

# ON THE CAUSES OF CHINA'S AGRICULTURAL CRISIS AND THE GREAT LEAP FAMINE

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**ABSTRACT:** Recently researchers have conducted extensive investigations on China's Great Leap crisis. In this article, we critically review this literature and argue that, since the grain production collapse was not the only factor that led to the famine, the causes of these two catastrophes require separate examination. At the theoretical level multidimensional factors were responsible for the crisis. However, existing empirical findings mainly support the exit right hypothesis to explain the dramatic productivity fluctuations in Chinese agriculture, and support grain availability and the urban-biased food distribution system as important causes of the famine. We suggest that additional empirical research is needed to assess the relative importance of the proposed causes.

## I. INTRODUCTION

The sharp declines in agricultural production and the widespread famine between 1959–61 are two most important aspects of China's economic crisis during the Great Leap Forward. In 1959, total grain output suddenly dropped by 15 percent and, in the following two years, food supplies reached only about 70 percent of the 1958 level. During the same period, massive starvation prevailed in China. A careful study of demographic data concludes that this crisis resulted in about 30 million excess deaths and about 33 million lost or postponed births (Ashton, Hill, Piazza, & Zeitz, 1984). This disaster is one of the worst catastrophes in human history.

The crisis of the Great Leap Forward became a fertile ground for academic research immediately after the release of reliable economic and demographic information from China in the early 1980s. Using census and fertility survey data, demographers investigated China's population trends for the period since the early 1950s, assessing in particular the mortality and fertility consequences of the famine.<sup>1</sup> For the economic analysis of the crisis, Lin (1990) proposed a hypothesis that the deprivation of exit right from a collective in 1959 was the main cause of the sudden and prolonged declines in agricultural productivity during the commune regime. This explanation caused considerable controversy among theorists interested in the role of incentives within cooperatives and students of the Chinese economy. A 1993 symposium issue of the *Journal of Comparative Economics* was devoted to a lively debate that focused on the role of exit rights for the success of agricultural coop-

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eratives.<sup>2</sup> Those discussions also explored alternative reasons for the agricultural crisis, including bad weather, bad management, and increases in the size of production units.

More recently a few studies have investigated the causes of the famine, shifting attention away from the focus on productivity changes with collectivization. Utilizing Sen's entitlement approach to famine analysis, Lin and Yang (1996) presented econometric evidence that both urban-biased food ration systems and the food availability decline (FAD) contributed significantly to the increase in death rates during the famine. Other researchers argued that consumption irrationality (Chang & Wen, 1997) and the Great Leap radicalism (Yang, 1996) were the critical causes of massive starvation. These researchers have carried out a lively discussion over the famine causes during a recent AEA session, where issues were raised and clarified, but participants did not reach a consensus. It is most likely that the debate will continue even after the publication of this symposium.

In this article, we summarize and critically examine existing economic studies of the Great Leap crisis. First, by applying Sen's entitlement approach to famine, we make a conceptual clarification that, although a sharp reduction in per capita grain output may result in famine, it is only one of many possible causes. In China's context, other potential causes include the urban-biased food ration system, radical political and economic policies during the Great Leap Forward, and consumption inefficiency. Therefore, inquiry into famine causes differs from investigating reasons for the collapse of food supply.

After this clarification, we discuss appropriate analytical frameworks and existing findings on the causes of the agricultural production collapse and of the famine. We argue that diversion of productive inputs away from agriculture and the reduction in production efficiency may both result in shortfalls in grain output. Existing empirical evidence principally supports the exit right hypothesis originally proposed by Lin (1990) that compulsory participation in the communes was the main cause for the sudden shortfall of grain output during the Great Leap and the low total factor productivity in the subsequent collectivization period. For the causation of famine, we present arguments that dispute consumption irrationality and political radicalism as the most critical causes of the famine. There are serious analytical shortcomings in these two hypotheses that cast doubt on the reliability of their empirical findings. However, empirical evidence supports the findings that urban bias in food allocation policies and grain output decline are the main causes of the excess deaths (Lin & Yang, 1996).

We conclude by emphasizing the importance of further empirical analysis for future research.

## II. FACTUAL AND CONCEPTUAL ISSUES

Scholars have generally agreed with the severity of production shortfall in the Great Leap crisis. The most commonly used statistics on grain output are released by China's State Statistical Bureau, which indicates yearly grain production of 195, 200, 170, 144, 148, 160, and 170 million metric tons respectively for the years between 1957 and 1963. These numbers are generally consistent with other independent estimates.<sup>3</sup>

The demographic catastrophe, however, was not known to scholars before the release of demographic data in the late 1970s. Therefore, many scholars praised the Chinese government's ability to avoid a famine in spite of a sharp production shortfall in the agricultural

crisis (see, for example, Perkins, 1966). Using the newly released 1964 and 1982 population census and supplemental birth and death registrations, Ashton et al. (1984) presented estimates on the impacts of famine on both mortality and fertility. Their calculations indicate that 30 million excess deaths occurred in China during the period 1958–62, and in the same period, the number of actual births fell short of the expected births by 33 million. Based on the 1982 one-per-thousand fertility survey, Peng (1987) provided a similar estimate on the total premature deaths of 23 million. Two earlier studies reported the number of excess deaths to be approximately 16.5 million (Coale, 1981) and of at least 23 million (Aird, 1982).

However, there have been misperceptions about the causes of the Great Leap crisis. One common mistake is to confuse the causes of the production shortfall with the causes of the famine. For instance, Chang and Wen (1997) wrote:

... there have been some careful studies on the demographic aspect of the famine, .... Most scholars have listed a variety of causal factors, including bad weather, reduction in sown acreage, the government's high procurement, forced collectivization, allocation of resources away from agriculture to heavy industry, bad management, and collapse of the incentive mechanism. Amartya Sen emphasized that the famine might also have been caused by "political complexity," such as the lack of an independent news media and lack of a democratic system. Justin Yifu Lin recently suggested that the famine was caused mainly by the sudden elimination of farmers' withdrawal rights from the collectives.

The misunderstandings revealed in this statement also appear in other professional discussions and publications. It is important to clarify that the dramatic decline in grain output and the massive starvation are both components of the Great Leap crisis, but the causes of the demographic catastrophe differs from the production collapse. The exit right hypothesis of Lin (1990) aimed at explaining the decline in agricultural output rather than the cause of the famine. As will become clear in the following analysis, many other "causal factors" for the famine, listed by Chang and Wen, are used in other scholars' studies to explain the production shortfall instead of the demographic catastrophe.

The logical relationship between the reasons for the grain production crisis and the causes of starvation can be better understood in light of Sen's entitlement approach to famine. Sen (1981a and b) emphasizes that famine is the situation in which a significant number of people in a region fail to acquire enough food to eat. While a shortage in food output per head can cause famine, it is only one of many possible causes. In his studies of several well known historical famines, Sen found that famine often occurred even when per capita food output was maintained. Famines either resulted from a sudden collapse in the endowments of certain portions of the population or from dramatic changes in relative prices which prevented certain portions of the population from acquiring enough food. Since food availability decline (FAD) is neither a necessary nor a sufficient condition for famine to occur, the causes of FAD may or may not be important factors in grain production followed by a horrific famine—their causes are both worthy of independent and careful investigation. One critical aspect of the inquiry lies in the relative importance of the grain availability shortage among other famine causes for explaining excess mortality. Supposing FAD to have been a significant factor to result in extra deaths, then the reasons behind output collapse would have contributed indirectly to the famine through their negative impact on food availability. To draw conclusions, it is necessary to conduct separate investigations into the causes of the production crisis and of the famine.

### III. CAUSES OF THE DECLINE IN GRAIN PRODUCTION

Two sets of factors could have contributed to the shortage of grain production during the Great Leap crisis. The diversion of productive inputs away from agriculture, including capital and labor, may have undermined the capacity to produce food, and at the same time, the decline in production efficiency could have dramatically aggravated the situation. During the crisis period, a sudden change in the form of organization, a series of radical policies for industrialization, and natural calamities all had negative effects on grain production.

Lin (1990) outlined a framework to assess the causes of food availability decline. A game theory hypothesis proposes that the main cause of the agricultural collapse was the deprivation of the peasants' right to withdraw from the collectives with the communization starting in the fall of 1958. This switch in the form of organization changed the incentive structure for the peasants who chose to shirk within the communes because the mechanism of self-discipline breaks down with compulsory participation. A total factor productivity index estimated by other researchers (Tang, 1984; Wen, 1989) suggested a sudden drop in 1959 and stayed at a low level for the entire collectivization period 1958–78, which give support to Lin's exit right hypothesis to explain the drop in efficiency.

Lin's explanation for the abrupt collapse of Chinese agriculture provoked a heated debate over the nature of incentives within agricultural collectives. The articles that appeared in the 1993 symposium issue of the *Journal of Comparative Economics* were, in effect, criticisms and comments on Lin's paper. The debate focuses on two critical issues. The first is a theoretical postulation that the right to exit is necessary for high effort-supply among cooperative members. This theoretical possibility suggested by Lin contrasts with a theory proposed by MacLeod (1993) in which the imposition of exit costs on individuals is considered as necessary to avoid the case that some members may shirk and then quit the cooperative. The second issue is on the voluntary principle of participation practiced during the collectivization movement before the establishment of communes. While the disputes were certainly not resolved by the symposium, the issues raised by Lin and his critics were clarified. There was convergence on the key issue that elimination of exit rights caused a decline in the productivity of collective farms which was both logically and historically defensible (Putterman & Skillman, 1993).

Factors other than the elimination of exit rights may also reduce the efficiency of agricultural production. Incentive problems due to the unwieldy size of the communes could result in lower production efficiency (e.g., Perkins & Yusuf, 1984), and the initiation of local food self-sufficiency policies in 1958 might have caused the loss of regional comparative advantage resulting in a decline in aggregate food supply (Lardy, 1983). While these institutional changes and new policies could have negatively affected food supply, their importance needs to be assessed empirically. If the disaster was caused by the incentive issue that arose from the unwieldy size of the communes, then agricultural productivity should have soon recovered to the level reached prior to the communal movement when the production team was made the basic unit of production management and accounting. Since the total factor productivity of Chinese agriculture stayed at low levels for the entire commune period (see Lin, 1990, Table 4), empirical evidence rules out the increase in organizational size as a critical cause for the production collapse.

Lardy's hypothesis that the implementation of local food self-sufficiency policy may suppress total factor productivity is consistent with the long-term patterns of productivity change in Chinese agriculture. Lin (1990) concurs that this policy may cause reduc-

tions in productivity due to the loss of regional comparative advantage, but he argues that the magnitude is likely to be small. In the literature of international trade, it has been found that the loss arising from trade restrictions in general is lower than 1 percent of gross national product (World Bank, 1987, p. 90). As in the case of international trade, the loss associated with local self-sufficiency is unlikely to be large. In a separate paper, Lin and Wen (1995) estimated the changes of land productivity due to the deviation from cropping patterns prevailing before the adoption of local self-sufficiency policy. Their findings showed that none of the land productivity changes, either positive or negative, in any specific year, were larger than 3 percent in the period of 1952–1990. As such, the gains and losses of regional comparative advantage can at most explain a small portion of the changes in total factor productivity during the period in 1952–1990. Therefore, much of the decline in productivity during the commune period needs to be explained by reasons other than the loss of regional comparative advantage. The empirical results of McMillan, Whalley, and Zhu (1989) show that the change from the production team system to the household responsibility system between 1978 and 1984 increased total factor productivity by 32 percent while the estimation by Lin (1992) suggests that the return to a household-based farming system increased total factor productivity by 20 percent. These estimates indirectly confirm Lin's hypothesis that the withdrawal of exit rights from a collective was responsible for the production collapse in 1959–61 and the subsequent stagnation during the commune period.

The above explanations for the output shortfall all focus on production efficiency. The deprivation of exit rights, the increase in the size of organization, and the implementation of local food self-sufficiency policies may cause output decreases with given quantities of productive inputs utilized in agriculture.

However, as a number of scholars have documented, some policies during the Great Leap Forward caused massive diversion of resources away from agriculture, resulting in the decline in aggregate food supply.<sup>4</sup> First, radical government policies resulted in severe reductions in the grain-sown areas. In 1958, there were signs of a bumper harvest, and the government started to accept outrageously high estimates of grain production, a part of the “wind of exaggeration.”<sup>5</sup> With the delusion that China had solved its grain problem, Mao personally initiated a “three-three system” of agricultural land utilization, in which grain would only occupy one-third of the sown area. Another official policy was “sow less, harvest more.” The implementation of these policies in 1959 caused a sharp reduction of nearly 10 percent in sown areas for grain production, which certainly contributed to the output decline.

Second, there were also massive outflow of labor away from agriculture during the crisis period. For the industrialization, about 41 million workers exited agriculture between 1957 and 1958, which represented a 21 percent decline (Riskin, 1987). Among these workers, approximately 17 million worked in the iron, steel and other heavy industrial undertakings in the countryside, while close to 16 million migrated into cities working in state industrial enterprises.<sup>6</sup> Since the workers who participated in industrial production were usually the best workers, the quantity and quality of the labor force in agriculture were reduced.<sup>7</sup>

In addition, natural calamities during 1959–61 may have played a role in reducing grain production. According to official weather records, the average percentage of sown areas hit by natural calamities during the period was 15.27 percent, which compares with an average of 7.63 percent disaster areas in the three years prior to the crisis (MOA, 1984).<sup>8</sup> Although bad weather may severely damage agricultural production, scholars

have been cautious about the magnitude of the negative impact. For instance, the average percentage of disaster hit areas in 1962 and 1963 was 13.1 percent, similar to the crisis period, but the negative impact on grain supply was minimal. For a long time, however, the government emphasized that bad weather was the main cause for the catastrophe. While scholars generally agree that the natural calamities may be responsible for a fraction of the decline in grain production, the crisis was primarily caused by several human mistakes that dramatically reduced both the capacity and efficiency of agricultural production.

#### IV. CAUSES OF THE FAMINE

The traditional approach to famine analysis, which dates back to the writings of Adam Smith and Thomas Malthus, proposes that famines are primarily caused by a sudden decline in food availability (FAD). For example, war or a natural calamity may decimate agricultural production in a particular geographic region and result in widespread food shortages that lead to famine. This supply-based FAD account was an accepted explanation for famines before the seminal work of Sen (1981a and b), who proposed a more general entitlement approach. Sen emphasizes that the access to food problem is central to questions of hunger and starvation in the modern world. Consider a person's endowments, which may include the possession of land, labor services, health conditions, and the ownership of other properties. The person may produce his own food based on initial endowments, or he may exchange possessions in the market for a consumption bundle that includes food. This person starves if he fails to obtain enough food, a result either from a fall in his endowments (direct entitlement failure), or from an unfavorable shift in the terms of exchanging properties for food (trade entitlement failure). Consequently FAD is not a necessary condition for famine.<sup>9</sup> Towards testing his propositions, Sen recognizes that there could be ambiguities in the specification of entitlement, and this problem could be compounded by data limitations.<sup>10</sup> Instead of conducting statistical analysis, Sen relied heavily on the indices of rice-exchange rates and the price ratios of other products or services to rice as major indicators of changing entitlement relations. He found that sharp declines in the food-exchange rates for people in selected occupations explained many of the famines.

In contrast to the market environment where Sen laid out his entitlement hypothesis and applications, the analysis of the Great Leap famine must incorporate factors that are unique to China. First, China had a planned economic structure where the acquisition and distribution of food were directly controlled by the central government. Rural workers had to deliver compulsory quotas to procurement agencies at prices set by the government. A food rationing system existed in cities where urban residents had protected legal rights for certain amounts of grain consumption. Second, the Chinese famine occurred during the chaotic Leap period when bad policies other than food distribution may have aggravated hunger and starvation. Third, unlike many famines that Sen examined, China had a severe food availability decline. A major research question is to assess the relative importance of FAD, entitlement arrangements, and other complementary causes of famine.

## Food Availability and Entitlement

Applying Sen's entitlement approach, Lin and Yang (1996) presented a framework that jointly considers per capita food supply and the right to food as determinants of famine. Under the centrally planned regime, China had an effective, urban-biased ration system in which city residents were given legally protected rights to acquire a given amount of food. In contrast, compulsory grain procurement quotas were imposed on the farmers. As a result, farmers were entitled only to the residual grain. In years of poor harvest, there was barely enough grain left in the village for the farmers after they fulfilled the quotas. Lin and Yang hypothesized that the severe decline in grain supply and the urban-biased arrangement were both likely responsible for the massive death toll.

Panel data for 28 Chinese provinces for the period 1954–66 were used for the empirical analysis. Using the percentage of rural population and per capita grain output in a province as proxies for the degree of urban bias and for the extent of food availability, respectively, in that province, they assess contributions to the observed cross-province differences in death rates. Estimation is based on a two-way fixed-effect model that controls for province-specific and time-invariant factors.<sup>11</sup>

Their empirical results from a baseline specification show that, in normal years, the cross-province differences in the variables did not result in cross-province differences in death rates. However, in the famine period of 1959–61, both variables contributed significantly to the observed inter-provincial differences in mortality rates. In fact, the Chinese food entitlement system, which was dominated by urban-biased distribution, explains a greater part of the inter-provincial variation in mortality rates than does food availability, providing support to Sen's entitlement approach.

More precisely, the estimation results indicate that a 10 percent increase in the proportion of rural population in a province would result in a 6.39 percent increase in the provincial death rate. In contrast, a 10 percent drop in per capita food availability would result in a 4.7 percent increase in mortality rate. Therefore, the effect on excess death rate from a given percentage change in entitlement is about 36 percent bigger than from the same percentage change in food availability.<sup>12</sup>

This article sheds light on the specific causes of the Chinese famine. Additionally, to the best of our knowledge, it is also the first econometric study to assess the importance of famine causes using the entitlement approach.

## Communal Dining and Radical Policies

Factors other than FAD and legal rights to food may also cause hunger and starvation. Two recent studies by Yang (1996) and Chang and Wen (1997) postulated and empirically tested the results that communal dining and radical policies during the Great Leap Forward were the primary causes of the famine. In what follows, we critically examine the analytical content of those hypotheses, and we also cast doubts on the reliability of their empirical results.

Yang (1996) argued that the creation of commune mess halls during the Great Leap was the crucial factor that led to the depletion of grain and thus to hunger and starvation. He considered the famine as a tragedy of the commons: when meals were freely supplied in commune mess halls, the pursuit of individual gains led to excessive food consumption, a result that was detrimental to all commune members. Yang further argued that agrarian

radicalism, of which commune dining is an example, is the more fundamental cause of the catastrophe. More specifically, he advanced a "loyalty compensation" hypothesis that the provinces with lower ratios of communist party members would implement the radical policies of the Great Leap more enthusiastically than the provinces with higher ratios of party members because those who wanted to join the party would try to gain their party membership by showing their loyalty to the central government. Therefore, the provinces that had lower ratios of party members are expected to have higher mess hall participation rates, and consequently to have more severe famines.

Yang's empirical analysis is based on data from 24 Chinese provinces. OLS estimation indicates that mess-hall participation rate, which is used as the dependent variable, is negatively and significantly correlated with the logarithm of density of party membership, which is measured by the ratio of party members to rural population. This result is consistent with the loyalty compensation hypothesis. Regression results also indicate that the severity of famine is significantly and positively correlated with the mess-hall participation rate, a proxy for Great Leap radicalism, and is significantly and negatively correlated with the density of party membership, a determinant for the degree of implementing radical policies.<sup>13</sup> These results are interpreted to confirm the hypotheses on communal dining participation and the causation of the famine.

We agree with Yang's argument that the forceful Great Leap Forward programs, not the communal kitchens alone, contributed to the severity of the famine. But we disagree with his view that the key causal mechanism is the loyalty compensation hypothesis. At first glance, the explanation seems to make sense because non-party members may behave more radically as a way to show their loyalty to the central government. But a careful examination on the composition of party versus non-party membership of the provinces challenges the empirical importance of this hypothesis. Table 7 of Yang (1996) reveals that the percentage of provincial population who were communist party members as of mid-1956 ranged from 0.71 to 3.14 with a mean of 1.34, which implies that the overwhelming majority of the population were not party members in all provinces. Also, because party members were concentrated in urban areas, the differences in the intensity of party membership in rural areas across provinces were further reduced. It is implausible that behavioral differences resulting from 1 to 2 percentage differentials in the non-party memberships would cause significant disparity in mess-hall participation rates, which ranged from 16.7 to 97.8 percent.

In fact, one could use logic similar to Yang's analysis to propose plausible arguments that directly contradict his "loyalty compensation" hypothesis. If communist party members were obliged to pursue central government policies more enthusiastically than non-party members, a situation which often accords with the Chinese reality, provinces with *higher* ratios of party members would engage in more radical Great Leap practices. Therefore, at the analytical level, there is much ambiguity concerning the relationship between the percentage of party membership in a province and the extent of radicalism in that province.

### Provincial Leadership

We believe that the political attitude of the provincial leaders is a more useful factor than loyalty compensation in explaining the Great Leap radicalism that includes communal dining. The negative correlation between mess-hall participation rate and the density of party

memberships could be spurious because the degree of radicalism of provincial leaders is likely to be negatively correlated with the density measure. More specifically, a lower ratio of party membership in a province indicates that the province was liberated later. The newly liberated provinces were mostly in the south. However, most political leaders in those provinces were from the north, appointed by the central government. Those leaders were likely to pay less attention to local needs. Moreover, the southern provinces, such as Sichuan, used to be the power base of the Nationalist Government. The provincial leaders might have felt that it was necessary to follow the central government's policies closely and to suppress any tendency for policy deviation. Therefore, the provincial leaders in the southern provinces may implement radical policies more thoroughly, resulting in higher participation in communal dining.<sup>14</sup>

Communal dining is only one aspect of the radical policies during the Great Leap that may cause famine. The personalities and political strategies of provincial leaders may also affect the total grain extraction/exports from the provinces to the central government. Some of the southern provinces, such as Sichuan and Hunan, were among the most cooperative and obedient provinces who managed to export large quantities of grain despite their own shortages. For instance, the governments of Sichuan and Hunan submitted 2.24 and .440 million tons of grain to the state in 1959–60, respectively, while starvation prevailed in those two provinces. As early as the 1958–59 agricultural year, a procurement slogan was propagated in Sichuan: "First the center, than the locality; first external (commitments), then internal (commitments)." The province organized 5 million people to transport grain for export and the procurement reached the highest historical level of 2.595 million tons. Because of these heavy grain extractions, Sichuan and Hunan were both hit severely by famine. To the contrary, provinces such as Guangdong and Jilin only had mild increases in excess deaths because these provinces successfully reduced their grain export burdens.<sup>15</sup>

We believe that the political attitudes of the provincial leaders in weighing local welfare and central orders played a direct role in affecting the severity of famine within the provinces. Two specific mechanisms that reflected the influence of the political leaders were the participation in communal dining, which may have resulted in over-consumption and waste of food, and the grain exports to the central government, which directly reduced local food availability. However, it is hard, if not impossible, to estimate the relative importance of these effects. First, it is difficult to design a variable that is suitable to measure the degree of radicalism of the provincial leaders. Second, while grain procurement information are available, inter-provincial grain transfers were often done on a very short-term basis and are not reflected in recorded data. This limitation prevents further investigation in this direction. Third, since mess-hall participation is partly determined by political stands of the provincial leadership and is correlated with grain transfers to the central government, it is impossible to separate their individual effects on famine given the first and second difficulties just stated. If there is a positive correlation between the severity of famine and the mess-hall participation rate, the coefficient may not represent the effects of over-consumption in communal dining. Instead it could reflect the effects of other radical policies.

Because of these complications in the relationships and measurements of the key explanatory variables, caution must be used when interpreting the empirical findings of Yang (1996). His empirical analysis aims to show that "the structure of political incentives (approximated by density of party membership) accounted for the differential rates of

adoption of commune mess halls, which in turn led to differences in famine severity among the provinces." Our earlier discussions have suggested that there is no reliable evidence to distinguish between the role of provincial leaders and of the political incentives of non-party members (Yang's "loyalty compensation" hypothesis) in determining the degree of provincial radicalism. Moreover, the negative correlation between the rate of communal dining and the density of party membership is likely spurious. We have just shown that the positive correlation between the participation in commune kitchen and the severity of famine does not necessarily show the effects of over-consumption of food. Large quantities of grain exports, which are mainly determined by the political attitudes of provincial leaders and are likely correlated with dining hall participation rates, may result in hunger and starvation. Therefore, those empirical findings cannot conclusively support the proposition that communal dining is the crucial mechanism that leads to the depletion of food and thus the famine.

### **Overconsumption in the Communal Dining System**

In a related study, Chang and Wen (1997) singled out the communal dining system as the primary cause of the famine. While admitting that multidimensional factors contributed to the severity of the catastrophe, they emphasized that hunger and starvation started in 1958 when there were a bumper grain harvest and abundance of food availability. They argued that it was the communal dining system that caused enormous overconsumption and waste of food, that first started, and then greatly aggravated, the famine. Their empirical analysis relied heavily on anecdotal evidence and inference drawn from the sequencing of events. They also utilized a positive correlation between 1960 province-level excess death rates and the 1959 dining hall participation rates to support their postulation that communal dining is the crucial cause of the famine.

The analysis of Chang and Wen leaves an impression to the readers that famine started in 1958. However, a careful examination of China's mortality statistics reveals that widespread famine did not occur until 1959. Table 1 presents the death rates of the Chinese provinces for the period 1956–63. The national death rate increased in 1958 to 12.0 per thousand from the average of 11.1 per thousand for 1956–57. However, this increase is primarily driven by the dramatic increases in mortality in three provinces, in which Sichuan from 11.3 to 25.2 per thousand, Yunan from 15.8 to 21.6, and Gansu from 11.1 to 21.1 per thousand. In fact, using the 1956–57 average as the reference, the death rates in 1958 actually declined in 16 out of 28 provinces, and thus rises in mortality were an isolated phenomenon that occurred only in certain provinces. In 1959, the national average mortality jumped to 14.6 per thousand and higher mortality rates are found in 27 out of 28 provinces, marking the beginning of the widespread famine. The worst famine year is 1960 when the national mortality rate reached 25.4 per thousand. The death rate stayed high at 14.2 per thousand in 1961, the last year of the crisis, and then it lowered to the trend level of 10.0 per thousand in the post-famine period in 1962–63.

We acknowledge the possibility that overconsumption and waste of food in commune mess-halls could reduce food availability in local regions and increase the severity of famine. The appropriate empirical method to test this hypothesis is to estimate the total quantity of grain reduction due to consumption irrationality and examine its relative importance in light of other causes, such as grain production shortfalls and entitlement arrangements. Because of the difficulties in estimating the extent of consumption inefficiency,<sup>16</sup> Chang

**Table 1**  
**Death Rates of the Chinese Provinces: 1956–1963**  
**unit = .1%**

<i>Province</i>	<i>1956–57</i>					<i>1962–63</i>	
	<i>Average</i>	<i>1958</i>	<i>1959</i>	<i>1960</i>	<i>1961</i>	<i>Average</i>	
(1)Beijing	8.0	8.1	9.7	9.1	10.8	8.5	
(2)Tianjin	9.1	8.7	9.9	10.3	9.9	7.4	
(3)Hebei	11.3	10.9	12.3	15.8	13.6	10.2	
(4)Shansi	12.2	11.7	12.8	14.2	12.2	11.4	
(5)Neimonggu	9.2	7.9	11.0	9.4	8.8	8.8	
(6)Lianing	8.0	6.6	11.8	11.5	17.5	8.2	
(7)Jilin	8.3	9.1	13.4	10.1	12.0	9.7	
(8)Heilongjing	10.3	9.2	12.8	10.6	11.1	8.6	
(9)Shanghai	6.4	5.9	6.9	6.8	7.7	7.2	
(10)Jiangsu	11.7	9.4	14.6	18.4	13.4	9.7	
(11)Zhejiang	9.4	9.2	10.8	11.9	9.8	8.3	
(12)Anhui	11.7	12.3	16.7	68.6	8.1	8.1	
(13)Fujian	8.2	7.5	7.9	15.3	11.9	7.9	
(14)Jiangxi	12.0	11.3	13.0	16.1	11.5	10.4	
(15)Shandong	12.1	12.8	18.2	23.6	18.4	12.1	
(16)Henan	12.9	12.7	14.1	39.6	10.2	8.7	
(17)Hubei	10.2	9.6	14.5	21.2	9.1	9.3	
(18)Hunan	11.0	11.7	13.0	29.4	17.5	10.3	
(19)Guangdong	9.8	9.2	11.1	15.2	10.8	8.5	
(20)Guangxi	12.5	11.7	17.5	29.5	19.5	10.2	
(21)Sichuan	11.3	25.2	47.0	54.0	29.4	13.7	
(22)Guizhou	8.2	13.7	16.2	45.4	17.7	9.9	
(23)Yunnan	15.8	21.6	18.0	26.3	11.8	12.5	
(24)Shanxi	10.1	11.0	12.7	12.3	8.8	10.0	
(25)Gansu	11.1	21.1	17.4	41.3	11.5	9.4	
(26)Qinghai	9.9	13.0	16.6	40.7	11.7	6.9	
(27)Ningxia	10.9	15.0	15.8	13.9	10.7	9.4	
(28)Xinjiang	14.1	13.0	18.8	15.7	11.7	9.6	
Nation	11.1	12.0	14.6	25.4	14.2	10.0	

Note: Regional classification: North = (1)–(5), North East = (6)–(8), East = (9)–(15), Center South = (16)–(21), South West = (21)–(23) and North West = (24)–(28).

Source: State Statistical Bureau, *Quanguo gesheng zizhiqu zhixiaoshi lishi tongji ziliaoz huibian, 1949–1989* (a compilation of historical statistical data of provinces, autonomous regions, and municipalities), Beijing: China Statistical Press, 1990.

and Wen relied on indirect analysis. They quoted anecdotal evidence from specific rural areas. For instance, they restated Peng (1987)'s description that "in some rural areas the grain consumed by peasants in a three-month period amounted what usually sufficed for six months." "In some places, three months' supply of grain was consumed in merely two weeks (Yang, 1996)." There was also anthropological evidence from Potter and Potter (1990): "According to one peasant, everyone 'irresponsibly' ate whether they were hungry or not, and in 20 days they had finished almost all rice they had, rice which should have lasted for six months (emphasis added)." While this evidence could be helpful in understanding the situation, it can hardly be used as systematic evidence to test the hypothesis that communal dining was the crucial cause of the famine.

In fact, the timing of the 1958 harvest and the establishment of communal kitchens suggest that public dining is unlikely to be the cause for increased mortality in 1958. Communal kitchens did not start until the communes were established. The first commune appeared in August 1958 and, in most cases, in October or November 1958. In most places in China, the crops were not harvested until October or November. For the single-crop areas, the harvested grain should provide sufficient consumption for 12 months. For the double-crop areas the grain output should provide consumption for 6 months. It was highly unlikely for the communal kitchens to consume all the food in one or two months and to cause hunger and starvation in 1958. Moreover, the communal kitchens were adopted nationwide, but the death rates in 16 out of 28 provinces continued to decline in 1958. This evidence is also inconsistent with the hypothesis that communal dining soon depleted food supplies, which triggered widespread famine in 1958.

Chang and Wen also examined cross-province mortality rates to support their communal dining hypothesis. Similar to Yang (1996)'s analysis, they regressed 1960 provincial excess death rates (CEDRs) on dining hall participation rate at the end of 1959 (DHPRs) and found a significantly positive coefficient. Notice that the appropriate variables for hypothesis testing are 1958 death rates and dining hall participation rates. Because of the erroneous timing of these variables, the regression results simply cannot provide reliable confirmation of their central hypothesis that "it is the communal dining system that first started, and then greatly aggravated, the famine." To our knowledge, the mess hall participation rates for 1958 are not available at the provincial level. Without this information, and/or the quantitative estimates of overconsumption and waste of grain, it is impossible to test the hypothesis of Chang and Wen that the famine started in 1958 and the famine was triggered by communal dining.

Earlier analysis has shown that significant increases in mortality occurred in certain provinces in 1958, including primarily Sichuan (21), Guizhou (22), and Yunnan (23) in the southern regions. What caused the increases in mortality in those provinces? First, many of those provinces were located in the south and were recently liberated. The political leaders in those provinces were newly appointed by the central government to repress the anti-revolutionaries in their provinces and tended to be more radical. One radical policy adopted in those provinces was to export large quantities of grain to the central government in 1958 to support the Great Leap Forward, of which Sichuan was a typical example (see note 13 and related discussions). Grain exports may dramatically reduce food availability in some regions of the province.<sup>17</sup> Second, there were campaigns other than the communal movement and dining programs in 1958. The leaders of those newly-liberated areas might have been more eager to push forward the backyard furnace, irrigation, and other labor-intensive projects because they were newly appointed by the central government and were likely to implement the central government's policies more enthusiastically. The Great Leap Forward projects may have been physically too demanding and the zealous devotion to the campaigns may have led to the neglect of health care, resulting in higher mortality. A supporting evidence for this argument is that the death rate in urban areas also increased to 12.5 per thousand in 1958 from 11.4 and 10.8 per thousand in 1956 and 1957. The destruction of health resulting from Great Leap projects is a likely reason for the increase in the mortality rate in the newly liberated provinces in the south because the campaigns also existed in cities but there were no public dining programs in the cities.

### Other Causes

After reviewing the role of grain availability, food entitlement arrangements, communal dining, provincial grain exports, and political leadership in causing the famine, we would like to briefly mention a few other possible causes. China's net grain export reached a historical record of 4.2 million tons in 1959 and stayed at 2.7 million tons when the nation suffered the horrific death rate of 25.4 per thousand in 1960. Since total grain outputs were 170 and 143.5 million tons in those two years, the net grain exports accounted for 2.47 and 1.88 percent of production, respectively. Hundreds and thousands of lives could have been saved without these grain exports. Grain procurement also reached the highest levels of 51.83 and 64.12 million tons in 1958 and 1959. These procurements were to secure urban food supplies and to provide basic materials in support of rapid industrialization. This latter reason of frenzied industrialization policies was also responsible for loss of lives in rural areas. Lastly, as Sen (1983) emphasized, the lack of news distribution systems and pressure groups within China may have obstructed information flows to provide necessary famine relief, and therefore these factors have also contributed to the severity of the famine.

### V. CONCLUDING REMARKS

Inquiries into China's Great Leap crisis is an active research area because of the crisis's profound impacts on the welfare of the Chinese people. In this paper, we have critically reviewed this literature and argued that, since the grain production collapse was not the only factor that led to the famine, the causes of these two catastrophes require separate examination. At the theoretical level, multiple factors have been proposed in the existing literature to explain the crisis. The consensus view is that the catastrophes are primarily a result of human mistakes. However, existing empirical findings mainly support the exit right hypothesis to explain the dramatic productivity fluctuations in the Chinese agriculture, and support grain availability and the urban-biased food distribution system as important causes of the famine. Other hypotheses, including the role of bad weather in causing the production collapse, and communal dining to explain the famine, are still not supported by convincing empirical evidence. Consequently we still do not know the magnitudes of their impacts on the severity of the crisis. Collection of historical records and assembly of new data will be necessary for conducting further empirical analysis, which should have high priority to advance our knowledge of the Great Leap crisis.

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### NOTES

1. See, for instance, Coale (1981), Ashton et al. (1984), and Peng (1987).
2. These articles include Dong and Dow (1993), Kung (1993), Lin (1993), MacLeod (1993), Puttermann and Skillman (1993), and Liu (1993).
3. See Ashton et al. (1984) for other reports of China's grain output.

4. See Ashton et al. (1984), Walker (1984), Peng (1987), and Johnson (1990) for related references quoted below.
5. The initial grain estimate by the State Statistical Bureau was 375 million tons, and it was reduced to 360 million tons in December 1958 and, then, to 250 million tons in August 1959. But the actual grain output is in fact 200 million tons.
6. Ashton et al. (1984), Walker (1984), and Bernstein (1984) provided similar estimates.
7. In response to the production decline and the famine in 1959 and 1960, the government sent 10 million workers back to their rural homes in 1961 to release the pressure of urban food demand and to increase labor inputs for agricultural production. However, the massive exodus of labor must have undermined the capacity of grain production during the whole crisis period.
8. Disaster areas are defined as the sown acreage that are hit by flood, drought, frost, and hail, and have 30 percent or more reduction in yield compared to normal yield.
9. For an assessment of the entitlement approach that describes its conceptual apparatus, the evolution of Sen's analysis, and the contrasts with FAD approaches, see Osmani (1995).
10. In the absence of a market-clearing equilibrium, for instance, entitlement may not be well defined. There is also a great deal of ambiguity in characterizations of a person's possessions. See Sen (1981b) for additional explanations.
11. This fixed-effect specification assumes that certain characteristics unique to individual provinces and years can be captured in differences in the constant terms, causing shifts in provincial death rates. For instance, the quality of immunity services and health care continued to improve over time, which may have resulted in a continuous decline in death rates. The insertion of year dummies may account for this and other time-dependent effects. Similarly, the provincial dummies may pick up regional effects on death rates, such as the behavior of provincial leaders towards the central government, availability of medical services, differential income levels, transportation conditions, and other province-specific, time-invariant variables. Hausman-tests support this fixed-effect model over a random effect specification.
12. Notice that the entitlement measure used in the analysis is the percentage of rural people in a province that represents the proportion of population who do not have legal entitlements to food. An alternative entitlement measure is the state grain procurement and transfers from rural areas of a province, which would represent the deprivation of food entitlement of that province. However, because many transfers were often done on a very short-run basis, especially in disastrous periods, they are not available in recorded data. This data limitation prevents further investigation in this direction.
13. There are 24 observations for each of the above regressions because data for mess-hall participation rates are available only for the end of 1959, and data for density of party membership are available only for 1956. The implicit assumption for justifying these regressions is that the ratios do not vary significantly over a few years. The famine severity is either approximated by the 1960 provincial mortality rate or by a relative famine severity measure, where "Famine Severity = (highest mortality rate during 1959–61 – average mortality rate for 1956–58)/(average mortality rate for 1956–58)."
14. Five out of six provinces that have dining participation rates higher than 90 percent are from the south, including Hunan, Sichuan, Yunan, Guizhou, and Anhui provinces (See Yang 1996, Table 7).
15. See Walker (1984) for an exhaustive analysis of China's grain supplies and procurement in the 1950s and 1960s and detailed descriptions about the political struggle between the provincial and central government.
16. The authors did give a quantitative estimate made by Xue Muqiao, a well known Chinese economist, that the over-consumption of grain by peasants in 1958 amounted to 17.5 million tons, which was 8.78 percent of total domestic production in that year. However, the authors

- neither explained how this estimate was derived nor did they discuss the reliability of this estimate.
17. Chang and Wen have apparently and entirely ignored the role of provincial grain exports. In the discussion on increased mortality in Sichuan in 1958, they described that the death rate in 1958 increased to 25.2 per thousand from 12.0 per thousand in 1957 despite a record harvest in 1958. Then they conclude that "this contradiction can *only* be explained by the introduction of the communal dining system (emphasis added)."

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