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Rural China: An International Journal of History and Social Science 14 (2017) 248-270

Rural China
中国乡村研究
brill.com/rchs

Industrialization and China's Agricultural Development, 1949–1985

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工业化与中国农业的发展，1949–1985

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Abstract
In the 1950s, Chinese agriculture received far too few modern inputs from industry, but in the 1960s–1970s, this situation was significantly improved. The chemical fertilizer industry, crucial for enhancing crop yields, saw substantial development in the later period. More chemical fertilizer was used in agricultural production, and the price of chemical fertilizer relative to agricultural products was falling. The institutional framework in rural China, which underwent frequent changes in the 1950s, was stabilized in the 1960s and 1970s with the consolidation of the three-tiered commune-brigade-team structure and the establishment of the production team as the basic managerial unit. This stabilized framework remained in place until the implementation of the household responsibility system in the early 1980s. Agricultural development in the 1960s–1970s laid the necessary material foundation for the 1979–1984 Rural Reform. Revisiting this history can help us to rethink the interrelationship between institutional change and material factors in a developing economy.

Keywords
industrialization, agricultural development, chemical fertilizer industry, micro allocation of resources, institutional change, input mismatch

* I thank Philip C. C. Huang, Kathryn Bernhardt, Tong Zhihui, and Chen Chuanbo for their helpful criticisms and suggestions. I also thank Chen Feng, Gong Boyang, and Zhang Qi for their research assistance.

** This research was funded by the National Natural Science Foundation of China (Projects 71373271).

DOI: 10.1163/22136746-01402002

摘要
在1950年代，中国农业从工业部门得到的现代化要素为数甚少，而在60–70年代，这一状况则得到显著改善。尤其是对农业增产至关重要的化肥工业，在后一阶段有了长足发展；农业生产的化肥施用量有明显的提升；同时化肥和农产品之间的比价则在持续下降。在1950年代变动频繁的农村经营制度，在1960–70年代则以“三级所有、队为基础”为核心稳定下来，直到家庭承包制实施。1960–70年代的农业发展为1979–1984年的农村改革提供了不可或缺的物质基础。检视这段历史有助于我们重新思考经济系统中制度变迁与物质基础之间的关系。

关键词
工业化、农业发展、化肥工业、资源的微观配置、制度变迁、要素投入扭曲

China's economic development in the pre-Reform years has received far too little academic attention compared with that in the Reform era. Economists from both in and outside China have mainly focused on the transformation of the Chinese economy from a centrally planned to a market-oriented one since the 1980s. Their treatments of the pre-Reform economy are by and large brief, usually as merely background for more detailed discussion of the Reform years. The relationship between industrialization and agriculture in the pre-Reform era also has to some degree been analyzed in a simplistic manner. This is partly due to the paradigm of neoclassical economics, which is more attuned to analyzing the responses and choices of individual economic agents than to analyzing interactions among different economic sectors. In addition, mainstream economists usually have a simplistic view of the 1950s to the 1970s, believing that pre-Reform industrialization was coerced rather than spontaneous and Chinese agriculture a sacrificed sector whose resources had been ruthlessly exploited to satisfy the needs of the forced industrialization. In this story, agriculture is thought to have received no support from industrialization.[1]

In our view, these arguments have failed to discern the complexity of pre-Reform economic development and have mistaken pre-Reform agricultural development and its changing dynamics for a changeless and undifferentiated unity. Instead, we argue that the pre-Reform era can be divided into two stages distinct from each other. The first stage (roughly from 1949 to 1961) was characterized by a series of dramatic institutional changes in the countryside, by weak linkages between agriculture and industry, and by the lack of modern farm inputs in agricultural production. The second stage (roughly from 1963 to 1978) was quite different. It was characterized by stable rural economic-political institutions centered on the three-tiered commune-brigade-team structure with the production team as the basic managerial unit, by strengthened linkages between agriculture and industry, and by the rapid increase in the use of modern farm inputs. From the

[1] For discussions from mainstream economics on this issue, see Lin, Cai, and Li, 1994; and Wu, 1999.

early 1960s on, Chinese industry was consciously adjusted toward lending more support to agriculture. By 1978, modern inputs, especially chemical fertilizer, had become indispensable ingredients in agricultural production, and thus made the configuration of inputs very different from that in the 1950s. The increase in modern farm inputs continued into the years of the Rural Reform from 1979 to 1984, though the basic rural management system changed again during this period with the implementation of the household responsibility system.

The policymakers' different understandings of industrialization strategy and the industry-agriculture relationship accounted to a large extent for the differences between those two stages. In the 1950s, the focus of industrialization was on the basic equipment and national defense industries. The industrial sectors that were supportive of agriculture did not receive much attention. The policymakers thought that institutional change (or, in Marxian terminology, the transformation of production relations) alone would suffice to ensure the rapid growth of agriculture, with no need to import modern inputs from industry. They in fact had mistaken the limited improvement of agriculture within the traditional peasant economy, brought about by greater efficiency in resource allocation and an increase in traditional farm inputs, for a substantial transformation toward a modernized agriculture. This line of thought reached its peak during the Great Leap Forward, only to be debunked by the catastrophic agricultural decline in 1959–1961.

Both qualitative and quantitative materials show that after the Great Leap Forward the policymakers' consideration of the agriculture-industry interrelationship changed and the industrialization strategy was consciously adjusted. Along with the stabilization of the basic rural management system, the industrial sectors supportive of agriculture were emphasized as a focus of investment. The proportion of agriculture-supporting industrial investment in the total industrial investment rose from 2.9 percent during 1953–1957 to 9 percent during 1963–1965 and then was kept at that level until 1980. Chemical fertilizer (by nutrient value) used per cultivated mu of land rose from 0.9 kilograms in 1965 to 3.95 kilograms in 1978 and further up to 8.05 kilograms in 1984. It was the domestic rather than the foreign chemical industry that contributed to this increase; in 1978, for instance, domestically produced chemical fertilizer totaled 42.2 million tons, while imported fertilizer totaled merely 7.3 million tons. Furthermore, the time series of pre-Reform price indexes shows that the price of chemical fertilizer relative to grain was falling continuously at the same time, thus ruling out the possibility that the increasing use of chemical fertilizer was based on an increasing exploitation of the peasants through the price scissors between agricultural and industrial products.

The Industrialization Strategy and Agricultural Development in the 1950s

With their overwhelming emphasis on the post-1978 era, economists often lump all the years from 1949 to 1978 together into a single category, as if throughout this

almost one third of a century China's agricultural development was following the same pattern. This was not the case. A clear distinction can be made between a later phase (1963–1978) with more intensified inter-sectorial links between agriculture and industry as well as a stabilized rural management system and an earlier phase (the 1950s) during which agriculture received little modern input from industry and dramatic institutional changes were being effected in the countryside. Drawing this distinction is crucial for our discussion. In this section we will focus on the phase of the 1950s and leave the later phase to the next section.

Industrialization in the First Five-Year Plan and the Modest Growth of Agriculture Before 1958

At the beginning of the 1950s, the Chinese economy as a whole was still a pre-industrialized one. The gross product of the modern industrial sectors in 1952 amounted to only 16.9 percent of the country's total gross product. By way of comparison, the agricultural and handicraft sectors, production for which was carried out at the micro level by peasant families, accounted for 45.9 and 9.3 percent respectively (Feuerwerker, 1983: 39, Table 3). The foremost economic task for the newly born People's Republic at the time was to speed up industrialization, which had long been pursued by generations of Chinese people since as early as the late nineteenth century and seemed to be even more urgent after the Korean War in 1950–1953.

The first big step toward industrialization was made in the context of the First Five-Year Plan carried out from 1953 to 1957, revolving around 150 key projects aided by the Soviet Union.[2] A quick look at the distribution of those projects over different industries can readily reveal the characteristics of this first large-scale push toward economic modernization. First, it put an obvious priority on heavy industry; 147 projects belonged to this category, while only three to light industry. Second, it manifested significant consideration for supporting national defense and the military industry; a total of 44 projects fell into this category (Dong and Wu, 2004: 331). These priorities led to unbalanced economic growth. During 1953–1957, the increase of the gross output value of heavy industry averaged 25.4 percent a year, while the figures for light industry and agriculture were merely 12.9 and 4.5 percent respectively (Zhonghua renmin gongheguo, 1989: 54).

Agriculture in fact benefited little from the rapid expansion of heavy industry during this period. Among the 150 projects, only five were designed for producing modern farm inputs—three nitrogenous fertilizer plants in Jilin, Taiyuan, and Lanzhou, and two tractor plants in Tianjin and Shenyang (Dong and Wu, 2004: 366, 379). Investments in agriculture-supporting industries accounted for only 2.9 percent of the total industrial investments during 1953–1957 (Gudingzichan

[2] At first, 156 projects were planned, but in the end only 150 were implemented (Dong and Wu, 2004: 152).

tongjisi, 1987: 103). The average amount of chemical fertilizer used per cultivated mu in 1957 was only 0.15 kilograms by nutrient value. In the same year, the whole of China had only a total of 14,674 tractors of all sizes from small to large (Zhonghua renmin gongheguo, 1989: 308, 340). The lack of modern inputs in agricultural production persisted through the entire decade of the 1950s.

However, agriculture still saw modest growth in the 1950s. In 1952, the total grain yield surpassed the highest historical record by 9.2 percent, signaling the recovery of agriculture from the damage caused by the long period of war since 1937 (Dong, 1996: 262). From 1952 to 1957, the total output value of agriculture increased by 24.8 percent in constant prices (Zhonghua renmin gongheguo, 1989: 54). Before being interrupted by the chaos of the Great Leap Forward, this trend of development was substantial, though much less significant than what was achieved in industry.

The Impact of Institutional Change on the Rural Economy Before the Great Leap Forward

What was the nature of the agricultural growth before the Great Leap Forward? If it was just a kind of limited improvement within the scope of the traditional peasant economy, then it could not be sustained, and real change could occur only with the coming of abundant modern farm inputs as well as modern technology. On the other hand, if it indeed meant an essential transformation of the traditional agriculture into a new agriculture with substantially higher productive forces, then there would be no need for injection of modern inputs; one need only wait for the productive forces to become even more fully developed. In fact, the decision-makers in the 1950s mistook the former for the latter, and this mistake was to some degree responsible for the catastrophe of the Great Leap Forward.

In the following we will demonstrate our argument that agricultural growth in the 1950s was based on the increase of traditional farm inputs, as well as on the improvement of the micro productivity of agriculture, which was brought about by the mitigation of input mismatches as a result of a series of institutional changes.

First was the increase of traditional farm inputs. During the economic recovery from 1949 to 1952, this increase was obvious. The end of the Sino-Japanese War and the civil war against the Guomindang would enable the labor power that had been drawn into the army to return to agriculture. The farmland that had been abandoned in wartime would be recultivated. Consequently, the input of both land and labor, critical in the traditional peasant economy, would naturally increase, thus leading to the growth of agriculture.[3]

[3] The central role of labor and land in China's traditional agriculture has been discussed by Ho, 1959; and Perkins, 1969.

This increase of land and labor input continued throughout the period of 1952 to 1957. Official records show that the number of laborers in the agricultural sector increased by 11.5 percent and the amount of cultivated land by 11.3 percent during those years (Nongmuyuyebu jihuasi, 1986: 46, 132). Because of the lack of data on labor and land inputs for 1949–1952, we cannot compare the rates of increase for the two inputs between the 1949–1952 and the 1952–1957 periods. However, it stands to reason that the rate of increase might well have slowed down during the second period, for the rebound in labor and land input after the wars could not persist for long. The rate of increase in labor would revert to a natural rate consistent with the pace of growth of the total population. The increase in land might also be limited because by the mid-20th century China already had very little uncultivated land.

The increases in both labor and land were significantly lower than the 24.8 percent increase in the gross output value of agriculture during the same period—only about half of the latter. Thus we may infer that there were other factors promoting agricultural growth. In our view, a critical factor was the improvement of economic efficiency at the micro level. More concretely, what underlay this improvement was relief from the distortion in input allocation for peasant families at the lower end of rural wealth distribution.

In neoclassical economics' general equilibrium model of market economy, where land, labor, and capital markets are all complete and perfect, the distortion in input allocation could not occur because any potential distortions or mismatches would be eliminated by vigorous market transactions. But in traditional Chinese villages, these mismatches were firmly entrenched; a considerable number of peasants could not use market mechanisms to eliminate distortions in input configuration, especially the mismatch between labor and land.

Using Japanese Mantetsu (South Manchurian Railway Company) records, Philip Huang (1986: 168–73) convincingly shows that on the North China plain only peasant families at the upper end of rural wealth distribution—usually those possessing 100–200 mu of land—could adjust the labor input on their farms through the local labor market to reach appropriate land-labor compositions and thereby maximize their profits. In contrast, families with small amounts of land suffered from distortions of the optimal land-labor composition. Huang particularly emphasizes one form of distortion, well known as "involution," which meant that more than enough labor had been put into a fixed amount of land so that the marginal returns to additional units of labor had become very low. In fact, involution is a special kind of land-labor mismatch. Huang himself notes that it was also possible for the poor peasant families to suffer from insufficient labor input on their own farms because of their need to hire their labor out to others to supplement their income. What the historical records of the 1930s reveal is, in a word, that rich peasant families with their greater endowments of land and capital and greater access to market mechanisms were able to manage their farms profitably, while poor peasants with little land and capital and less access to the market (accounting for more than half of the total rural residents) could only allocate their inputs in a distorted and

inefficient way. This situation was caused by three basic characteristics of traditional Chinese agriculture: an especially high population-land ratio, a large amount of surplus labor at the aggregate level, and the lack of non-farming employment opportunities.

Institutional changes in the 1950s worked to relieve the input mismatch for a majority of Chinese peasants. First was Land Reform—a large-scale resource redistribution implemented not by market mechanisms but by political power. Before Land Reform, poor peasants and hired agricultural laborers, while accounting for 57.4 percent of the rural population, owned only 14.3 percent of the land. Through Land Reform, this figure rose to 47.1 percent (Huang Daoxia et al., 1992: 1353). Besides land, they also received considerable numbers of farming implements and draft animals. These changes surely enlarged their available sets of farm inputs, thus allowing them to manage production with a more advantageous combination of inputs compared with the old days.

Some scholars argue that the impact of Land Reform on rich peasants and managerial landlords must have caused significant harm to the rural economy, because they had better technology than other peasants (Yang, 2008). We believe that this issue needs to be addressed by differentiating between the micro and the macro levels. At the micro level, Land Reform of course could not help but have an impact on the production of managerial landlords and rich peasants. However, if we take this occurrence at the micro level to be the overall consequence at the macro level, it would be impossible to explain the empirical fact that, as previously discussed, overall the agricultural sector during Land Reform experienced a significant growth. A more balanced and pertinent explanation, in our view, would be that Land Reform had different effects on different rural residents: on the one hand, it significantly mitigated the input mismatches of peasants at the lower end of rural wealth distribution, which would help to increase agricultural output; on the other hand, it also impacted families at the upper end, which could lead to productivity loss. On the aggregate level, the positive effect of Land Reform on agricultural production should have significantly exceeded the negative effect, as suggested by the macro evidence.

Furthermore, we believe that the loss of productivity at the micro level caused by Land Reform's impact on landlords and rich peasants may not have been as severe as some scholars have imagined. Gao and Tong (forthcoming) analyze a collection of county and village archives of Wuwei county in Anhui province, which was historically famous for its rice exports to the lower Yangzi River basin, and find that during Land Reform the average yield per unit of land in the region—a good indicator of micro-level agricultural productivity—had increased substantially rather than decreased. Of course, the inverse should have been the case if the impact of Land Reform on the productivity of landlords and rich peasants was at all serious. A field investigation conducted by the Land Reform Commission of the peasant families in Baima township in Wuwei showed that the farming technology of landlords and rich peasants was not superior to that of middle peasants. The argument that Land Reform adversely affected agricultural production usually

assumes more advanced agricultural techniques for landlords and rich peasants, but this clearly was not the case, at least not in Wuwei county in the lower reaches of the Yangzi River. This finding is also consistent with what Mantetsu records reveal for the North China plain, where managerial landlords and rich peasants had the same productivity as the middle peasants for land and capital (including draft animals and fertilizer) (Huang Zongzhi, 1986: 161). Assuming landlords and rich peasants had better technology and productivity is thus not in accordance with the actual situation.

Another institutional arrangement aimed at relieving input mismatches was the Mutual Aid Movement promoted by the government during Land Reform. It provided poor peasants a more fine-grained improvement of input configuration than land redistribution. The movement had its roots in the Communist base areas in North and Northwest China, especially the Taihang base area, during the Sino-Japanese War (Liu, 1943: 4–7). The Taihang base area government found that land-labor mismatches were pervasive among local peasants. As for the poor peasants, the lack of farming tools and draft animals made their input configuration even farther from optimal. Once again, the standard neoclassical theory of general equilibrium would suggest a market mechanism to deal with these problems. However, such markets for trading indivisible inputs (such as labor, as well as land already highly parcelized into very small sizes such as one mu or so) just did not exist. Ronald Coase's transaction cost theory is relevant here—the cost of forming and using such a set of markets was too high for the peasants to bear.

Non-market mechanisms had already emerged in peasant communities in order to deal with input mismatches. One popular mechanism was called *huangong*, or "exchanging labor," in which a household exchanged its surplus labor for another household's draft animals or farming tools. Easy to imagine, the scale and scope of spontaneous labor exchange were limited, contingent on the probability of two households having exactly the inputs the other wanted or on the moral commitment of one party to help the other without asking for payment. Thus successful matches would happen only among a small portion of all of the peasants with distortions in input allocation. Through the Mutual Aid Movement, base area governments aimed to institutionalize the previous spontaneous labor exchange into a lasting mechanism covering the entire community. Peasants who themselves were Communist Party members or who had been influenced by the party's ideology played a key role in making the mechanism of mutual aid possible, for they usually spent much time and energy in surveying the local households' farming endowments and setting procedures for mutual aid exchanges, with themselves gaining no payoff from doing this.[4] In a word, the Communists introduced into the base area a new mechanism to improve resource allocation where the

[4] A fruitful collection of cases detailing how mutual aid in the Taihang region worked is given in 长治市农业合作史料 (*Historical Materials on the Agricultural Cooperativization in Changzhi City*) (Changzhi shi nongye hezuoshi bianjishi, 1994: Part I).

market had failed. The base area experience was deemed a success and extended to the whole country during Land Reform after 1949. By 1952, 39.3 percent of peasant families throughout the country had joined the Mutual Aid Movement, and by 1954, 58.3 percent (Huang Daoxia et al., 1992: 1353).

Based on those analyses, we believe that both Land Reform and the Mutual Aid Movement benefited Chinese agriculture. However, the process of institutional change did not stop there. The sudden acceleration of agricultural cooperativization in 1955–1956 brought new changes to rural society. First the elementary and then the advanced co-ops became the major unit of agricultural production, in place of the mutually aided peasant families. As members of elementary co-ops, peasants put their land, labor, draft animals, and farming tools under the management of co-op leaders, and received both payments for labor and dividends from their shares of land. In the advanced co-ops, because of the collectivization of the land itself, the dividends from land were abolished, and peasants only earned incomes through labor. In both kinds of collectives, peasant families no longer had the autonomy to make production decisions; instead they had to submit to the coordinated planning of the entire collective. And these changes happened very quickly. In 1954, the peasant families who joined elementary co-ops accounted for only 1.9 percent of all peasant families, while this number increased to 14.1 percent in 1955 and further to 29.1 percent in 1956. In 1955, the peasant families who joined advanced co-ops accounted for merely 0.03 percent of all peasant families, but the figure rose to an astonishing 62.2 percent in 1956 (Huang Daoxia et al., 1992: 1335–81). By 1957, the whole agricultural sector was basically collectivized through co-ops.

Aggregate data suggest that cooperativization before the Great Leap Forward probably also improved the agricultural sector, just as Land Reform and the Mutual Aid Movement had done. The gross value of agricultural output continuously increased from 47.7 billion yuan in 1955 to 55 billion yuan in 1958 (both in constant prices of 1957), for an annual growth rate of 5.1 percent, until the big recession of 1959–1962 (Nongmuyuyebu jihuasi, 1983: 58). However, behind this agricultural growth at the aggregate level, the contradiction between two approaches to cooperativization emerged. One was top-down, based on commandism, which usually had negative effects on the rural economy; the other was bottom-up, based on community spontaneity, which helped to improve agriculture a step further than Land Reform and the Mutual Aid Movement.

The contradiction between those two approaches can be seen in the autobiography of Du Runsheng, who in the 1950s was a high-ranking cadre in the Ministry of Rural Work under the leadership of Deng Zihui. Du recollected that in late 1955 he "summarized a collection of materials obtained by comrades who had gone down to the village to investigate co-ops . . . and found that there were four different kinds of regions or four kinds of situations for cooperativization in the whole country, among which two kinds of regions had been implementing cooperativization too quickly." He also found that "among the 600 thousand co-ops that had

been established, 15 percent were 'fake,' or in chaos, or could not maintain production" (Du, 2005: 50).

Two major reasons might explain the chaos and productivity loss in commandism cooperativization. First, under top-down pressure, the peasants might have little enthusiasm for participating in cooperativization but rather prefer family-based farming, even to the extent of engaging in passive resistance to cooperativization (Du, 2005: 51). Second, the requirements for running co-ops were considerably higher than those for small-scale family farming, and even an excellent operator on the family farm would find it difficult to manage a co-op with its larger scale and more complicated business. In community spontaneity, the peasants would naturally gather around some qualified managers and explore together an optimal scale for the co-op. However, the top-down commands sometimes would disregard the rural realities when setting up co-ops, even to the extent of directly dictating the co-op scale and membership. This was prone to make many co-ops hard to manage from the outset.

The cases of failed co-ops do not rule out the existence of well-managed co-ops that were based on peasant agency. Those were especially prominent in the previous Communist base areas, where a tradition of revolutionary democracy had been established, a tradition that stressed the substantial improvement of peasants' socioeconomic lives and their direct participation in political decision-making in grassroots rural communities. Because of this, peasants in those areas were generally more prepared to join collective enterprises. Though this tradition faced increasing pressure from the strengthening of top-down bureaucratic command after the victory of the revolution, it still to some extent maintained its momentum in the 1950s before the Great Leap Forward.

For example, in Changzhi in southeast Shanxi province, which had been part of the Taihang base area during the Sino-Japanese War, a collection of well-managed co-ops, called *shige laoshe* ("ten old co-ops"), had emerged as early as 1951, even before the Chinese Communist Party Central officially pushed nationwide cooperativization. Chuandi village (now Sanliwan village) provides fruitful information on the dynamic of spontaneous cooperativazation. The elementary co-op of Chuandi was established in 1951, led by a poor peasant, Guo Yu'en. Cooperativization in Chuandi significantly improved local agricultural production mainly for two reasons. First, a series of effective managerial rules was laid out—including *baogong baochan* (contract for fixed labor input and fixed output), *chaojiang jianpei* (reward for exceeding and penalty for failing to meet contract quotas), *nonghuo ding'e* (quantify the farming tasks), and *pinggong jifen* (appraise the work by counting labor input recorded as workpoints)—in order to link remuneration closely to labor input. When managing the co-op, Guo Yu'en differentiated the local farming activities into 11 categories and 92 kinds of work quotas in 1953 and into an even more fine-grained system in 1955 (Zhang and Wu, 1989: 53–55). In this institutional framework, the co-op members would be sufficiently motivated to increase labor input, and it would be possible for the co-op to organize a

large-scale labor force to carry out projects that had been previously impossible, especially land improvement and irrigation systems. A document from the village archive records that in the old days the "bad land" and "good land" in Chuandi used to be unevenly fertilized. After the establishment of the co-op, a group of co-op members were organized to apply more fertilizer to those plots of bad land, thus increasing their yields ("Pingshunxian Chuandixiang dangqian shengchan qingkuang huibao," 1957). As for irrigation, the co-op applied 770 work days in 1952 and built two dikes and two canals, thereby enabling 130 mu of land to be newly irrigated (Zhang and Wu, 1989: 53–55). The evidence shows that in well-managed co-ops it was possible to further improve productivity beyond what the mutual-aid teams had achieved.

To sum up, it would be reasonable to conclude that the institutional changes before the Great Leap Forward had produced heterogeneous effects in the countryside. On the one hand, there was measurable relief from the input mismatches caused by inequality in land and capital distribution before the revolution; yet on the other hand, there was also productivity and efficiency loss brought about by the regional radicalness of cooperativization. The modest but substantial growth in the agricultural sector as shown in macro statistics suggests that the latter was still in a controllable range before 1958.

Mistaking Limited Improvement for Fundamental Progress of Productive Forces

Agricultural growth from 1949 to 1957 remained within the scope and limitations of the traditional peasant economy; it was not the result of any fundamental progress in the productive forces. Neither the enhanced production of poor peasants through Land Reform, the mitigation of input mismatches through the Mutual Aid Movement, nor the improvement of input use on a larger scale through the well-managed co-ops signified a substantial modernization of agriculture. China's rural economy in the 1950s did not break through any of the three basic constraints on traditional agriculture—lack of the modern inputs crucial for yield growth, scarcity of farmland, and lack of ample nonfarm employment to absorb surplus labor. The first constraint was not to be relieved until the increase in the supply of chemical fertilizer in the 1960s and 1970s, and the second and the third not until the two waves of growth in nonfarm employment—in the first, peasants leaving the land but not the village (*litu bu lixiang*), and in the second, peasants leaving both the land and the village (*litu lixiang*)—in the 1980s and 1990s.

However, policymakers in the 1950s mistook the modest agricultural growth generated by institutional changes for fundamental development of the rural productive forces. They thought that the traditional peasant economy could be transformed into a modernized one purely by the reconfiguring of the relations of production. Mao Zedong was especially supportive of this idea. He simplified the subtle interactions between productive forces and production relations into the judgment that a change in production relations pure and simple could quickly

transform productive forces in a short period. In his understanding, the history of capitalism had in fact provided such an example; he believed that even before the steam engine was invented, the capitalist economy had already been substantially transformed by the expansion of handicraft workshops using hired labor, thereby replacing the system of family production. Thus, Chinese agriculture could also go through such a stage even before modern technologies became available (Du, 2005: 32). Mao's misunderstanding of history came from two neglected facts. First was the essential difference between handicraft production and agriculture; the former could benefit from the increasing return to scale generated by the division of labor while the latter's ability to do so was constrained by the natural limits to land productivity. Second was that capitalism could not surpass all traditional economies without finally transforming from an organic economy to a fossil fuel-based economy. As E. A. Wrigley has analyzed, even the rather advanced Netherlands capitalism of the 17th century could not have escaped from the Ricardian trap (in which the decreasing marginal returns to factors applied on a fixed amount of land would finally pull all sectors' profits toward zero) if it had not evolved further into the stage of using fossil fuel energy. The only way to escape from this trap was to follow the path of England, which successfully transformed its advanced capitalist organic economy into an even more advanced coal-based economy, thus substantially relieving the pressure on the fixed supply of land (Wrigley, 2000: 23). In a word, the interrelationship between productive forces and production relations was not as simple as Mao imagined; nonetheless, his simplified view deeply shaped the strategy for agricultural development in the 1950s.

Cooperativization finally radicalized into the experiment of the Great Leap Forward. Different from the previous phases of institutional change marked by Land Reform, the Mutual Aid Movement, and the elementary or even advanced co-ops, the Great Leap Forward had a negative impact on the countryside, for the two factors accounting for agricultural growth between 1949 and 1957—the increase in traditional farm inputs and the improvement of input allocation at the micro level—were both destroyed. First, with the overwhelming emphasis on the steel and iron industry at the beginning of the Great Leap Forward, a large amount of labor was withdrawn from rural areas to support steel-making and other heavy industries in the city, which led to a significant decrease in labor input in agriculture. In 1958, the total number of employees in China's industrial and building sectors doubled to 19 million, with 10 million being recruited from the countryside. In addition, the development of rural industry also appropriated a large amount of labor from farming. By the end of 1958, labor input in agriculture had been reduced by 20 percent (38.18 million people) compared with 1957. Though the policy was subsequently adjusted over the next few years, agricultural labor input had not recovered to its 1957 level even by 1960 (Wang, 1994: 78). Second was the unrealistic enlargement of the scale of co-ops, out of the belief that larger scales would necessarily lead to higher yields. But the result ran exactly counter to this expectation—overly large co-ops could not generate sufficient

work incentives and easily fell into management chaos, which in turn led to overwhelming productivity loss throughout the country. As a result, the gross value of agricultural output dropped from 55 billion yuan in 1958 to 47.5 billion yuan in 1959 and further to 40.5 billion yuan in 1960. The recovery from this decline was slow; not until 1964 did the gross value—54.53 billion yuan—reach the 1958 level (Nongmuyuyebu jihuasi, 1983: 58, in 1957 constant prices).

The Adjustment of the Industrialization Strategy and Agricultural Development in the 1960s–1970s

After recovering from the chaos of the Great Leap Forward, a new stage for agricultural development was initiated, marked by the stability of the basic rural management system and the substantial increase in modern farm inputs provided by the expanding agriculture-supportive industries. This stage lasted roughly for fifteen years from 1963 to 1978, only to be interrupted by the Rural Reform and its establishment of the household responsibility system in 1979–1984.

The Stabilization of the Basic Rural Management System

Throughout the 1950s China's basic rural management system underwent constant change. After the twists and turns of the Great Leap Forward, the decision-makers' consideration of the basic management system in rural areas fundamentally changed. They now pursued a stabilized institutional framework rather than endless radical experiments. This new inclination was embodied in the consolidation of the three-tiered commune-brigade-team system. The spatial size of a people's commune was set to be commensurate with the traditional jurisdiction of a township, and the production brigade with that of an advanced co-op. Under each brigade several production teams were set up as the basic unit "directly managing agricultural production and collective welfare." The arrangements of this system were laid out in detail in the draft and amended draft of the "Regulations on the Work of Rural People's Communes," issued in March and June respectively in 1961 (Huang Daoxia et al., 1992: 632, 640).

In 1961, although the production team was understood to be the basic unit managing agricultural production, the accounting unit was still the production brigade. In February 1962, this inconsistency was fixed, and the accounting function was delegated down to the production team. In the policymakers' view, this would first "make the production team have full command of both the production procedures and output distribution and eliminate the naïve egalitarianism that has been suppressing the enthusiasm of the production team since the establishment of advanced co-ops," and second "give enough autonomy to the production team to change the past situation of inconsistency between production plan and implementation." They thought that this arrangement was also "in accordance with the current level of consciousness of the peasants; since the production team is small

in size, consisting of several tens of families, and serves as the basic accounting unit, the team members can clearly see the fruits of their labor and their own stake in the collective enterprise." Moreover, because of the small scale of the production team, "the team members could easily take part in team management and supervise cadres." The policymakers also clearly stated that "the size of the production team should be fixed at about 20 to 30 families" (Huang Daoxia et al., 1992: 677).

The purpose of this readjustment and stabilization of rural institutions was to seek the best configuration of basic management units at the micro level, under the premise of not retreating to family farming. The stabilized basic unit—the production team—was roughly equal in size to the elementary co-op during the initial stage of collectivization from 1953 to 1955. The elementary co-ops in 1955 had an average of 26.7 peasant families and 464.7 mu of arable land. Production teams in 1962 had an average of 24 families and 276.7 mu of arable land. From then until 1979, the average size of the production team did not exceed 35 families and 350 mu of arable land (Huang Daoxia et al., 1992: 1377).

The size of specific production teams did of course differ from the national average. The local archives that we found in Sanliwan village in Pingshun county in southeast Shanxi province document that the size of the Chuandi (the village's former name) brigade fluctuated between 90–127 families and 559–589 mu of arable land ("Chuandi dadui zhunian qingkuang biao," 1974; "Guo Zhongqin ziliao biji," n.d.). The brigade was divided into six production teams, each with 15–20 families and 93 to 98 mu of arable land, smaller than the national average. Compared with the agricultural management bodies of today, the production teams of the Chuandi brigade had roughly the same amount of arable land as a contemporary middle-scale "family farm" (*jiating nongchang*). The above-mentioned national average of about 270–350 mu of arable land per production team was roughly equal to a contemporary small-scale "big household of grain cropping" (*zhongliang dahu*) or a large-scale "family farm." In contrast to the average of 1,071 mu for the advanced co-ops, the size of the production teams of the 1960s and 1970s was in a reasonable range.

Economists often indiscriminately characterize all rural areas in all years of the pre-Reform era as suffering from low efficiency and insufficient incentives. These problems no doubt did exist in some production teams, but it is also possible that that was not the case for many other teams. In those production teams with clear boundaries for the wielding of power, the membership, and the collective assets, which usually happened when the jurisdictions of the production teams were coincident with their historically formed kinship-geographical communities, solid social relations enabled effective group decisions and actions. It is not difficult to imagine that this system would at least keep agricultural production in a sound state and not lead to catastrophes of the sort generated by the most radical institutional experiments in rural management, such as the Great Leap Forward. That the

gross output of Chinese agriculture never dropped except for during the Great Leap Forward is the best confirmation of this point.

Li Huaiyin and his coauthors have recently demonstrated the diversity of pre-Reform agriculture in their collection of detailed oral-historical data from 131 villages in 16 provinces. They found both regions with vigorous economic development (some of which were even considering upgrading the accounting unit to the brigade level to accommodate this development), as well as regions with agricultural stagnation. They call for a more comprehensive view in assessing pre-Reform agriculture, one that takes into account both institutional factors and non-institutional ones such as the rural traditions and natural endowments of different areas. Most valuably, their work challenges the a priori assumption of mainstream economists that collective production is synonymous with low efficiency and the lack of incentives. Under the appropriate conditions—including production teams of relatively small size as the basic unit of account for labor management and output distribution, a piece-work system for labor remuneration, an increased proportion of workpoint grain (*gongfen liang*) in the total grain distributed, and an overlap between the collectives and the traditional rural communities—collective economies could also provide sufficient work incentives (Li et al., 2016).

Based on the new rural management system established in 1962, another strategy for agricultural development was initiated—the enhancement of support for agriculture from heavy industry. The next two decades were to see an intensifying injection of modern farm inputs into agricultural production.

The Adjustment of the Development Strategy of Heavy Industry and the Growth of Modern Farm Inputs in Agriculture

As mentioned earlier, during the First Five-Year Plan of 1953–1957, China's industrial development strategy was to prioritize heavy industry, and only a small part of that heavy industry was supportive of agriculture. During the Great Leap Forward, the priority for heavy industry remained the same, and the decision-makers even drew a large amount of resources from the agricultural sector to support it, especially the steel industry, for they believed that agricultural development had already been accomplished through collectivization. After the setback of the Great Leap Forward, agriculture was accorded priority, and it was particularly emphasized that heavy industry should support agriculture.

This new policy line was clearly laid out in a December 1964 government work report: "The plan for the development of the national economy shall be arranged in accordance with the order of agriculture, light industry, and heavy industry." In stressing industrial support for agriculture, the report stated: "Heavy industry shall first of all provide more and more machinery, chemical fertilizer, pesticide, fuel, electricity, irrigation equipment, and building materials." In reflecting on the lessons of the Great Leap Forward, the report suggested that "the scale and pace of industrialization shall be in accordance with the amount of

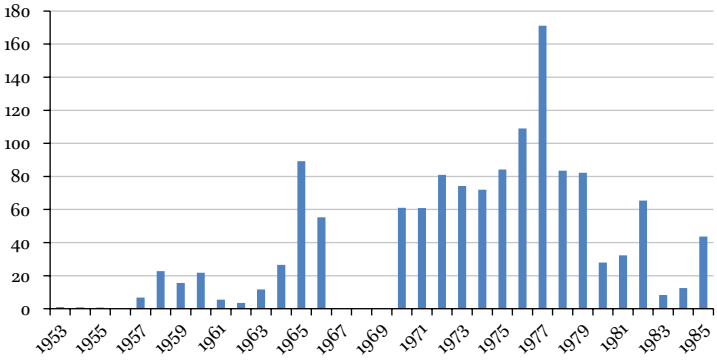
marketable grains and raw materials that agriculture can provide" (Quanguo renda, 2008: 525).

This new development strategy resulted in a change in the configuration of the industrial sectors. During the First Five-Year Plan, investment in industries supportive of agricultural development accounted for only 2.9 percent of total industrial investment. In the Great Leap Forward, this figure rose to 5 percent because of the support for small-scale industries in the countryside. Between 1963 and 1965, the proportion jumped to 9 percent and stayed roughly at that level until 1980 (Gudingzichan tongjisi, 1987: 103). The sectors of critical importance for agriculture included the chemical fertilizer industry, the chemical pesticide industry, and the farm machinery manufacturing and repair industry. Among the three industries, the chemical fertilizer industry was the most important for its direct linkage to the improvement of crop yields.

The preference for heavy industry that could support agricultural development resulted in a growth spurt in the chemical fertilizer industry in the 1960s–1970s. This is clearly shown in the data on the annual increase in new production capacity for chemical fertilizer, as given in Figure 1. Except for the years of the Great Leap Forward, there was virtually no annual increase in new production capacity in the 1950s. This situation changed from the mid-1960s, and the annual increase stayed at a relatively high level. In 1977, it reached a historic high of 1.712 million tons (Gudingzichan tongjisi, 1987: 137).

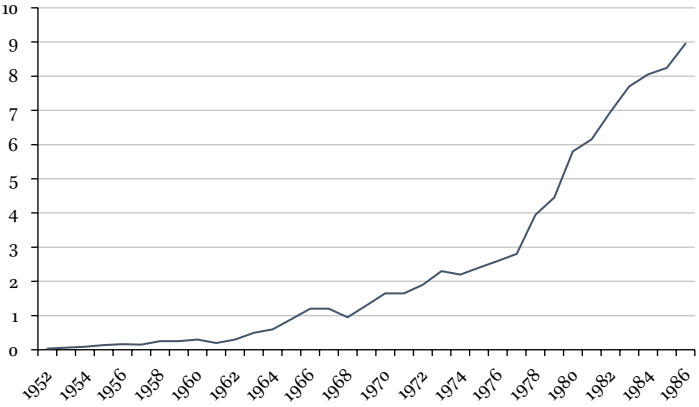
The growth of the chemical fertilizer industry in the 1960s–1970s brought about a significant increase in chemical fertilizer input in farming. Figure 2 shows that the increase in chemical fertilizer use per mu (by nutrient value) grew substantially from 1961 on, except for a short period of fluctuation between 1966 and 1968. Beginning in the early 1970s, chemical fertilizer use grew at an even faster pace, especially in the years 1977–1986 (Zhonghua renmin gongheguo, 1989: 340–41).

Figure 1. Incremental production capacity of chemical fertilizer (in 10,000 tons), 1953–1985.



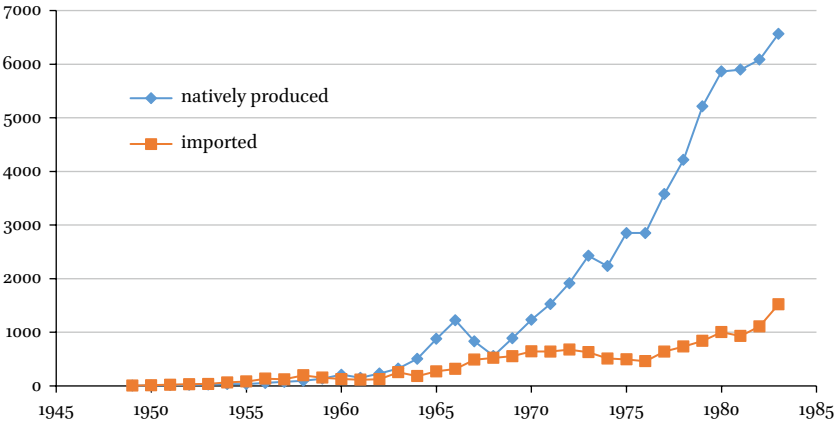
Source: Gudingzichan tongjisi, 1987: 137. No data given for 1967–1969.

Figure 2. Chemical fertilizer used per cultivated mu (kilograms by nutrient value), 1952–1986.



Source: Zhonghua renmin gongheguo, 1989: 340–41.

Figure 3. Domestically produced vs. imported chemical fertilizer (in 10 thousand tons), 1949–1983.

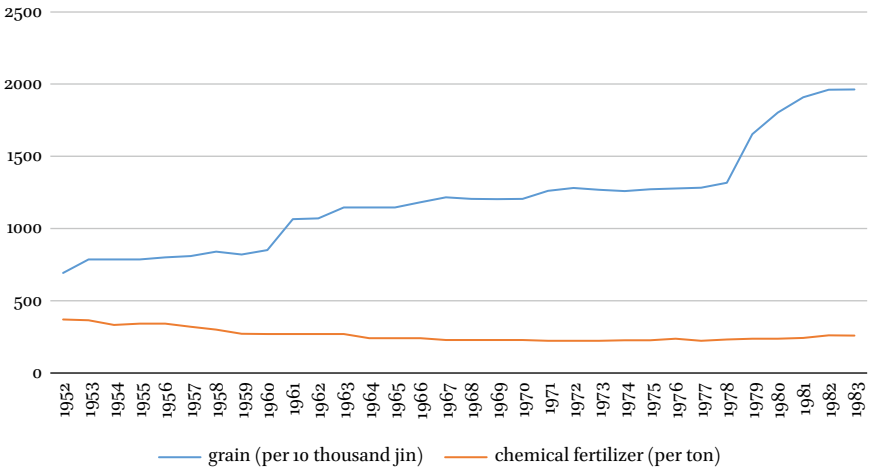


Source: Nongyebu jihuasi, 1989: 324–25.

This meant that the intense investment in the production capacity of the chemical fertilizer industry had finally begun to pay off. Moreover, the increased chemical fertilizer mainly came from domestic industry rather than from imports. Figure 3 provides a comparison of the amounts of imported and domestically produced chemical fertilizer and shows that the latter dominated from the early 1970s on (Zhonghua renmin gongheguo, 1989: 324–25).

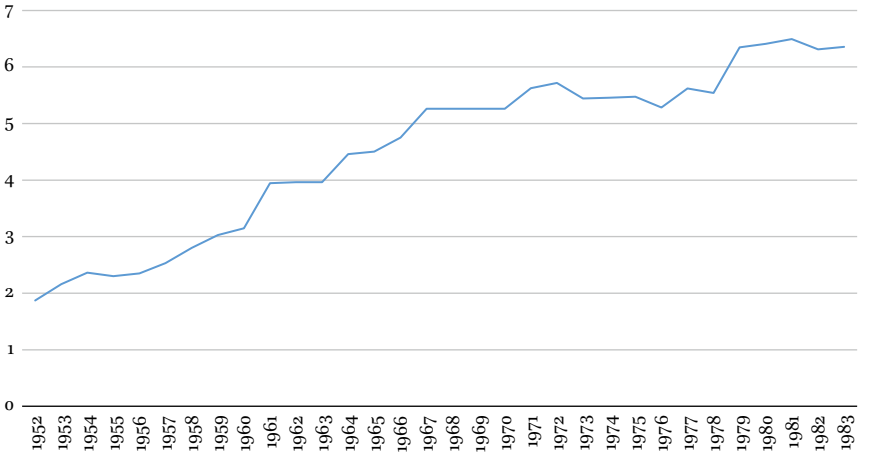
Notably, the increase in chemical fertilizer use was not based on a higher "exploitation" of the peasants through the so-called "price scissors," as can be seen

Figure 4. Purchase price of grains and retail price of chemical fertilizer (yuan) 1952–1983.



Source: Maoyi wujia tongjisi, 1984: 450, 451.

Figure 5. Amount of chemical fertilizer that could be purchased by selling 10,000 jin of grain (in tons), 1952–1983.



Source: Calculated according to data used in Figure 4.

by analyzing the price time series of grain and chemical fertilizer. Figure 4 depicts the purchase price per 10 thousand jin (5 thousand kilograms) of grain versus the retail price per ton of chemical fertilizer from 1952 to 1983, and clearly shows that the price of grain was increasing while that of chemical fertilizer was decreasing (Maoyi wujia tongjisi, 1984: 450, 451). This trend is even more evident in Figure 5,

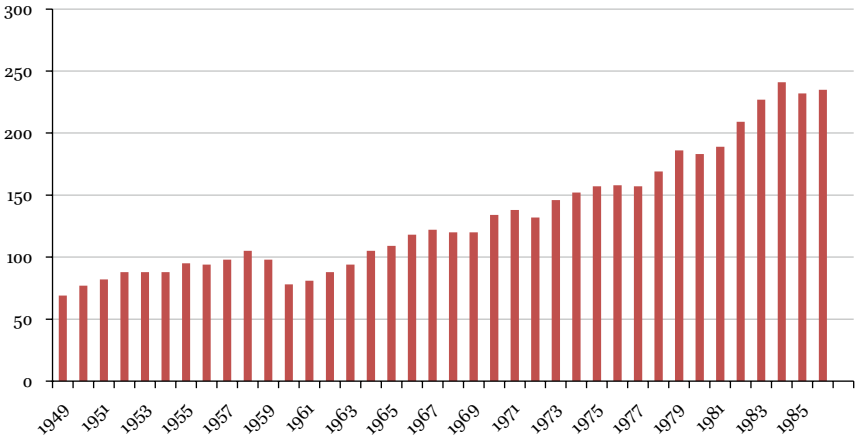
Figure 6. Purchase price index of agricultural products vs. retail price index of industrial products sold in the countryside (according to the 1930–1936 constant prices), 1951–1983.

Source: Maoyi wujia tongjisi, 1984: 427.

which shows the amount of chemical fertilizer that could be purchased by selling 10 thousand jin of grain; the top-right rising curve indicates that chemical fertilizer was getting cheaper compared to grain. Similar changes happened to the prices of other agricultural products. Figure 6 shows that the purchase price of agricultural and sideline (*fuye*) products was increasing from 1951 to 1983, while the retail price of industrial products was stable except for a short period of increase during the Great Leap Forward (Maoyi wujia tongjisi, 1984: 427).

It was thus the increase in modern farm inputs, especially the chemical fertilizer so important for agricultural growth in land-scarce countries, that substantially changed China's agriculture in the 1960s–1970s, compared with the 1950s. On this point, a key indicator is grain yield per unit of cultivated land, the 1949 to 1986 time series for which is given in Figure 7. Clearly, between 1952 and 1957, when cooperativization/collectivization was so highly expected to bring about agricultural growth, the annual average increase in grain yield per mu of cultivated land was only 2.3 percent. Between 1963 and 1978, what we call the second stage of pre-Reform agricultural development, the annual average increase reached a much higher 5.3 percent. The highest record of grain yield per mu in the 1950s was just about 100 kilograms, while it increased by over 50 percent to 150 kilograms in the 1970s (Zhonghua renmin gongheguo, 1989: 146–48). This achievement came

Figure 7. Grain yields per cultivated mu (in kilograms), 1949–1986.



Source: Zhonghua renmin gongheguo, 1989: 146–48.

from the readjustment of industrial priorities and the enhancement of modern farm inputs provided by heavy industry.

Moreover, input modernization continued into the Rural Reform era of 1979–1984. Mainstream economists usually characterize this era as a sharp break or "rupture" from the earlier period, based on the fact that during these six years the old three-tiered commune-brigade-team structure was replaced by the new household responsibility system. Needless to say, their criterion for rupture is whether or not institutional change took place. However, in our view, though of course institutional change did occur, the legacies of the pre-Reform agricultural development, especially the intensified injection of modern farm inputs, were still of paramount significance. Without the modernization of farming inputs that had been initiated in the pre-Reform years, simply switching the basic management unit from production team to peasant family would not have been enough to "transform the traditional agriculture." The idea that institutional change pure and simple was sufficient to bring about an economic revolution in the countryside had already been proven false by the lessons of the 1950s.

Though emphasizing institutional change as the single most important factor behind the 1979–1984 agricultural growth, mainstream economists do not deny that modern inputs also helped in this process. In his well-known article "Rural Reforms and Agricultural Growth in China," even Justin Yifu Lin acknowledges that farm inputs could explain 45.79 percent of the yield growth in 1979–1984 and chemical fertilizer alone 32.2 percent, although he emphasizes much more the role of institutional change from production teams to peasant households, which, he argues, accounted for 46.89 percent of the growth (Lin, 1992: Table 6).

In the vast literature that attempts to empirically estimate the extent to which institutional change explains the rural growth of 1979–1984, economists diverge dramatically in their arguments. The estimates range from a low of 19.5 percent to a high of 62 percent, according to Zhang and Carter's review of the literature (1997). Different econometric models, as well as different variables used to indicate agricultural output, have given rise to this wide variation in final estimates. To fully discuss the origins of the differences and to assess which results are more plausible, we would have to digress into the philosophy of social science and the methodology of econometrics, which would take us too far from our main topic. Here we just point out that the scholars who doubt the foremost role of institutional change usually highlight the effect of modern technology. For example, Huang and Rozelle (1996) argue that the use of hybrid rice was more crucial in explaining the agricultural growth between 1979 and 1984 than the implementation of the household responsibility system.

Conclusion

We differentiate the pre-Reform agricultural development into two stages. The first stage (the 1950s) saw a series of dramatic institutional changes, but scarce modern farm inputs provided by industry. Agriculture was modestly improved within the scope of the traditional peasant economy, mainly because of increased use of traditional farm inputs and greater efficiency in resource allocation brought about by institutional changes such as Land Reform, the Mutual Aid Movement, and cooperativization. In sharp contrast, the second stage saw a stabilized institutional framework and an increasing injection of modern inputs, especially chemical fertilizer, into agriculture from industry. The industrial sectors that could support agricultural modernization were given greater preference. The second stage of pre-Reform agricultural development thus laid a completely different material basis for the rural economy in 1979–1984, when the household responsibility system was implemented. Without this preparation, the high-speed agricultural growth in 1979–1984 would not have been possible, for the insufficiency of solely institutional change to initiate a rural economic revolution had already been demonstrated by the experiments in the 1950s.

Examining the history of agrarian change and industrialization from the 1950s to 1970s can help us to reflect on the interrelationship between two dimensions of an economic system: institutions and sectorial configuration. In Marxian terms, the first belongs to the "superstructure" and the second to the "material basis" of an economy. In the tradition of classical political economy, the two are intertwined and interactive. For example, Marx's discussion of the characteristics of the two major economic "departments" (to use his term) that produce the means of production and consumption goods was closely related with his analysis of capitalist institutions and production relations. In contrast, the relationship between institutions and sectorial configuration has become to some degree a neglected field in

neoclassical economics. We hope our study, though focusing on China's experience, can provide some insight on this topic.

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