Agricultural Development and Reform in China*

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Abstract

The paper provides an analytical overview of China's agricultural development after the socialist takeover in 1949. It first discusses the relationship between the heavy industry oriented development strategy and China's three most important agricultural institutions-- the collective farming system, monopolized procurement and marketing policy, and grain self-sufficiency policy. These institutions were detrimental to work incentives. Agriculture and grain production in China barely kept up with population growth before the recent reforms. The individual household-based farming system reform in 1979 greatly improved peasant's incentives. Grain production and the agricultural sector as a whole registered unprecedented growth between 1978 and 1984. The impact on agricultural productivity from the farming institutional reform, however, was mainly once-and-for-all. Further development of Chinese agriculture, especially, the grain production depends on the liberalization of domestic procurement and marketing system. China is a land-scarce economy and grain is a land-intensive crop. China should also reconsider its grain self-sufficiency policy and allow international trade to play a larger role.

I. Introduction

China's ability to feed her large population with a very limited availability of cultivated land has been highly claimed. When the People's Republic of China was founded in 1949, cultivated land per capita was only 0.18 hectare. Due to rapid population growth, per capita cultivated land dropped to 0.1 hectare in 1978. The government, nevertheless, was able to keep grain production ahead of population growth. The economy also experienced a dramatic transformation. The share of agricultural sector in total national income dropped from 57.72 percent in 1952 to 32.76 percent in 1978, while the industrial sector expanded from 19.52 percent to 46.8 percent in the same period (see table 1). The institutions that the Chinese government adopted to cope with the increasing food demand from rapid population growth and to obtain the necessary accumulation for the industrial expansion was a collective farming system in agriculture, a state monopolized procurement and marketing system of grain, cotton, and other major farm product, and a grain self-sufficiency policy. This Chinese

strategy was often considered as a development model for densely-populated Third World countries (Robinson 1964).

Really remarkable achievements in Chinese agriculture, nevertheless, did not occur until the beginning of recent agricultural reform in 1979. Between 1952--the year that Chirese economy recovered from 12 years of war
destruction--and 1978, the growth rate in grain production was 2.4 percent per year, which was only 0.4 percent above the population growth rate in the same period. Per capita availability of grain, therefore, increased only 10 percent over a quarter of centur. The growth rates of other farm products were not much higher than the population growth rate either (see table 2). Frustrated by the failure to raise living standards substantially after 30 years of socialist revolution, the moderate veteran leaders, who were purged during the "Cultural Revolution" and came into power again after the death of Chairman Mao Zedong in 1976, initiated in 1979 a series of sweeping reforms in agriculture. The most important reform was the emergence and eventual predominance of t.. household responsibility system, which by 1984 had completely restored the primacy of the individual household in place of the collective team system as the basic unit of production and management in rural China. While the population grew at 1.4 percent per year between 1978 and 1984, the net value of agricultural product and grain output respectively grew at 7.73 percent and 4.95 percent annually in the same period. Other agricultural products also grew at an accelerated rate in the reform period (see Table 2). The success of agricultural reform, especially the success of the household responsibility system, greatly encouraged the moderate political leaders. As a result, a series of more market-oriented reforms were undertaken at the end of 1984 in both the urban and rural sectors, including the eventual elimination of the monopolized procurement and rationing system in the 1993. It is fair to say that the rural reform was the driving force for the market-oriented reform in China.

Agriculture as a whole still grew at a respectable average rate of 5.8 percent per year in 1984-95. Grain production, however, stagnated after reaching a peak of 407 million tons in 1984 and did not recover to that level until 1989 and in 1995 per capita grain output was a 1.3 percent lower than the level in 1984. Population in China is expected to rise continuously until 2030 and per capita income is expected to increase rapidly simultaneously. Therefore, the demand for grain is expected to rise substantially. The slow growth in grain output has aroused a worldwide concern about the question of whether China will be able to feed herself in the future. Such suspicion seems to be supported by the severe grain price

spikes in 1993-95 and a large increase of grain import in 1995.

In this paper, I provide an analytical overview of China's experience of agricultural development and reforms. The relationship between China's development strategy and the choices of farming institution, domestic grain policy and international grain trade policy before the reforms are investigated in Section II. Section III investigates the farming institutional reform and its achievements. Section IV discusses the major changes in grain policy and China's grain future. Section V explores the desirable changes and reform in the grain trade policy. Some lessons from China's agricultural development and reforms are drawn in Section VI.

II. Development Strategy and Agricultural Policies

The farming institution, domestic grain policy, and international grain trade policy in China prior to the 1979 reform were all shaped by the development strategy that the Chinese government adopted in the early 1950s.

At the founding of the People's Republic of China in 1949, the Chinese government inherited a war-torn economy in which 89.4 percent of the population resided in rural areas and industry only consisted of 12.6 percent of national income. A large share of heavy industry in the national economy was a major feature of a developed country's economic structure at that time. In order to strengthen China's national power, the government adopted in 1952 a Stalinist heavy-industry-oriented development strategy, as the economy was recovering from war time destruction. The goal was to build
as rapidly as possible the country's capacity to produce capital goods and military materials.

China was an underdeveloped agrarian economy at that time. Capital was extremely scarce and the voluntary saving rate was far too low to finance a high rate of investment in heavy industry sought by the development strategy. To facilitate rapid capital expansion, a policy of low wages for industrial workers evolved alongside the heavy-industry-oriented development strategy. The assumption was that through low wages, the state-owned enterprises would be able to create large profits and to reinvest the profits for infrastructure and capital construction. The practice of establishing low prices for energy, transportation, and other raw materials,

such as cotton, was instituted for the same reason.

To implement low wages, the government was required to provide urban dwellers with inexpensive food and other necessities, including housing, medical care, and clothing. A restrictive food rationing system in urban area was instituted in 1953 which had been kept in effect until 1992. Meanwhile, in order to secure the food supply for rationing, a compulsory low-price grain procurement policy was imposed in rural areas in 1953. Moreover, since the industrial strategy would not permit the use of large amounts of scarce foreign reserves to import food for urban consumption and also for the reason of food security, the government adopted a grain self-sufficiency policy.

The industrial development strategy also resulted in a great demand for agricultural products. First, the urban population increased dramatically from 57.65 million in 1949, to 71.63 million in 1952, and to 99.49 million in 1957. Since the government adopted a grain self-sufficiency policy, China's ability to satisfy the increasing food demand in urban areas hinged on the growth of domestic grain production. Second, since the bulk of China's exports consisted of agricultural products, the country's capacity to import capital goods for industrialization depended on agriculture's growth. Third, agriculture was the main source of raw materials for many industries, such as textile and food-processing. Agriculture, therefore, was clearly viewed as the bottleneck and major point of intervention in pursuing the overall economic development strategy in China in early 1950s.

Under this conditions, agricultural stagnation and poor harvests would not only affect food supply but also have an immediate and direct adverse impact on industrial expansion. As the government was reluctant to divert resources from industry to agriculture, the government adopted a new agricultural development strategy that would foster the development of agriculture without competing with industry for resources. The core of this strategy involved mass mobilization of rural labor to work on labor-intensive investment projects, such as irrigation, flood control, and land reclamation, and to raise unit yields in agriculture through traditional methods and inputs, such as closer planting, more careful weeding, and the use of more organic fertilizer. Collectivization of agriculture was the institution that the government believed would perform these functions. Collectivization also was viewed as a convenient vehicle for effecting the procurement of grain and other agricultural products to carry out industrial development strategy.

The independent family farm was the traditional farming institution in rural China for thousands of year prior to the founding of the People's Republic. The typical farm not only was small, but also fragmented. In the wake of socialist revolution, nearly half of the cultivated land in rural China was owned by landlords who rented land out to peasant families. Rent was often as high as 50 percent of the value of the main crops. A land reform program was implemented in areas under the Communist Party's control starting in 1940s. Under this program, land was confiscated without compensation from the landlord and distributed to the tenants. The land reform program continued after the success of revolution and was completed in 1952. However, after adopting the heavy-industry-oriented development strategy in the first five-year plan in 1953, the government switched to the promotion of agricultural collectivization.

The official approach to collectivization, initially, was cautious and gradual. Peasants were encouraged and induced to join small agricultural collectives on a voluntary basis. Collectivization was surprisingly successful in the initial stage. It encountered no active resistance from the peasantry and was carried out relatively smoothly. This experience greatly encouraged the leadership within the Party and led them to take a bolder approach. The main rationale of collectivization was rooted in the notion that mobilizing rural surplus labor would increase rural capital formation and, hence, increase production. However, a small collective farm did not solve the problem of mobilizing labor for large-scale projects, such as digging irrigation canals, building dams, or the like. In this way, the "People's Commune" came into existence in the fall of 1958. The average size of a commune was about 5,000 households with 10,000 laborers and 10,000 acres of cultivated land. However, the communal movement ended up with a severe agricultural crisis in 1959-1961. The newly available data indicates that thirty million people were estimated to have died of starvation and malnutrition during this crisis (Lin 1990).

Communes were not abolished after the great crisis. However, starting in 1962, agricultural operation was divided and management was delegated to a much smaller unit, the "production team," which consisted of about 20-30 neighboring households. In this new system, land was owned collectively. Each worker's income depended on its contribution of labor input to the team's production.

Furthermore, a more realistic approach towards agricultural development was adopted after the 1959-1961 crisis. Greater emphasis was given to modern inputs. Irrigated acreage increased gradually after 1962. Rather than

the construction of labor-intensive canals and dams, additional acreage mostly resulted from increasing powered irrigation, which did not depend so much on the mass mobilization of labor force. The utilization of chemical fertilizer was accelerated after 1962, accompanied by the promotion of high-yield fertilizer-responsive modern varieties. Dwarf varieties of rice and wheat were introduced in early 1960s. By the end of 1970s, about 80 percent of the traditional varieties of rice and wheat had been replaced by the modern dwarf varieties. After 1976, dwarf varieties of rice were replaced by higher-yielding hybrid rice. So far China is the only countries that hybrid rice is commercially produced. Modern varieties of corn, cotton, and other crops were also introduced and promoted in the 1960s and 1970s. The pace of mechanization also accelerated after 1965, especially during the 1970s.

Despite dramatic increases in modern inputs in the 1960s and 1970s, the performance of agriculture continues to be poor. The discouraging picture of Chinese agriculture came to an end in 1978 when China started a series of fundamental reforms in rural sector. Output growth accelerated to a rate several times the long-term average in the previous period (see Table II). The dramatic output growth was a result of a package of reforms that gave priority to the roles of individual incentives and reduced the functions of government interventions.

III. The Household Responsibility System Reform

The main defect of the production team as an institution for agricultural development is its incentive structure. Team members, working under the supervision of a team leader, were accredited with work points for the jobs they performed. At the end of a year net team income was distributed according to the work points that each member accumulated during the year. Work points were supposed to reflect the quality and quantity of effort that each member contributed to the team's work. The work point system is not inherently an inefficient incentive scheme: if the monitoring of each peasant's work is perfect and complete, the incentives to work will be strong rather than weak. The return to a peasant's additional increment of effort has two components: a share of the increase in team output and a larger share of the total net team income, as now he contributes a larger share of total effort and thus obtains a larger share of work points. The sum of these two components is likely to make a worker to exert him- or herself beyond the point at which what he or she adds to the value of output equals his or her valuation of the foregone leisure. On the other hand, if the monitoring of work effort does not exist, a peasant is not likely to

obtain additional work points for his additional contribution of effort. In this case, the return to his increase in effort has only a single component, namely, a share of the increase in team output. The incentives to work then would be insufficient. The extend to which a work point share is increased for an additional unit of effort depends on the degree of monitoring. Incentives to work in a production team are positively correlated with the degree of monitoring in the production process. The higher the degree of monitoring, the higher the incentives to work, and thus the more effort contributed.

However, monitoring is costly. The management of the production team has to balance the gain in productivity due to an increase in incentives and the rise in the cost of monitoring. The monitoring of agricultural operations is particularly difficult because of agricultural production's sequential nature and spatial dimension. In agricultural production, the process typically spans several months over several acres of land. Farming also requires peasants to shift from one job to another throughout the production season. In general, the quality of work provided by a peasant does not become apparent until harvest time. Furthermore, it is impossible to determine each individual's contribution by simply observing the outputs because of the random effects of nature on production. It is thus very costly to provide close monitoring of a peasant's effort in agricultural production. Consequently, the optimum degree of monitoring, even under the best circumstances, has to be very low. The incremental income for each additional unit of effort will be only a small fraction of the marginal product of effort. Therefore, the incentives to work for peasants in a production team are also likely to be low (Lin 1988).

The commune, brigade, and production team system of agricultural production management, with its work point system of compensation, has been challenged ever since its establishment. After the disaster of the Great Leap Forward, land was reallocated to individual families, and households were restored as the units of production in many parts of China, especially in Anhui Province. Production soon recovered in these areas. Nevertheless, this practice was prohibited and criticized as capitalistic, and those people responsible were punished. Although the reallocation of land to individual households, secretly or sometimes openly, was never totally eliminated in some areas, real change was not possible until 1978, when moderate leaders came into power again after the chaos of the Cultural Revolution and the death of Chairman Mao.

At the end of 1978, the government proposed a sweeping change in rural

policies. In place of a lopsided stress on grain production, the new policy encouraged the development of a diversified economy. Better prices were set for the state's purchase of farm produce. Production teams were granted more freedom in making decisions about their own affairs. Private plots and the country fairs in which farm people sold their surplus products were revived and expanded. It had been recognized at that time that solving the managerial problems of agriculture within the production team system was the key to improving work incentives, yet the household-based farming system reform was considered the reverse of the socialist principle of collective farming and, therefore, was prohibited. The official position at that time maintained that the production team was to remain the basic unit of production, income distribution, and accounting. Nevertheless, a small number of production teams, first secretly and later with the blessing of local authorities, began to experiment with a system of contracting land, other resources, and output quotas to individual households toward the end of 1978. A year later, these teams brought in yields far larger than those of other teams. The central authorities later conceded the existence of these practices and named it "the household responsibility system." However, the authorities required that this practice be restricted to poor agricultural regions, such as hilly, mountainous areas, and to poorly functioning teams in which people had lost confidence in the collective. In practice, this restriction could not be put into effect at all. Rich regions welcomed the household responsibility system as enthusiastically as poor regions. Full official recognition of the household responsibility system as universally acceptable eventually was given in late 1981. By the end of 1983, almost all the households in China's rural areas had adopted this new system. Under the arrangement of the household responsibility system, land is contracted to individual households for a period of fifteen years. After fulfilling the procurement quota obligations farmers are then entitled to sell their surplus on the markets or else retain it for their own uses.

The government's current position on farming institution is to maintain the stability of the household responsibility system. The government adopted a new policy in 1993, which allowed the land contract to be extended to another 30 years after the expiration of existing contract. The land can be subleased to other households with compensation if a household has nonfarm job and gives up farming. A household can also hire temporary workers for farm work. Therefore, despite of the existence of some ideological restriction, land and labor markets have reemerged in rural China (Lin 1995a).

The shift to the household responsibility system is China's most successful reform. A careful econometric analysis, using province-level input-output data covering the period 1970 to 1987 and employing the production function approach, found that of the 42.2 percent output growth in cropping sector in 1978-1984, about 54 percent can be attributed to productivity growth due to reforms. Of the productivity growth, 97 percent is attributable to the changes in farming institutions from the production team system to the household responsibility system (Lin 1992).

The shift from the production team system to the household responsibility system also improve farmers' incentives to adopt new technology and may thus be expected to speed the diffusion of new technology (Lin 1991). Therefore, the household responsibility system is also expected to have a long-term dynamic impact on the growth of agricultural productivity.

IV. The Grain Policy Reforms and China's Grain Future

As discussed in Section II, the basic framework of existing grain policy was set up in 1953. It was instituted to secure the government's control of grain supply, on the one hand, and to meet the demand of urban residents for low-priced grain, on the other hand. As in many other countries, grain is more than just a commodity. Once the government is involved in the distribution of grain, the raise of sale price becomes a political issue. To avoid possible political unrest, ration prices did not have any major change until late 1980s.

The compulsory grain procurement is divided into two categories: the "basic quota" and "above quota," -- both specify the amount of obligatory grain delivery by a farm unit and the latter had a price premium. When the quota system was introduced in 1953, procurement prices were set at a level under which the state grain procurement and marketing agency could make a small profit. However, after the great agricultural crisis in 1959-61, grain procurement prices were raised on an average of 25.3 percent in 1961 to improve the incentives for grain production. After that, five other major price adjustments were made in 1966, 1979, 1985, and 1988 respectively. Because the adjustments in the ration prices lagged behind the increases in procurement prices and, moreover, the increases in ration prices were fully compensated by the increase in food subsidies to the urban residents, each raise in the procurement prices resulted in an increase in the government's financial burden.

At the beginning of the 1979 reforms, political leaders in China reached an agreement that farm income was too low and grain output was barely sufficient to meet subsistence needs. As a measure to increase farm income and boost grain production, procurement prices for grain and other major crops were increased by a big margin in 1979. The basic quota price of grain was raised 20 percent, and the above quota price was raised from 130 percent to 150 percent of the basic quota price (The weighed-average increase was 33 percent). Furthermore, the state monopoly on grain marketing was gradually lifted. Private as well as collective traders were allowed to handle grain marketing alongside the state marketing agency.

The household responsibility system reform along with the marked price increase brought in an upsurge of grain output. The annual growth rate, for example, increased from an average of 2.41 percent annually in the period 1953-1978 to 4.95 percent in the period 1976-1984 (see table 2). Since the output growth rate was about twice as large as the growth rate of consumption in 1978-1984, China became a net grain exporter in 1985, after being a net importer for a quarter century (see table 3). The sudden success, nevertheless, also brought with it new issues which the Chinese government had never handled before. According to the regulation at that time, the government was obliged to buy all grain at the above-quota price after a farmer fulfilled his basic quota obligation. Consequently, the greater the output growth, the larger was the government's financial burden. Food subsidies (including edible oils) increased from 5.6 billion yuan in 1978 to 32.1 billion yuan in 1984, representing 21 percent of the government's budget in that year. Furthermore, there existed a serious shortage of storage facilities. Because the government was unable to buy all the grain that farmers wanted to sell, the market price for grain dropped substantially throughout the country. In some grain surplus areas, the market price at harvest time even approached the basic quota price set by the government.

As a measure to reduce the government's financial burden and to increase the role of the market in the production and distribution of grain, the mandatory quota procurement system was changed to a contract procurement system at the beginning of 1985. According to the new system, procurement quantity was to be determined by contracts based on mutual agreements between the government and individual farmers. The contract price was fixed at a price, calculated as a weighed average of the original basic quota price (30 percent) and the above-quota price (70 percent). This price was 135 percent of the original basic quota price and about equivalent to the market price at harvest time of 1984 in major grain production areas.

However, it was 10 percent lower than the above-quota price. As a supplement to contract procurement, the government agreed, in addition, to purchase certain amounts of grain on the market at the market price.

The contract procurement system, however, met with a host of problems in its first year. Management costs for signing contracts with millions of agricultural households were tremendous and the means to enforce contracts were limited. The contract price did not provide enough incentives to farmers, especially in areas where the contract price was lower than or even roughly equalled to the market price in 1984. Enforcement of contracts was made difficult because of a 6.9 percent drop of grain output in 1985. The drop in output led the market price of grain to register a 10 percent increase in 1985. As a result, the gap between the contract price and the market price had widened, and farmers were reluctant to fulfil the contracts.

As a reaction to this experience, contract procurement reverted to the original compulsory quota procurement system by the end of 1985, even though the name of "contract" was not abolished. The quantity of procurement was reduced and the quantity of market purchase was increased. To minimize administrative costs, procurement quotas in each region were allocated to households in proportion to the cultivated land that each household operated under the household responsibility system. At the same time, the government raised sharply the procurement prices between 1986 and 1989. Moreover, the government promised to provide farmers with fertilizers, diesel gas, and credits at subsidized prices, although farmers frequently complained that these promises had not been realized. However, because farmers were given more autonomy in the production decision and the government's enforcement measures had been weakened as a result of the household responsibility system reform, farmers allocated resources to more profitable activities, such as fruits, aquatic products and township-village enterprises. As a result, grain output stagnated after the decline in 1985. The grain output did not recover to the level of 1984 until 1989 (see table 3).

The main problem of China's grain policy in the 1980s arose from the procurement practice and sale prices. The adjustment in sale price lagged far behind the adjustment in procurement prices. Under this situation, an increase in procurement price means an increase in the government's subsidy. Because of the existence of a gap between the government-set procurement price and the market price, the government was confronted with a dilemma. If the government tried to make the procurement price as competitive as the market price, its financial burden became unbearable. If the government, on

the other hand, attempted to limit the procurement price so that the amount of food subsidies could be controlled, peasants' incentives to produce grain and to fulfil the quota obligations were impaired. Since individual households had been given more autonomy in the production decision and the government's enforcement measures had been weakened as a result of the household responsibility system reform, how to stimulate grain production became a difficult issue.

The attempt to keep the ration price at a low level was justifiable in 1950s. Fore example, the expenditure on grain alone represented 22.8 percent of total household expenditure for an average urban household in 1957. The share of expenditure on grain in urban household's total expenditure declined to 7.6 percent in 1987. The government's attitude towards urban food rationing took a dramatic turn in 1990. The grain production recovered to the 1984 level in 1989 and scored a new historical record of 446.2 million tons in 1990, which was a 10 percent growth (see table 3). The output stabilized in that level in the subsequent two years. The sudden increase in the output depressed the market prices. The grain price in rural market fairs declined 19.9 percent in 1990. Moreover, the consumer price index dropped from 18 percent in 1989 to 3.1 percent. As grain stock was often used as a means of savings in rural China. The deflation expectation induced farmers to reduce grain stock (Song and Johnson 1995). Therefore, grain price further dropped 19.4 percent in 1991, and stayed at the low level in 1992. The collapse of grain market prices increased farmers' incentives to sell their output to the government. As a way to reduce government's financial burden, the government raised the urban ration prices of grain in 1992 to a level that required no more government subsidies. In 1993 both the procurement and sale prices of grain were decontrolled. Nevertheless, farmers were still required to meet the grain quota obligations.

Market price of grain took an unexpected turn after the market liberalization. The price increased 31 percent in 1993, 51 percent in 1994, and 36 percent in 1995. Moreover, China imported 20 million tons of grain in 1995. The price spikes and import caused widespread concern about the future of China's grain supply. However, the rapid price increases and import were not caused by failures of grain production. In 1993, China's grain output
scored a new historical record of 456.5 million tons. The grain output in 1994 dropped 2.5 percent, which was within the normal range of output fluctuation as the grain production is subject to the random impacts of weather. China's grain output in 1995 increased 4.5 percent and scored

another new historical record of 466.6 million tons (see table 3). The main reasons for the price spikes were twofold: The first was the impact of two-digit inflations in 1992-95 changed farmers' inflation expectation and caused farmers to increase their grain storage as a way to hedge against inflation, which reduced the marketable supply. The second was the reduction of grain cultivation in the grain-deficit coastal provinces where grain production was no longer to farmers' comparative advantage. As a result, the market demands for grain increased.

When market prices started to rise, the government again resorted to administrative intervention in the grain market. The central government's policy in 1995 requires each provincial governor to be responsible for the balance of grain demand and supply in his or her province, a policy that intensifies the local government's intervention in grain production and marketing.

Unless the government is willing to subsidize farmers heavily, any government restriction on the function of grain markets will reduce the profitability of grain production and thus grain output. The government in China is financially weak. But it gives a high priority to the goal of achieving grain self-sufficiency. Therefore, the administrative restrictions on grain markets will probably be removed gradually in order to give farmers incentives to produce grain.

Due to population growth and rapid economic growth, China's grain demand will continue to grow rapidly while the cultivated land will decline gradually as a result of the expanded demand for housing and industrial purposes, salinization of irrigated lands and so forth. Some study predicts that China may have to import so much grain in the future. This in turn may lead to high world prices, resulting in many poorer importing countries being priced out of the market (Brown 1995). Future growth of China's grain output to meet the increasing domestic demand can come from the increase of yield through many measures, such as increases in inputs and technological change, as well as effective policies to encourage their use. Grain's yield potentials in China are still very large. If the Chinese government invests adequately in seed improvements and other agricultural research and allows market to function well, China has the potential to produce enough food to feed herself in the next century (Lin 1995b; Lin, Shen, and Zhou 1996).

V. International Grain Trade

As argued in the above section, with adequate investments in agricultural research and other supporting policy changes, China has the ability to produce enough grain for her own needs. However, China is a land-scarce economy and grain is a most land-intensive agricultural crop. The theory of comparative advantages suggests that, for a better allocation of resources, it is desirable for China to export labor-intensive agricultural and industrial products and to import grain (Anderson 1990). Foreign trade is an integral part of China's national economic development strategy. The original policy design of foreign trade in the planned system was mainly for the purpose of facilitating the implementation of the heavy-industry-oriented development strategy. Few concerns were given to the consideration of China's comparative advantages. Because the availability of foreign exchanges was limited and most foreign exchanges derived from exporting agricultural and processed agricultural products, the main goal of agricultural trade was to generate foreign exchanges for the development strategy. Since most foreign exchange was reserved for priority industries, the grain trade policy thus emphasized the importance of "self sufficiency." However, despite the great emphasis on grain self-sufficiency, China changed from a net grain exporter in the 1950s to a sizable grain importer after 1961 (see table 3). The imports were mainly wheat, corn and other feed grain. For rice, China remained a net exporter except 1988 and 1989.

A simple regression for the data in 1952-1995 with the net grain import in year t as dependent variable and grain output in year t-1, time trend, and a dummy variable with 1 for years after 1978 as explanatory variables has the following result:

Net importt = 19081.71 + 11176.80 Dummy + 925.95 Trend - .14 outputt-1

(4.52) (3.63) (4.50) (4.77)

2 = .44, F = 11.96

Figures in the parentheses are absolute values of t-statistics. The positive sign of trend variable suggests that, despite of the emphasis on self-sufficiency, China is increasingly relying on grain imports to feed its population, as predicted by the theory of comparative advantage. And the positive sign of the institutional dummy indicates that, after the reform in 1979, the Chinese government has become more willingly to import grain. The

negative sign of outputt-1 indicates that on average imports and exports of grain were formulated on a yearly basis with the intention of smoothing domestic supply at the margin.

The major problem of China's grain trade policy lies in its administrative system. The import and export of grain in China are monopolized by the state grain trade agencies, who are not responsible for their profits or losses. The agencies are very insensitive to domestic grain situation. For example, in 1984, which was a peak year in domestic grain production, China imported over 12 million tons of grain, an almost four-fold increase over imports in 1983. And in 1993 and 1994, the domestic market price of grain increased 31% and 51%, China had the historical records of export in those two years (see table 3). Such a pattern of export and import increases the instability of both the domestic and international grain markets.

As a result of the state's monopoly in grain trade, the domestic market prices of grain are completely shielded from the international market prices. Before the liberalization of foreign exchange rate in 1994, the official exchange rate was substantially overvalued. The World Bank's study (1992) shows that at the official exchange rate, rice, corn, and soybean in rural free market was about equaled or moderately exceeded border price in 1987 and 1988, while the price of wheat in rural market was 50 percent higher than the import price in 1988. However, at the shadow exchange rate, rural free market prices were only between 51 percent (rice) to 85 percent (wheat) of the corresponding border prices. The studies by Garnaut and Ma (1993) shows that rice was seriously discriminated against, and wheat and corn was slightly protected in 1988-1991, if the shadow exchange rate was used in the calculation. Garnaut and Ma's study also shows that the domestic grain prices in 1988-1991 had a larger fluctuation than the international prices. Their study casts doubts on the conventional wisdom that the policy of self-sufficiency can reduce domestic price fluctuation by shielding domestic market from the impact of international market price fluctuation.

If China continues her current GDP growth rate of around 10 percent per year, China's comparative advantages will change rapidly. After the price increases in the period of 1993-95, the domestic prices of grain have already been very close to or slightly above the international prices. Before the reform in 1978, China had already relaxed the grain self-sufficiency policy and allowed the imports of grain to meet about 2-3 percent of domestic needs in some years (see table 3). It is desirable for China to relax further the self-sufficiency policy and to allow a larger

increase in imports to meet a part of the future needs for domestic grain consumption, especially of wheat and feed-grain. China should also improve the administrative system of international grain trade so that it will response quickly to the changing situations of domestic and international grain supply.

IV. Summary and Implications

China's experiences in agricultural development before and after the 1979 reform provide many valuable lessons for other developing countries. It is remarkable that China has been able to feed at a reasonably high level over one-fifth of the world's population with only one-fifteenth of the world's arable land, and to quickly develop a major industrial capacity. China, however, carried an unnecessary burden before the 1979 reform. The collective farming system and monopolized procurement and marketing policy were so detrimental to work incentives, that, despite sharp improvements in technology and increases in modern inputs in the 1960s and 1970s, grain production in China barely kept up with population growth.

The individual household-based farming system reform in 1979 greatly improved peasant's work incentives. Grain production and the agricultural sector as a whole registered unprecedented growth between 1978 and 1984. The success of agricultural reform greatly encouraged the Chinese leadership to adopt a more ambitious reform in the urban sector and provided the material basis for the economy to grow outside the planned system.

The increase in work incentives resulting from the farming institutional reform, however, has mainly a once-and-for-all discrete impact on agricultural productivity. While the average annual growth rate of agriculture after 1984 is still very remarkable compared to the agricultural growth rates of other developed and developing countries, grain production in China stagnated after reaching its peak in 1984 and did not recover to the level until 1989. This stagnation is mainly due to the incompleteness of macro-policy reform. Individual households has been given more autonomy in production decisions, so farmers in the household system will allocate more resources to crops which command higher profits. Reforms have freed the prices and marketing of most cash crops and other products of animal husbandry and fishery. Grain, however, is among the exceptions. Farmers are still required to meet grain quota obligations at government-set prices. Grain production in the post-reform period has been held back by the artificial effects of these price distortions on the profitability of grain

production.

Because of the stagnation of grain production in 1984-1988, the optimism about Chinese agriculture which developed in the first six years of reform was quickly replaced by pessimism. The small farm size and the fragmentation of cultivated land in the household-based farming system are often blamed for the poor performance in grain production after 1984. However, the lessons of the period before the 1979 reform demonstrate that collectivization is not a solution to the increasing demand for grain arising from population growth and industrial expansion.

Agriculture was a supporting sector in the pre-reform development strategy, receiving public attention only when a poor harvest became a constraint to industrial development. Under such a strategy, the contribution that agriculture made to modern economic growth was systematically undervalued, and a cyclic pattern in agricultural production was inevitable. Sustained agricultural growth will be possible only when China replaces its existing policy environment molded under the heavy-industry-oriented development strategy in the earlier five-year plans with one that stresses China's regional as well as international comparative advantages. To make such a transition in the development strategy, further reforms are required to improve the security of land tenure system, the functions of outputs and inputs markets, and the role of international trade.

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Table 1: Sector Composition of National Income

Year	Agriculture	Industry	Construction	Transportation	Commerce
1952	57.72	19.52	3.57	4.24	14.94
1978	32.76	49.40	4.15	3.92	9.77
1993	25.30	51.69	8.25	4.47	10.19

Source: China Statistical Yearbook 1994, p. 33.

Table 2: Average Annual Growth Rate of Population and Farm Products

	52-78	78-84	84-95
Population	2.00	1.36	1.36
Gross value of agriculture	1.85	7.73	5.81
Grain	2.41	4.95	[illegible]
Cotton	1.97	19.33	-0.25
Oil-bearing seeds	0.84	14.74	5.93
Sugar crops	4.49	12.31	4.72
Fruit	3.88	6.97	14.13
Pork, beef and mutton	3.63	10.28	9.67
Aquatic products	4.03	4.85	13.53
Per capita consumption of farm population	1.73	9.29	4.97*

Source: A Statistical Survey of China, 1996.
Note: *The figure is for 1984-94.

Table 3: Output and the Imports and Exports of Grain in China
(Unit=1,000 tons)

YEAR	Output	Imports	Exports	Net Import
1952	163900	0	1530	-1530
1953	166850	15	1825	-1810
1954	169500	30	1710	-1680
1955	183950	180	2230	-2050
1956	192750	150	2650	-2500
1957	195050	165	2090	-1925
1958	200000	225	2885	-2660
1959	170000	0	4155	-4155
1960	143500	65	2720	-2655
1961	147500	5810	1355	4455
1962	160000	4920	1030	3890
1963	170000	5950	1490	4460
1964	187500	6570	1820	4750
1965	194550	6405	2415	3990
1966	214000	6440	2885	3555
1967	217800	4700	2995	1705
1968	209050	4585	2600	1985
1969	210950	3785	2235	1550
1970	239950	5360	2120	3240
1971	250150	3175	2620	555
1972	240500	4755	2925	1830
1973	264950	8130	3895	4235
1974	275250	8120	3645	4475
1975	284500	3735	2805	930
1976	286300	2365	1765	600
1977	282750	7345	1655	5690
1978	304750	8830	1875	6955
1979	332100	12355	1650	10705
1980	320550	13430	1620	11810
1981	325000	14810	1260	13550
1982	354500	16115	1250	14865
1983	387300	13530	1150	12380
1984	407300	10410	3190	7220
1985	379110	6000	9320	-3320
1986	391510	7730	9420	-1690
1987	402980	16280	7370	8910
1988	394080	15330	7180	8150
1989	407550	16580	6560	10020
1990	446240	13720	5830	7890
1991	435290	13450	10860	2590
1992	442660	11750	13640	-1890
1993	456490	7520	15350	-7830
1994	445100	9200	13460	-4260
1995	466570	20270	420	19850

Source: data for 1952-1959 are taken from Zhongguo Nong cun tongji zhiliao dachuan, 1949-1986 (a comprehensive statistical data of China's Rural economy); for 1960-1991 are taken from FAO, AGROSTAT; and for 1992-95 are taken from China Statistical Yearbook 1993-5 and A Statistical Survey of China, 1996.