity (A), the regulation of distribution – the determination of the money wage rate w_n and of the mark-up k – must logically precede price formation. Hence, given A , the price p_c is determined once w_n and k are fixed. The determination of the wage and property shares in income is a *social* problem because *part-whole relationships* are involved. The parts are the wages (W) and profits and rents ($P+R$), the whole is the *given* income Y , which, as is evident from the supermultiplier relation (40), is governed by effective demand. The determination of the structures of wages, profits and rents are also part-whole issues.⁴

Normal or trend gross investment is directly associated with the maintenance and expansion of the normal capital stock, K , required for the production of the normal output, Q :

$$I = (g + d)vQ \quad (39)$$

where g is the trend growth rate of the economic system, a weighted average of the trend rates of growth of the autonomous variables, that is, normal government expenditures, G , and normal exports, X (see relation (40) and Bortis, 1997, p. 155); d represents the fraction of the normal capital stock that is annually replaced and v stands for the normal capital coefficient K/Q . *Normal investment* is thus related to the *functioning of the entire social system*, encompassing technology and institutions. Hence, technology and institutions *determine* the normal or long-period investment volume through the principle of effective demand (the social product, Q , appearing in relation (39) is determined by the supermultiplier relation (40)). Therefore, investment – which is autonomous in the short run – represents *derived* demand in the long run. This is a central tenet of relation (40).

Taking account of relations (35) to (39) yields a relation for long-period (normal, trend) output Q , and, since $Q = AN$, for the long-period (normal, trend) level of employment, N (Bortis, 1997, pp. 142–204):

$$Q = \frac{G + X}{z_s[1 - (1/k)] + t(b_1 + b_2) - (g + d)v} \quad (40)$$

where:

$$z_s = 1 - c_s = s_s + t_s \quad (41)$$

The leakage coefficient z_s indicates the fraction of the surplus over ordinary wages that is *not* consumed, the fraction consumed being c_s . Consequently, the leakage coefficient is the sum of the fractions of the surplus paid for taxes (t_s) and saved (s_s). Since the long-period consumption coefficient c_s and the long-period tax coefficient t_s are both determined by institutions – consumption habits and tax laws –, the long-period saving propensity s_s is a *pure residual* varying with the normal level of output and employment (Bortis, 1997, pp. 166–8). This is perfectly analogous to Keynes's short-period theory of saving.

Equation (40) may, following Hicks (1950, p. 62), conveniently be called a supermultiplier relation, 'which can be applied to any given level of [autonomous demand components] to discover the equilibrium level of output [Q] which corresponds to it'. Hence the autonomous demand components, G and X , set economic activity in motion, similarly to the expenditure of rents by the landlords in Quesnay's extended *tableau économique* (on this see Oncken, 1902, p. 394). This gives rise to two different employment mechanisms, namely, the internal mechanism set in motion by government expenditures, G , and the external mechanism initiated by exports, X (see Bortis, 1997, pp. 190–8).

Once output and employment are determined through the supermultiplier relation (40), the output and employment scalar $1-u$ (definition (33)) is also fixed. In principle, the normal quantities corresponding to a specific output and employment level obtain if the full-employment quantity vector in the quantity system (25) is multiplied by the employment scalar. The determination of *normal output and employment is equivalent to fixing the output and employment trend* around which cyclical fluctuations take place (ibid., pp. 149–51). It has already been suggested that the position of the output and employment trend is of considerable socio-economic and political importance, because this determines the extent of long-period (system-governed) permanent involuntary unemployment. The latter is, in turn, an important element governing the social and political climate in a country.

Methodologically, the supermultiplier relation (40) represents the pure long-period Keynesian employment theory, picturing how output and employment are determined *in principle* by the various demand variables and parameters on the right-hand side of this equation (Bortis, 1997, pp. 142–

204). According to our methodological introduction, this relation is a metatheory (a metaphysical theory) of employment taking account of scientific and other information to determine what is – probably – essential about employment determination in a monetary production economy. Determination *in principle* of some socio-economic phenomena attempts to capture the essential features of the causal mechanism at work, which are timeless and invariable. Moreover, in a pure or ‘ideal-type’ model the *ceteris paribus* clause is automatically implied. This amounts to saying that the predetermined variables on the right-hand side of the supermultiplier relation (40) are considered independent of each other. As a rule, this will not be the case if some real world situation is considered.

In principle, normal output is positively linked to the autonomous variables G and X , and to the gross investment–output ratio $I/Q = (g + d)v$. The effect of exports (X) on output and employment will be particularly strong if exports mainly consist of high-quality manufactured products with a large value added, that is, a high content of direct and indirect labour (Kaldor, 1985, pp. 57–79). However, normal output will be lower if, given exports X , the technological and cultural dependence on the outside world is strong, as would be reflected in large import coefficients b_1 and b_2 , and if the terms of trade (t) are unfavourable, which would show up in a high value of t . Very importantly, normal output (Q) is negatively linked with the property share in income, $1 - (1/k)$, and with the leakage coefficient, z_s , associated with this share. As a rule, z_s will be larger if the distribution of property income is more unequal. Given government expenditures and gross investment, a higher leakage out of income ($z_s[1 - (1/k)]$) reduces effective demand because *consumption is diminished*. Fundamentally, unemployment occurs because the saving–income ratio, $s_s[1 - (1/k)]$, exceeds the investment–output ratio, $(g + d)v$, at full employment. Full employment could only be maintained if private and/or public consumption were increased. A redistribution of incomes, that is, raising the share of normal wages ($1/k$), would lead to higher private consumption through enhancing spending power. In principle, a higher level of public expenditures (G) would require a tax increase: the tax rate, t_s , would have to be raised to preserve the equilibrium of the budget, which would reduce the saving coefficient s_s . If these measures are not undertaken, output, employment and tax receipts will decline, and, given government expenditures, budget deficits will occur. These will reduce the saving ratio until it equals the investment ratio at some long-period equilibrium level of output and employment involving persistent involuntary unemployment. Hence the negative association between distribution and employment emerges because the property share and the

saving and the leakage ratio associated with it are too high; s_s , and thus z_s , will be the higher the more unequally property income is distributed. Thus, the notion of unequal income distribution has a double dimension: the property share is high and property income is itself unequally distributed. This leads to a high leakage out of income, given by $z_s[1-(1/k)]$, to which corresponds a reduced level of output and employment.

This crucially important relationship between unequal distribution and involuntary unemployment represents, according to Schumpeter (1946, p. 517), the essence of the Keynesian revolution: '[the Keynesian doctrine] can easily be made to say both that "who tries to save destroys real capital" and that, via saving, "the unequal distribution of income is the ultimate cause of unemployment." This is what the Keynesian Revolution amounts to'. Indeed, Keynes (1936/1973, pp. 372–3; see also Garegnani, 1978; 1979) held that:

[the] outstanding faults of the economic society in which we live are its failure to provide for full employment and its arbitrary and inequitable distribution of wealth and incomes. [Up] to the point where full employment prevails, the growth of capital depends not at all on a low propensity to consume but is, on the contrary, held back by it [and] measures for the redistribution of incomes in a way likely to raise the propensity to consume may prove positively favourable to the growth of capital.

The inverse long-period link between employment and distribution is *the* crucial feature of the supermultiplier relation.

VALUES, PRICES OF PRODUCTION AND MARKET PRICES

The previous sections deal with principles, that is, with the fundamental forces governing prices and quantities in a classical–Keynesian view. As such, these sections exhibit aspects of the pure long-period classical–Keynesian model of production, value, distribution and employment. However, concretely existing prices and quantities are governed by a great many factors, circumstances or causal forces, fundamental and accidental. Among the accidental factors, some features of the conditions of production, of cyclical movements of output and employment and of the functioning of the market – the sphere of circulation – are particularly important. It is important to note that, in the long run, the functioning of the system *determines* the behaviour of individuals and collectives. In the medium run and in the short run, behaviour of economic agents takes place within the

(institutional) system, giving thus rise to specific forms of behaviour during the business cycle and on the market. The issue of institutions and behaviour is a central tenet of Bortis (1997).

If sectoral differences in the conditions of production, expressed by differing ratios of fixed to circulating capital (n_{Ki}/n_i), are considered and if a uniform profit rate prevails in the various sectors and industries, prices are no longer proportional to the socially correct labour values. In fact, values are now transformed into Sraffian prices of production. This is required because it is impossible to calculate prices proportional to values with sufficient precision and to implement them, as has been shown by the experience of the centrally planned economies. Values are constitutive principles that are embodied in concretely existing prices or essential causal forces determining prices and appear simultaneously with other factors governing observable prices, like the conditions of production, profit rates and money wages, and market elements. Given this, the prices of production and the uniform rate of profits associated with these prices may be considered approximations to labour values and render these values socially operable. Indeed, the uniform rate of profits and the associated prices of production or the normal prices are the conceptual foundations for the long-period normal price calculation of enterprises (*Normalkostenkalkulation*): the normal price states what the calculated price is *in principle*. The normal prices calculated on the basis of permanent costs and of a normal (satisfactory, target) rate of profits approximate, in turn, the true, but largely unknown, prices of production associated with a given technique. In this view the prices of production fulfil, as suggested in the second section, at least four important social functions that are, moreover, related to the mechanism of the (medium-term) business cycle (Bortis, 1997, pp. 204–20) and to the functioning of the markets – the sphere of circulation – in a classical–Keynesian sense (*ibid.*, pp. 220–35). Firstly, the prices of production enable decentralised decision making regarding socially appropriate prices such that the processes of production and circulation function smoothly. Each firm may calculate its price of production that covers the costs incurred in the social process of production and yields a target rate of profits on the capital invested, which, given the money wage structure, regulates the distribution of the value of the product or of the incomes created. Hence normal prices approximately capture the social effort that is made to produce the various products, and the normal profit rate (r^*) together with the money wage structure regulate the distribution of the incomes created within the social process of production. In this way normal prices ensure the normal functioning of the social process of production and

of the associated spheres of circulation of means of production and final goods: firms recover their costs and realise a normal profit. Secondly, the institutionally fixed normal rate of profits, r^* , regulates the socially appropriate allocation of resources: sectors in which the realised profit rate, r_i , exceeds the normal rate (r^*) will attract resources, ultimately direct and indirect labour; contrariwise, resources will flow out of sectors where realised profit rates fall short of the normal rate r^* . The allocation function performed through the interplay of the realised and the normal rate of profits pictures the classical view of the functioning of markets: the function of the market is to implement the normal prices governed by distribution and technology. Thirdly, the comparison between the normal (target) profit rate r^* and the realised rate r enables entrepreneurs to behave rationally in the face of uncertainty about the future. Indeed, entrepreneurs will invest more if r exceeds r^* persistently, and vice versa. The investment behaviour of entrepreneurs and its coordination by the socio-economic system gives rise to cyclical movements of overall output and employment levels around a long-period institutional 'trend', whereby the cycles are governed by the interaction of the capacity effect and the income effect of investment (*ibid.*, pp. 204–20). Fourthly, competition with a given target profit rate r^* forces entrepreneurs and managers to attempt to produce goods of a given quality at the lowest possible prices. This implies saving the ultimately scarce natural resources, labour and land, through the introduction of improved techniques of production, that is, through realising land- and labour-saving technical progress.

Hence, the classical notions of the normal (uniform) profit rate and of the associated prices of production appear as ingenious devices of social organisation enabling decentralised decision making and justify the institution of private property of means of production. The latter is associated with responsibility for the proper functioning of production within each firm and hence for the entire process of production as well as with caring for the good state of the means of production (*ibid.*, pp. 158–80). As suggested in the previous sections, this view implies that there is no contradiction at all between Ricardian–Marxian value analysis and Sraffian prices of production since the same problem, to wit, price formation, is analysed at different levels of abstraction.⁵

It has already been suggested that the existence of a normal rate of profits, r^* , and its interplay with the realised rate r greatly contributes to the orderly functioning of a monetary production economy. In the real world deviations from the normal state of affairs will, as a rule, occur. For example, in times of depression, market prices below normal prices may come into existence.

Entrepreneurs may now attempt to maintain or to expand their market shares while, simultaneously, trying to maximise profits by reducing costs (mainly labour costs) as much as possible. This, as a rule, is possible in times of heavy unemployment. In this framework it is important to note that the supermultiplier relation holds in any situation; for example, prices may be long- or medium-run prices of production or short-period market prices. Hence the impact on employment of the abnormal distributional outcomes just mentioned may be captured by this relation.

Finally, in the classical–Keynesian view, the function of the market is to bring market prices into line with the prices of production calculated by the firms, which embody the normal or target rate of profits. If demand is in excess of production, market prices and realised profits are above their respective normal levels. If this situation persists, entrepreneurs will invest more, attempting thus to bring realised and normal profit rates into line. The contrary holds when normal production is in excess of demand. This is the classical view of competition, which, however, as has been alluded to above, may stop functioning if normal prices and normal profit rates – both institutions – no longer contribute to stabilising the long-period trend. In this case, the trend would itself become unstable and fluctuations around it would dominate (see Bortis, 1997, pp. 199–204).

CONCLUDING REMARKS: KEYNES AND SRAFFA

In this chapter the great problems of classical–Keynesian political economy – the economic theory of a monetary production economy – have been broadly sketched at a fundamental level, that is, at the level of principles or of pure theory, independent of space and time. At the heart of the monetary theory of production is the social and circular process of production embodying the labour and land aspects; distribution is a social and political process based upon the surplus principle and is, as such, governed by institutions; the essence of prices are labour values, which reflect the social effort made to produce commodities; output and employment are governed by effective demand through the supermultiplier; and last but not least, the processes of production and circulation, and of capital accumulation, could not go on without money. Methodologically speaking the whole analysis has been carried out at a long-period level. Only constant or slowly changing elements of reality associated with stock equilibria or fully-adjusted situations have been considered. The normal prices and quantities associated with a fully-adjusted situation represent a system equilibrium. The system is

an institutional system, made up of a material basis on which, out of part of the surplus, an institutional superstructure may be erected. Hence, in a way, this chapter suggests how classical and Keynesian institutionalism may be brought together at the level of principles.

The theoretical foundation to bring together Keynes and the classics was laid down in the 1930s, Shackle's *Years of High Theory*, when Keynes and Sraffa set up their respective theoretical systems. In his *General Theory* Keynes asked how behavioural outcomes were coordinated by the system in a monetary production economy. He had to stay at the short-period behavioural level because his main problem was to bring to the open the importance of money, which can only be a store of value in a world of uncertainty and disappointed expectations. However, Keynes also held that a modern monetary production economy simply could not function without money and finance: all the dispositions of producers and consumers are made in terms of money in the course of time such that, as he explicitly claims, money becomes the link between the past and the future. Having explained the importance of money and the nature of interest, Keynes was able to formulate his all-important principle of effective demand, which took the form of the multiplier, and, ideally, implies fixed prices and quantity adjustments.

Sraffa, however, worked at the level of the production system from the mid 1920s onwards to initiate a revival of classical political economy. His problem was not to formulate a new principle, but to take up already known principles, that is, to reformulate Ricardo's theory of value and distribution in light of Quesnay's view of the social process of production set forth in the *tableau économique*. Hence Keynes and Sraffa worked on different problems and at different levels of analysis, and it was impossible for them to meet in order to establish a synthesis. Moreover, there was an evident lack of mutual interest in their respective economic work. Keynes was unable to understand the significance of Sraffa's long-period equilibrium and Sraffa disliked Keynes's psychological approach to investment in the form of uncertainty and expectations. Hence, regarding economic theory, Sraffa and Keynes necessarily led parallel lives (Pasinetti, 1998). Only now does the time seem ripe to bring them together in a middle-way classical–Keynesian synthesis, which can provide the starting point for an alternative to the Walrasian general equilibrium model. At the theoretical level the capital-theory debate had to take place, and the approach to production based on vertical integration had to be developed. At the social and political level the breakdown of centrally planned socialism and the present and past difficulties experienced by capitalism are also necessary preconditions for

putting to the fore a humanist intermediate way between liberalism and socialism. To work out such a middle-way framework was Keynes's fundamental preoccupation, as emerges, for example, from Fitzgibbons (1988), O'Donnell (1989) and Mini (1991). In this undertaking Keynes was greatly supported by Sraffa. In fact, 'all the time that the explosions of the Keynesian Revolution were going on overhead, Piero Sraffa was sapping and mining away to prepare a revolution of his own' (Joan Robinson quoted in Porta, 1995, p. 683). Given the immense social and economic problems presently prevailing – characterised by huge inequalities in income distribution, massive involuntary unemployment and growing poverty –, the classical–Keynesian synthesis that can be elaborated through working in the *spirit* of Sraffa and Keynes on a Pasinettian labour principle platform of vertical integration constitutes a message of hope.

In the third and fourth sections we have suggested that, building upon Pasinetti (1986a; 1986b), the theoretical starting point for a classical–Keynesian synthesis lies in the integration of Sraffa's-cum-Leontief interindustry approach with Ricardo's and Pasinetti's vertically-integrated framework.

To establish a complete classical–Keynesian system of political economy (for a preparatory and tentative attempt to do so, see Bortis, 1997, Chs 3–4) is, however, only a first step to be undertaken. In a second step, classical–Keynesian political economy must be linked to other social sciences – sociology, law and politics – to provide a system of social sciences. Moreover, the notion of the middle way must be specified. This amounts to elaborating a social philosophy that is an alternative to liberalism and socialism. In Bortis (1997, Ch. 2) the notion *comprehensive humanism*, covering the individual and social dimension of man, has been suggested and the classical–Keynesian system of political economy put in a wider context (ibid., Ch. 7). Finally, while the social philosophy of humanism underlies the humanist system of social and political sciences, social and political ethics must provide the roof, for, to extend Keynes's famous dictum, the social and political sciences are essentially moral sciences.

NOTES

1. In Pasinetti (1981, pp. 133–8) the *distribution* and the *social effort* aspects of the price system are set forth for the natural system.
2. It has already been suggested that, in the real world set in historical time, proportions will not be independent of activity levels, as is precisely the case with economies of scale.
3. Again, if the proportions between circulating and fixed capital were not uniform, the price

vector in system (18) would be a matrix with each column containing one price and the corresponding mark-up at the appropriate positions, and zero positions elsewhere. At the level of principles, where essentials are set out, there is no need to consider non-uniform ratios of fixed to circulating capital. However, non-uniform compositions of capital have to be considered explicitly at the level of scientific theories that are erected upon a set of principles.

4. It should be emphasised that the wage and property shares (38) do not correspond to the definitions of shares one usually finds in statistical yearbooks. In the surplus approach W in the wage share only contains ordinary, eventually necessary, wages of labour active in the *profit sector* of an economy. And rents, R , in the property share also contain 'surplus wages', due to special abilities or privileges, for instance. Moreover, government expenditures, G , in the supermultiplier relation (40) also contain the wages of all civil servants.
5. On 'layers' of reality see Bortis (1997, pp. 103–17).

REFERENCES

- Bortis, H. (1996), 'Structural economic dynamics and technical progress in a pure labour economy', *Structural Change and Economic Dynamics*, 7 (2), 135–46.
- Bortis, H. (1997), *Institutions, Behaviour and Economic Theory: A Contribution to Classical–Keynesian Political Economy*, Cambridge: Cambridge University Press.
- Fitzgibbons, A. (1988), *Keynes's Vision: A New Political Economy*, Oxford: Clarendon Press.
- Garegnani, P. (1970), 'Heterogeneous capital, the production function and the theory of distribution', *Review of Economic Studies*, 37 (3), 407–36.
- Garegnani, P. (1978), 'Notes on consumption, investment and effective demand: I', *Cambridge Journal of Economics*, 2 (4), 335–53.
- Garegnani, P. (1979), 'Notes on consumption, investment and effective demand: II', *Cambridge Journal of Economics*, 3 (1), 63–82.
- Garegnani, P. (1983), 'Two routes to effective demand', in J.A. Kregel (ed.), *Distribution, Effective Demand and International Economic Relations*, London: Macmillan, 69–80.
- Harcourt, G.C. (1972), *Some Cambridge Controversies in the Theory of Capital*, Cambridge: Cambridge University Press.
- Harcourt, G.C. (1981), 'Marshall, Sraffa and Keynes: incompatible bedfellows?', *Eastern Economic Journal*, 7 (1), 39–50. Reprinted in C. Sardoni (ed.) (1992), *On Political Economists and Modern Political Economy: Selected Essays of G.C. Harcourt*, London and New York: Routledge, 250–64.
- Harrod, R.F. (1939), 'An essay in dynamic theory', *Economic Journal*, 49 (193), 14–33.
- Hicks, J.R. (1937), 'Mr. Keynes and the "classics": a suggested interpretation', *Econometrica*, 5 (2), 147–59. Reprinted in J.R. Hicks (1982), *Money, Interest and Wages: Collected Essays on Economic Theory*, Oxford: Basil Blackwell, vol. II, 100–15.
- Hicks, J.R. (1950), *A Contribution to the Theory of the Trade Cycle*, Oxford: Oxford University Press.
- Kaldor, N. (1985), *Economics Without Equilibrium*, Armonk: M.E. Sharpe.
- Kalecki, M. (1971), *Selected Essays on the Dynamics of the Capitalist Economy*,

- Cambridge: Cambridge University Press.
- Keynes, J.M. (1921/1988), *A Treatise on Probability*, London: Macmillan. Reprinted in *The Collected Writings of John Maynard Keynes*, Vol VIII, London and Basingstoke: Macmillan.
- Keynes, J.M. (1930/1971), *A Treatise on Money*, London: Macmillan. Reprinted in *The Collected Writings of John Maynard Keynes*, Vols V and VI, London and Basingstoke: Macmillan.
- Keynes, J.M. (1933/1973), 'A monetary theory of production'. Reprinted in *The Collected Writings of John Maynard Keynes*, Vol. XIII *The General Theory and After: Part I Preparation*, London and Basingstoke: Macmillan, 408–11.
- Keynes, J.M. (1936/1973), *The General Theory of Employment, Interest and Money*, London: Macmillan. Reprinted in *The Collected Writings of John Maynard Keynes*, Vol. VII, London and Basingstoke: Macmillan.
- Lowe, A. (1976), *The Path of Economic Growth*, Cambridge: Cambridge University Press.
- Marx, K. (1867–94/1973–4), *Das Kapital*, Berlin: Dietz-Verlag, 3 vols.
- Mini, P. (1991), *Keynes, Bloomsbury and The General Theory*, London and New York: Macmillan and St. Martin's Press.
- O'Donnell, R.A. (1989), *Keynes: Philosophy, Economics and Politics – The Philosophical Foundations of Keynes's Thought and their Influence on his Economics and Politics*, London and New York: Macmillan and St. Martin's Press.
- Oncken, A. (1902), *Geschichte der Nationalökonomie*, Vol. I, Leipzig: Hirschfeld (only one volume published).
- Pasinetti, L.L. (1977), *Lectures on the Theory of Production*, London: Macmillan.
- Pasinetti, L.L. (1981), *Structural Change and Economic Growth: A Theoretical Essay on the Dynamics of the Wealth of Nations*, Cambridge: Cambridge University Press.
- Pasinetti, L.L. (1986a), 'Theory of value: a source of alternative paradigms in economic analysis', in M. Baranzini and R. Scazzieri (eds), *Foundations of Economics: Structures of Inquiry and Economic Theory*, Oxford and New York: Basil Blackwell and St. Martin's Press, 409–31.
- Pasinetti, L.L. (1986b), 'Sraffa's circular process and the concept of vertical integration', *Political Economy – Studies in the Surplus Approach*, 2 (1), 3–16.
- Pasinetti, L.L. (1993), *Structural Economic Dynamics: A Theory of the Consequences of Human Learning*, Cambridge: Cambridge University Press.
- Pasinetti, L.L. (1998), 'Piero Sraffa: an Italian economist at Cambridge', in L.L. Pasinetti (ed.), *Italian Economic Papers*, Vol. III, Oxford and Bologna: Oxford University Press and Il Mulino, 365–83.
- Porta, P.L. (1995), 'Joan Robinson and Piero Sraffa', *Rivista internazionale di scienze economiche e commerciali*, 42 (9), 681–9.
- Ricardo, D. (1821/1951), *On the Principles of Political Economy and Taxation*, in P. Sraffa and M. Dobb (eds), *The Works and Correspondence of David Ricardo*, Vol. I, Cambridge: Cambridge University Press.
- Robinson, J. (1956), *The Accumulation of Capital*, London: Macmillan.
- Roncaglia, A. (2000), *Piero Sraffa: His Life, Thought and Cultural Heritage*, London and New York: Routledge.
- Samuelson, P.A. (1962), 'Parable and realism in capital theory: the surrogate

- production function', *Review of Economic Studies*, **29** (3), 193–206. Reprinted in G.C. Harcourt and N.F. Laing (eds) (1971), *Capital and Growth*, Harmondsworth: Penguin, 213–32.
- Schumpeter, J.A. (1946), 'John Maynard Keynes, 1883–1946', *American Economic Review*, **36** (4), 495–518.
- Smith, A. (1776/1976), *An Inquiry into the Nature and Causes of the Wealth of Nations*, Oxford: Clarendon Press.
- Sraffa, P. (1960), *Production of Commodities by Means of Commodities*, Cambridge: Cambridge University Press.