CHAPTER 5

Agricultural Development in China: Comparison with Japanese Experience

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5.1 Introduction

Feeding an enormous population has been the greatest challenge for China. Looking back on history, China has overcome the stagnation in food production per capita that occurred during the socialist era and has achieved remarkable development in agriculture since the late 1970s. Technological and institutional transformations under the reform and opening-up period are significant driving forces of continuous agricultural development. Meanwhile, small-scale farm households, whose farmlands tend to be fractionated and spatially dispersed, still mainly operate farm management in China. Thus, Chinese agriculture faces serious inefficiency and diseconomies of scale. Furthermore, with the continuous increase in migrant workers, relatively young and capable workers are prone to leave

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the countryside, causing serious shrinkage and aging in the agricultural labor force.

These characteristics of Chinese agriculture are generally common in East Asian countries. Among these countries, Japan has achieved continuous development in agriculture, but the growth rates of agriculture began to stagnate, and disparities in the productivity of agriculture and manufacturing industries considerably enlarge with economic development since the 1950s. To reform small-scale farming and improve the efficiency of agriculture, the Japanese government has implemented numerous measures to facilitate structural adjustment of agriculture since the 1960s. Moreover, agricultural protection policies through preferential rice prices, high tariffs, and generous public investment in agricultural facilities were implemented, but the policy measures were gradually changed in accordance with the economic circumstances.

The lessons in Japan demonstrate that China should implement appropriate structural adjustments and policy amendments to maintain its development of agriculture. Therefore, the principal objective of this chapter is to summarize agricultural development in China from the socialist era through the present, examining the changes in agricultural institutions and policies. Moreover, this chapter aims to compare the characteristics of agricultural development in China and Japan to deduce the implications for China, focusing on the development paths, technological and institutional transformations, and changes in the agricultural policy cycle.

The overview of Chinese agriculture has been conducted by several researchers, such as Huang et al. (2008), Lohmar et al. (2009), and Naughton (2018). Unlike these studies, the institutional and structural changes in Chinese agriculture examined in this chapter cover a longer period. Moreover, this chapter elucidates the characteristics of agricultural development in China and compares them with those of Japan. The remainder of this chapter proceeds as follows. Section 5.2 divides the process of Chinese agricultural development into three periods to explain the organizational features and agricultural policies. Section 5.3 compares the development path, farmland transaction, and agricultural policy cycle of China and Japan. Section 5.4 summarizes the results of the comparison and provides suggestions for Chinese agriculture.

5.2 Brief History of Agricultural Development in China

5.2.1 *Chinese Agriculture from an International Perspective*

First, I summarize the characteristics of contemporary Chinese agriculture and compare them with those of other selected countries. China is the most populous country in the world, and its total GDP has been the second largest since the early 2010s. China is also the world's largest agricultural country. Table 5.1 indicates that the value added of agriculture, forestry, and fishery of China accounted for $1,021 billion in 2018, and it is overwhelmingly larger than those of the U.S. and EU-28 are. Moreover, in China, the share of agriculture, forestry, and fishery in the total GDP is 7.5%, which is also much higher than that of the U.S. and EU-28. Having a high GDP share in agriculture, in China, 194 million people engage in agriculture, accounting for 25.4% of the total employment.

The total size of arable land and permanent crops in China is 136 million hectares, which is almost the same size as that of the U.S. and EU-28. However, the average size of farmland per agricultural management entity in China is only 0.7 hectares. The size is considerably lower than that of EU-28, the U.S., and Japan. In addition, China is a major importer of primary goods, such as soybean and seafood, amounting to

Table 5.1 Summary of agriculture in selected countries and regions

	Year	*U. S*	*EU-28*	*Japan*	*China*
Value added of agriculture, forestry and fishery (billion U.S. dollars)	2018	167	308	56	1,021
Share of total GDP (%)	2018	0.8	1.6	1.1	7.5
Total employment in agriculture (million)	2019	2	9	2	194
Share of total employment (%)	2019	1.3	3.9	3.4	25.4
Size of arable land and permanent crops (million hectares)	2017	160	117	4	136
Average farmland per agricultural management entity (hectares)	2016–2019	178.5	16.6	3.0	0.7
Total import of agricultural goods (billion U.S. dollars)	2018	130	520	56	156
Total export of agricultural goods (billion U.S. dollars)	2018	141	544	4	68

Source Author's creation based on MAFF (2021, pp. 46–47)

$156 billion in 2018. The total amount of imports is almost the same as that of the U.S. However, the amount of primary products export in China stagnates at $68 billion, which is less than half of its imports.

To examine the technological features of Chinese agriculture more precisely, I select several countries to compare the structures of agriculture in these countries. As presented in Table 5.2, the size of arable land per agricultural labor in China is only 0.2–0.3 hectares, which is much lower than those of the U.S. and Argentina, as well as those of other Asian countries. Moreover, fertilizer consumption per hectare in China was 158 kg per hectare in 1980, which was larger than the world average and much higher than that in other Asian countries, except for Japan. With the diffusion of high-yielding grain varieties and other commercial crops, fertilizer consumption in China rose to 283 kg per hectare in 2000.

The proportion of irrigated land to total arable land in China was 46.9% in 1980, surpassing the world average (15.5%) in 1980. As I will discuss later, this is mainly because the Chinese government initiated large-scale irrigation projects to construct canals and waterways in the early 1950s. However, because of the institutional reforms that have been

Table 5.2 International comparison of agricultural technologies

	Arable land per agricultural labor			*Fertilizer consumption*			*Irrigation*			*Agricultural tractor*		
	(hectare/person)			*(kg/hectare)*			*(%)*			*(number of tractors per1,000 hectares)*		
	1980	*1990*	*2000*	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*
World	1.3	1.1	1.0	87	98	98	15.5	17.5	20.7	16	19	19
China	0.2	0.3	0.2	158	220	283	46.9	38.8	45.0	8	7	6
Japan	0.8	1.0	1.6	373	385	325	62.7	59.7	59.0	272	431	460
Argentina	18.7	17.8	19.1	4	6	31	6.0	5.9	5.6	7	10	11
Brazil	2.6	3.3	4.4	93	63	114	3.6	5.3	5.5	12	14	14
India	0.8	0.7	0.6	34	74	103	23.6	28.7	38.0	2	6	12
Indonesia	0.5	0.5	0.4	65	123	122	22.8	21.8	26.8	1	1	5
Thailand	1.0	0.9	0.8	17	60	100	18.3	24.2	35.7	1	3	14
U.S	48.5	51.1	58.0	114	100	107	10.9	11.3	12.9	25	25	27

Source Author' creation based on FAOSTAT archive (https://www.fao.org/faostat/, accessed on April 27, 2010)

made since the late 1970s, the size of irrigated areas stagnated and experienced a slight decline in the 1980s. Farm mechanization in China was less developed due to the existence of numerous agricultural labors in rural areas. The number of agricultural tractors in China was only 6–8 units per 1,000 hectares during the 1980s and 1990s, which were relatively lower than the world average. Although the mechanization of Japanese agriculture was extraordinary and reached 272 units per 1,000 hectares in 1980, the number of tractors in other Asian countries was generally much lower than the world average.

These macroeconomic indicators reveal that agriculture in East Asian countries is characterized as land-scarce, labor-intensive, and heavily dependent on human labor, and these features are more prominent in China. After discussing the differences in agricultural structures among countries, I overview the historical changes in Chinese agriculture in the following section.

5.2.2 Agriculture in the Socialist Era

In China, the twentieth Century was a period of dramatic revolutions, and rural societies were greatly influenced by numerous political movements. Precise understanding of the historical transformations of rural societies is a prerequisite to understanding the structure of contemporary Chinese agriculture. Thus, I divide these historical processes into three periods (the Socialist era, the period under the reform and opening-up policy, and the period since 2000) to explain the changes in agricultural policies and organizational structures in China.

Since the establishment of the People's Republic of China (PRC) in 1949, grain production steadily increased until the mid-1950s. Nevertheless, the amount of commercial grains available for urban residents was still insufficient to meet the needs of the rapid urbanization and industrialization, and it caused frequent price hikes in urban areas. To ensure equitable and efficient distribution of grain among urban consumers, the Chinese government introduced the "unified purchase and unified supply" system in 1953. Under this system, government departments and agencies monopolized the procurement of agricultural products, mainly grain, from agricultural producers at official prices and distributed them to urban residents (Hoken, 2014).

Moreover, land-owned farm households, which had been created through the land reform, were forced to undergo a fundamental change

by the radical agricultural collectivization movement that began in the mid-1950s. During the movement, all farmers and rural residents were forcibly absorbed into rural cooperatives and were obliged to join the People's Commune, which was established in 1958. It encompassed a vast range of rural activities, including industry, agriculture, commerce, schools, and the militia, as well as administrative functions of the township government to control all aspects of rural societies.

Under "The Great Leap Forward" (GLF), collective farming and monopolistic agricultural marketing became radicalized, causing a serious decline in agricultural production and an enormous death of rural residents. Due to the enormous failures, the government began to modify agricultural institutions through more practical approaches. Specifically, the normalization of the People's Commune was advanced with the three-tier structure (commune, brigade, and production team). The production team was also defined as the basic accounting unit, being directly responsible for preparing specific production plans and determining the formula for profit distribution (Hoken, 2022; Naughton, 2018).

Although the People's Commune facilitated the mobilization of rural labors for irrigation construction and land improvement, its evaluation practice had systematic defects. The efforts of agricultural workers were supposed to be evaluated as work points, but the difficulty in assessing labor contributions resulted in excessively egalitarian rewards, which caused a serious deterioration in work motivation. Production teams were also under constant pressure to produce grain, preventing them from pursuing more lucrative cultivations and activities (Hoken, 2022).

Regardless of the policies, Chinese agriculture had not satisfied the augmenting demand for grain. As depicted in Fig. 5.1, the total amount of grain production increased from 170 million tons to 305 million tons from 1963 to 1978. However, throughout the late-socialist era, because of the rapid increase in the total population, grain production per capita did not exceed that of the mid-1950s. Specifically, the amount of grain production per capita exceeded 300 kg for the first time in the mid-1950s and remained at that level thereafter but fell to around 200 kg during the GLF. Although the amount of grain production per capita recovered to 287 kg in 1966, the amounts became stagnant since then, and it was not until 1974 that the grain production per capita exceeded 300 kg.

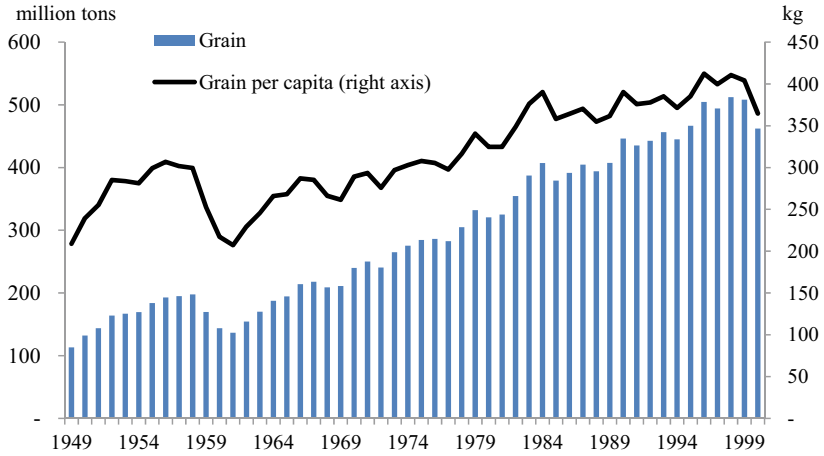

Fig. 5.1 Change in grain production (*Source* Author's creation based on data from the National Bureau of Statistics Department of Comprehensive Statistics [2010] and *China Statistical Yearbook*, various years)

5.2.3 Agriculture Under the Reform and Opening-Up Policy

To overcome the stagnation of agriculture and the inefficiency of collective farming, in December 1978, the Chinese government increased the procurement price of major crops to improve the work incentives of farmers. In addition, the theoretical right to self-management of the production team was reaffirmed by the Chinese government, and it facilitated more active and independent management. Specifically, some production teams initiated experiments with more radical changes, secretly contracting pieces of collective land to individual households to cultivate (Naughton, 2018). Recognizing the success of these experiments, the government formally allowed the contracting of farmland to households, which is known as the household responsibility system (HRS).

HRS returned decision-making authority from communes to rural households and made households the residual claimant of profit after fulfilling the grain quota assigned by the government. Farmers could trade the rest of agricultural products by their selves, improving the motivation to work harder. By the end of 1982, more than 90% of agricultural households returned to household farming, and the People's Communes were

dissolved and reorganized as administration units. In addition, policy-makers gradually reduced their emphasis on the grain first policy, allowing farm households to cultivate more lucrative commercial crops, such as vegetables, fruits, and tea. Non-government and private traders were also allowed to participate in the agricultural free market (Hoken, 2014; Naughton, 2018).

These reforms facilitated significant growth in agriculture. The annual growth rate of grain production jumped from 2.0% in 1955–1976 to 4.1% in 1976–1984, and the total amount of grain increased from 28.7 million tons to 40.7 million tons from 1976 to 1984. As illustrated in Fig. 5.1, the amount of grain production per capita constantly exceeded 400 kg since the late 1970s, and the amount reached more than 500 kg during the mid-1990s. However, the growth rates of other crops were much faster than that of grain was. Figure 5.2 depicts the changes in the amounts of major agricultural products, where the volume of production in 1978 is indexed as 100. Compared with that in 1978, oilseed and sugarcane productions increased approximately seven and five times in the late 2010s, respectively. Although cotton production experienced modest growth, the growth rates were still higher than those of grain were.

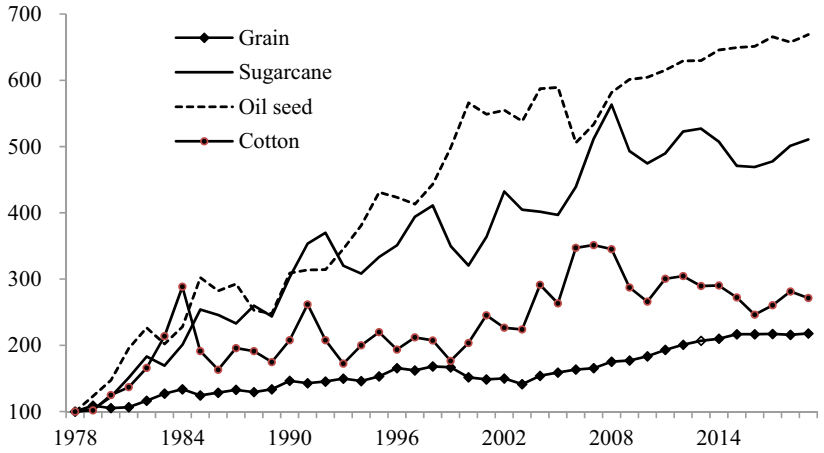

Fig. 5.2 Changes in the production index of major crops (1978 = 100) (*Source* Author's creation based on the data from *Chinas Statistical Yearbook*, various years)

In addition to HRS, the diffusion of new technology also greatly contributed to agricultural development. China succeeded in increasing land productivity of major grains through the green revolution, which refers to an integrated package of modern inputs that dramatically increase agricultural output. The development and diffusion of three key elements—improved seed (high-yield varieties and HYVs), chemical fertilizer, and irrigation—were crucial for the green revolution.

First, intensive research on improved grain seed by central and provincial academics was conducted during the socialist era, and reliable agricultural extension service was established and functioned during that period. Based on the accumulation of research and extension services, the improved grain seed rapidly diffused since the 1970s. Second, the government began to support fertilizer production by local factories. In 1973–1974, the central government decided to import large chemical fertilizer factories to increase the supply of chemical fertilizers. Third, until the late 1970s, the expansion of irrigated land was achieved through irrigation construction projects under the People's Commune, such as canals and storage reservoirs (Naughton, 2018; Stone, 1990; Tajima, 1989).[1] These technological innovations greatly contributed to the continuous growth in grain production.

However, China maintained systematic control over key elements of the agricultural marketing system, especially staple grains. The state procurement price for grains was increased by an average of 20% in 1979, and the price premium for above-quota selling was raised from 30 to 50%. Conversely, the rationing price for urban residents was kept at almost the same level as that in 1978, surpassing the procurement price, so the losses from this backspread were compensated for through budget expenditure. To deal with this problem, the government abolished the mandatory procurement quota for grain and cotton in 1985, and it introduced a less compulsory procurement system. Moreover, procurement quotas on other agricultural products were abolished, and the marketing of agricultural products, except for staple grains, was nearly liberalized (Hoken, 2014).

In the early 1990s, the government established a specialized bureau that procured a specific quantity of grain to construct indirect intervention measures for grain marketing. Large-scale wholesale markets for grain transactions also began to be established in 1990 to facilitate interprovince grain deliveries. Meanwhile, with the increase in the living standard of urban households, grain rationing became less important, and

they preferred to purchase better quality grain at the free market. Due to these changes, rationing prices were substantially increased by 140% from 1990 to 1992, and the entire rationing system was abolished shortly thereafter (Zhong, 2004; Zhong & Zhu, 2017).

However, the liberalization of grain marketing caused a considerable rise in grain prices in the early 1990s. Consequently, until the late 1990s, compulsory purchases by the government from farmers were restored to procure a specific volume of grains, but the procurement price was relatively favorable to farmers. Because of these policies, China achieved an increase in grain production from 1995 to 1999, but overproduction, excess stockpile, and huge budgetary losses became serious issues facing the grain policy (Hoken, 2014).

Moreover, until the late 1990s, urban-biased fiscal and investment policies were implemented by local governments. This was mainly because the local governments faced severe competition over interregional economic growth under the fiscal decentralization policies, and the central government had a weak fiscal redistribution ability to reduce the socio-economic disparity between rural and urban areas. Therefore, it placed a heavy financial burden on local authorities and led to increasing and heavily regressive taxes and local levies/fees on rural residents (known as "peasant burden") in the 1990s (Hoken & Sato, 2020).

5.2.4 Changes in Agriculture with Rapid Economic Development Since 2000

To prevent farmers' income level from falling further below that of urban workers, China has adopted pro-rural public policies since the turn of the century. The policies are well captured by the slogan "giving more, taking less, and allowing peasants more opportunities" (*duoyu shaoqu fanghuo*). The slogan means that government should give more support to agriculture and rural villages, lower the direct and indirect tax burden on farming, and undertake policies to improve rural markets.

Policies for "giving more" comprise various public transfer programs for rural households. Focusing on production-related transfers, the range of new subsidies can be classified into three categories (Gale, 2013; Naughton, 2018). The first category includes direct payment and comprehensive subsidy on agricultural inputs, which are distributed from the government budget to farmers directly. The direct payment is a fixed payment to grain farmers to compensate for the abolishment of official

procurement prices for major grains. The comprehensive subsidy on agricultural inputs was introduced in 2006 to support grain farmers against the increase in petroleum and fertilizer prices. The second category is subsidies targeting specific inputs or projects, such as improved seeds and agricultural machinery subsidies. The improved seed variety subsidy is intended to reduce the cost of purchasing varieties of seed that are officially specified to be of high quality or have special characteristics.[2] The agricultural machinery subsidy pays up to 30% of the purchase price of eligible agricultural machinery and equipment.

The third category is minimum prices for major commodities, including rice, wheat, corn, soybean, rapeseed, and cotton. To accomplish the liberalization of grain marketing, China introduced a minimum procurement price in 2004, and state agencies pledged to purchase grain at a specific price for the national grain stockpile if market prices fell below that level. Originally, the system was designed to stabilize grain trading prices and protect grain producers through indirect intervention. However, to deal with the abrupt increase in international grain prices during 2007–2008 and to intensify food security, the government pledged to raise minimum prices for rice and wheat yearly, regardless of the decline in international grain prices.

Policies for "taking less" began with the tax-for-fee (*feigaishui*) reform at the beginning of the 2000s and ended with the nationwide abolition of agricultural taxes at the beginning of 2006 (Hoken & Sato, 2020). The first phase of the reform (2000–2003) involved imposing newly defined agricultural taxes in place of local levies and fees, resulting in a reduction in the total "peasant burden." The second phase (2004–2006) first involved a gradual reduction in the agricultural tax and then its complete abolition in January 2006. The agricultural tax had taken 5–7% of agricultural value added in the preceding years. In supplementing the revenues, local government became much more dependent on budgetary transfers from higher levels.

Finally, policies for "allowing peasants more opportunities" were embodied in an agricultural movement called "agricultural industrialization." The purpose of the movement was to support economic organizations that integrate small farmers to achieve economies of scale and increase the quality and safety of agricultural products (MoA eds., 2008). To facilitate the marketization and upgrade of agriculture, revisions of related regulations and laws were vigorously implemented by the central and local governments. Details will be described in the next section.

These coexistences of protection and promotion of agriculture characterize the development of contemporary China, and it appears to be common in East Asian counties, including Japan. The next section compares the development paths, technological and institutional transformations, and changes in the agricultural policy of China and Japan.

5.3 Comparison with Experiences in Japan

5.3.1 Development Path of Agriculture in General

When considering the development path of agriculture, Hayami & Ruttan (1985) proposed a famous theoretical framework. Namely, in East Asian countries, due to the plenty number of labor and scarce land, farmers and governments tried to introduce high-yield seeds, fertilizer, and well-controlled irrigation to improve the productivity of crops. These technologies are suitable and cost-effective for East Asian countries, leading to labor-intensive farming and improving the yield per unit of land. However, in North America and Oceania, due to the large size of farmland and relatively scarce labor in comparison with land, power machinery was developed to substitute for the relatively scarce labor.

To examine the characteristics of technological changes using this framework, Fig. 5.3 depicts the innovation paths of agriculture in China and Japan. The horizontal axis indicates output per worker, that is, labor productively. The vertical axis represents output per unit of land, denoting land productivity and yield. As Hayami & Ruttan (1985) explained, East Asian countries first developed land productivity (illustrated by the vertical movement) and then facilitated improvement in labor-saving technology, which is shown in the rightward development. It is apparent from the figure that the directions of innovation marked a turning point for China in 2005 and for Japan in 1971. Specifically, China experienced clear vertical development until 2005 and accomplished high growth in land productivity by improving the yield of crops and transforming cultivation into more lucrative ones. As explained in Sect. 5.2.1, numerous workers engaged in farming were mainly manual labors. Although the number of small-size tractors increased considerably since the early 1980s, most tractors were mainly used for transportation, and the diffusion of large/medium-sized tractors stagnated until around 2000 (Naughton, 2018; Tajima, 1989).

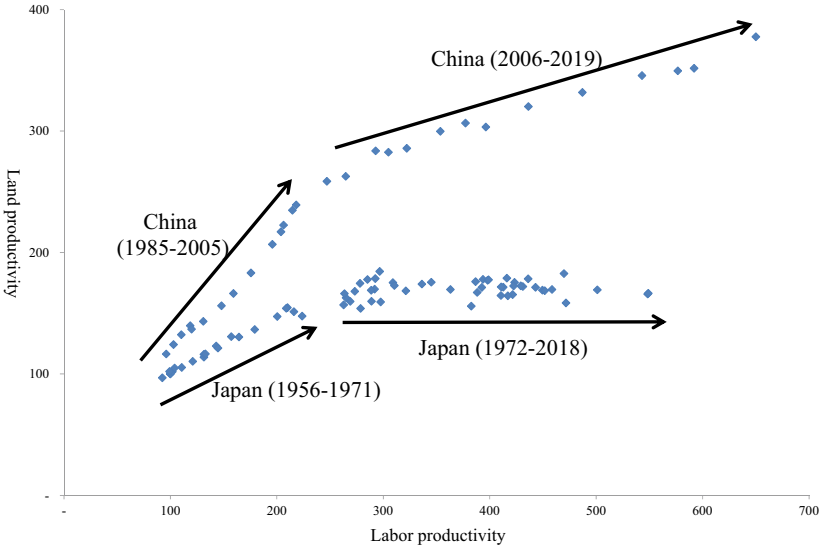

Fig. 5.3 Development path of land and labor productivity (*Note* China: The data about GDP [primary industry], employed person [primary industry], total sown area, and producer price index for farm products are from the *China Statistical Yearbook* various years; Japan: The data about the agricultural income produced are from the "statistics of agricultural income produced" by MAFF [https://www.maff.go.jp/e/index.html, accessed on February 21, 2022]; The data about agricultural and forestry workers are from the "labor force survey" by the Statistical Bureau of Japan [https://www.stat.go.jp/english/, accessed on February 21, 2022]; The data about the cultivated land and planted area are from the "statistics on cultivated land and planted area" by MAFF; The data about the price index of agricultural products are from the "statistics on commodity prices in agriculture" by MAFF; Labor and land productivities are indexed as 1985 = 100 for China and 1956 = 100 for Japan. *Source* Author's creation)

Since the mid-2000s, the development path of China became more horizontal, and the increase in labor productivity became the principal element in facilitating continuous growth in agriculture. Structural changes in the rural labor market were behind the transition of the development path. According to *China Statistical Yearbook*, the total number of labors who engaged in the primary industry gradually declined from 389 million in 1990 to 360 million in 2000. However, the considerable

increase in migrant labors during the early 2000s accelerated this trend—the workers in primary industry decreased considerably, reducing to 297 million in 2010 and 187 million in 2019.

Increase in the wage of hired agricultural labors became prevalent since the mid-2000s. According to the *Compilation of Production Cost Data on Agricultural Products*, the real daily wage of hired agricultural labors remained at almost the same level until 2003, approximately 18 yuan per day.[3] However, the wage levels began to increase from 2004, and the growth rates accelerated in 2008. From 2007 to 2012, the real daily wage increased from 31 to 68 yuan. Although the increasing rates of wage became relatively gradual during the 2010s, the real wage reached 81 yuan in 2019.

In response to the emerging need to substitute labor with capital, many farmers began to utilize mechanical services provided by specialized operators for plowing, planting, and harvesting (Wang et al., 2016; Yang et al., 2013). The agricultural machinery subsidy explained in Sect. 5.2.4 also promoted the rapid diffusion of specialized machines. Consequently, from 2000 to 2008, the number of large/medium-size tractors increased from 970,000 to 3 million, and the number reached approximately 6 million in 2015.[4] Following these processes, China adopted more labor-saving technology and developed agricultural mechanization in the mid-2000s.

Compared with China, Japan experienced a relatively balanced technological development from 1956 to 1971. This is mainly because Japan had already achieved high economic growth in the mid-1950s, and the degree of agricultural mechanization was much higher than that of China. Meanwhile, the total number of agricultural and forestry workers in Japan decreased dramatically from 14.9 million in 1953 to 8.4 million in 1970, and the share of agricultural and forestry workers in the total number of workers dropped from 38.0 to 16.5%.

Since the early 1970s, the decrease in agricultural and forestry workers of Japan became relatively moderate, and the number declined from 5.3 million in 1980 and 4.1 million in 1990. Due to the shift of crop variety from quantity to quality oriented, the consumption of chemical fertilizer and pesticide began to decrease gradually. Moreover, the diffusion of agricultural machinery (e.g. riding tractors, combine harvesters, and rice-planting machines) accelerated, establishing the system for automating agricultural production. In Japan, small/medium-size specialized machines were owned by almost all small-scale farmers because of the

comprehensive and nationwide supply system (Hokimoto, 1999). Due to these efforts, Japanese agriculture succeeded in continuous horizontal growth of labor productivity, as depicted in Fig. 5.3.

5.3.2 *Experiences of Structural Adjustment in Japan*

Agricultural production in China and Japan has been conducted mainly by small-scale farmers, and they greatly contributed to the development of their national economies. However, faced with slower growth of agricultural revenue and food consumption, both countries implemented structural adjustment of agriculture. In this subsection, I examine the processes and results of the structural adjustment in Japan and deduce the implications for Chinese agriculture.

The origin of the structural adjustment in Japan is traced back to the enactment of the Agricultural Basic Law in 1961, and the essence of the law was summarized in the slogan of "selective expansion." To reduce the income and welfare gap between farming and non-farming people, the government encouraged a transformation from food production of low-income elasticity to that of high-income elasticity. Moreover, the law intended to facilitate the expansion of the scale of operation by family farms by reducing the number of inefficient farmers and land transactions (Hayami, 1988).

Despite these policy efforts, the agricultural sector could not achieve sufficient growth to diminish the economic gap between farm and non-farm households. Conversely, farmers and agricultural cooperatives (*Nokyo*) intensified political lobbying for the government and politicians to raise prices of agricultural products, mainly focusing on the price of rice. As a result, the price of rice was determined by the production cost of less competitive farmers using an imputed wage for non-farming workers, causing a considerable increase in rice procurement price (Hayami, 1988). The implementation of preferential rice price and the rapid spread of labor-saving technology prevented less competitive small-scale farm households from relinquishing crop cultivations.

Furthermore, the regulations of land tenure also greatly prevented land transactions among farmers. The Agricultural Land Law of 1952 originally restricted ownership of arable land to less than 3 hectares per farm household (12 hectares in Hokkaido). The law strongly favored the rights of the tenant to a permanent usufruct on the leased land, and lease rents were strictly controlled to their advantage, virtually prohibiting

the leasing of farmland. In accordance with high-speed economic growth during the 1950s, the law was amended in 1962 to remove the ceiling on land ownership and encourage the leasing of farmland (Hayami, 1988; McDonald, 1997).

To examine the progress of structural adjustment in Japan, Table 5.3 summarizes the changes in agricultural workers and farm households. As presented in the first row of the table, the number of core persons mainly engaged in farming in 1960 was 11.7 million, decreasing dramatically to 2.9 million in 1990. This is closely related to the improvement in non-farming employment opportunities for farmers. Rapid progress in motorization and public transportation system facilitated their non-farming employments within a commutable distance from their residence.

Compared with that of core agricultural workers, the decline in the total number of farm households was relatively gradual, decreasing from 6.1 to 3.8 million households from 1960 to 1990, but the composition of farm households greatly changed. The share of full-time farm households

Table 5.3 Changes in agricultural labor, number of households, and arable land in Japan

	1960	*1970*	*1980*	*1990*	*2000*	*2010*	*2015*
Core persons mainly engaged in farming (million)	11.7	7.1	4.1	2.9	2.4	2.1	1.8
Total farm households (million)	6.1	5.3	4.7	3.8	3.1	2.5	2.2
Commercial farm household (%)	–	–	–	77.5	74.9	64.5	61.7
Full-time farm household (%)	34.3	15.6	13.4	12.3	13.7	17.9	20.6
Primary part-time farm household (%)	33.6	33.7	21.5	13.6	11.2	8.9	7.7
Secondary part-time farm households (%)	32.1	50.7	65.1	51.6	50.0	37.8	33.5
Non-commercial farm households (%)	–	–	–	22.5	25.1	35.5	38.3

Note Core persons mainly engaged in farming denote persons who engage in their own farming as usual work among household members. Commercial farm household denotes a household that cultivates more than 0.3 hectares or sells more than JPY 500,000 of farm products. Full-time farm households denote households in which no member engages in non-farm employment for more than 30 days. Primary (secondary) part-time farm households denote households where at least one member engages in non-farm employment and whose farm income is more (less) than their non-farm income *Source* Author's creation based on data from the *Census of Agriculture and Forestry* and *Statistical Yearbook of MAFF*. (https://www.maff.go.jp/e/index.html, accessed on February 21, 2022).

decreased from 34.4 to 12.3% during the period. By contrast, the share of secondary part-time farm households increased from 32.1 to 65.1% from 1960 to 1980. The share of secondary part-time farm households has become stagnant since 1990 due to the introduction of a new category (non-commercial farm households that conduct farming mainly for self-consumption), but, until 2015, the sum of the share of both secondary part-time and non-commercial farm households was more than 70%. The dominance of part-time farm households and their slow exit from their farming prevented the development of large-scale farming in Japan.

Due to the limitation of official rural household data by the Chinese government, it is difficult to make a comprehensive comparison of farm households of the two countries. However, according to the agricultural censuses, the aging of agricultural workers can be confirmed in both countries.[5] The share of agricultural workers over 65 years in Japan was 17.8% in 1970 and 24.5% in 1980. Thereafter, the share increased much rapidly, reaching 52.9% in 2000 and 63.5% in 2015. This tendency is also applicable to China. The share of agricultural workers over 55 years (56 years for 2016 census) in China increased from 10.4 to 34.1% from 1996 to 2016. Conversely, the share of agricultural workers under 35 years in China declined from 62.7 to 19.1% during that same period.

Meanwhile, the development of a well-functioning land rental market is essential to improving the efficiency of agriculture. In Japan, the Revised Agricultural Land Law was enacted in 1970 to consolidate small-scale farms into sufficiently large-sized farms through the land rental market. Japan also initiated the Agricultural Land Use Improvement Project in 1975, and the project was legalized in 1980. Moreover, the Farmland Exchange Promotion Project was launched in 1970 to facilitate land transactions through a public intermediary institution. Despite these policy efforts, Japanese agriculture could not achieve remarkable successes in land consolidation. This is mainly due to the low profitability of crop cultivation and high expectation on the diversion of farmland to non-agricultural uses (Hayami, 1988; Ito, Nishikori et al., 2016; McDonald, 1997).

Figure 5.4 summarizes the share of leased and abandoned farmlands. The share of leased land in Japan recorded considerably low ratios from 1960 to 1985, accounting for approximately 5%, whereas the share began to increase gradually in the mid-1990s. Conversely, farmland abandonment became a serious issue in Japan.[6] As illustrated in Fig. 5.4, the share of abandoned land to total cultivated land was approximately 3% until the

mid-1980s, but the share increased concurrently with leased land from the late 1980s, reaching 14% in 2015. According to Ito, Nishikori et al. (2016), land-holding non-farm households in Japan played a dual role by supplying their holdings to the land rental market and by abandoning their farmland.

In China, to secure land utilization rights of farm households, the land contract duration was extended for an additional 30 years and legalized as an amendment of the Land Management Law in 1998. The Rural Land Contracting Law was also enforced in 2003 to enhance tenure security and transferability of land. Followed by the legalization, a series of policy documents and practical guidance were issued from the mid-2000s to

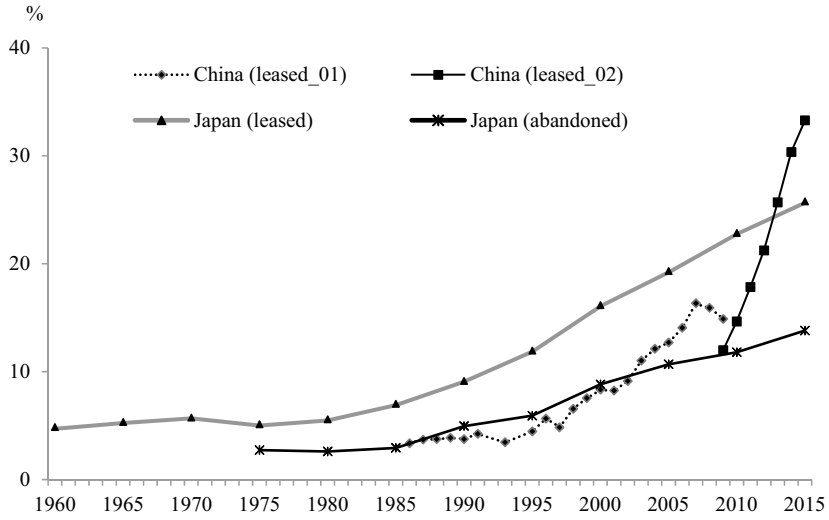

Fig. 5.4 Changes in the share of leased and abandoned farmlands (*Note* China: Data from 1986 to 2009 [leased_01] are from MoA ed. [2001] and [2010], and data from 2008 to 2015 [leasaed_02] are from *China Agricultural Development Report* [various years]; Japan: *Census of Agriculture and Forestry* by MAFF; Share of leased land in China is the total size of leased-out land divided by the total size of contract land; Share of leased land in Japan is the total size of leased-out land divided by the total size of cultivated land; Share of abandoned land is the total size of abandoned land divided by the total size of cultivated land. *Source* Author's creation)

promote land transfer through the rental market. Moreover, policy documents were issued by the central government in 2014 to formalize the three rights separation (ownership right, contractual right, and management right) and legalize existing land transfer practices in the past few decades (Cheng et al., 2019; Ye, 2015).

These legal reinforcements of land contracts greatly promoted land transactions in China. Figure 5.4 depicts that from 2000 to 2015, the share of leased land increased from 8 to 33%. Intermediary institutions, such as rural shareholding cooperatives, which have been generally organized by village committees since the mid-2000s, also play an important role in reducing transaction costs and promoting land transactions (Ito, Bao et al., 2016). However, administrative enforcement by the intermediary institutions restricts and, sometimes, suppresses rural residents' oppositions to land adjustment, causing potential dissatisfactions among rural residents. Thus, it is crucial to conduct institutional and legal adjustments to reconcile the efficiency and fairness of land utilization.

Although the Chinese government has not released statistical data on land abandonment, anecdotal evidence suggests that land abandonment is becoming a serious issue, especially in less developed remote regions (Yan et al., 2016; Zhang et al., 2016). As the aging of agricultural workers and the low profitability of farming are closely related to land abandonment in China, it is necessary to learn lessons of policy measures in Japan to prevent ineffective land utilization.

5.3.3 Agricultural Policy Cycle

As Hayami & Godo (2004) hypothesized, the objectives of agricultural policy and its measures change considerably with the development stages. In developing countries, governments tend to employ agricultural exploitation policies to accumulate government revenues to promote the development of domestic manufacturing. When the economy develops, the government begins to reduce the amount of resources taken out of agriculture and puts more government expenditure into it. Developed countries adopt agricultural protection to mitigate serious inequality of labor productivity between agricultural and non-agricultural sectors, which is caused by the high adjustment cost of reallocating workers. However, affluent budgetary support for the agricultural sector causes excess production of food, resulting in further political interventions

to support agriculture by implementing affluent production subsidies, favorable procurement prices, and high trade tariffs.

Following the theory, I compare the trends of the agricultural policy cycle of China and Japan based on two datasets. One is the Nominal Rate of Assistance (NRA) compiled by the World Bank (Anderson & Nelgen, 2013). The NRA is an indicator used to compare the price of a commodity in the domestic economy with the international price of the commodity at the border (including the total cost incurred to deliver imported goods, such as insurance and freight). A positive NRA indicates that the sector is being protected, whereas a negative NRA reveals the agriculture sector is being taxed (Huang et al., 2007). The other is the producer Nominal Protection Coefficient (producer NPC) estimated by OECD. The producer NPC is an indicator of the nominal rate of protection for producers, measuring the ratio of the average price received by producers (at the farm gate), including payments per ton of current output, to the border price. Similar to NRA, a positive producer NPC means protection of farmers, whereas a negative implies implicit taxation on agriculture. To compare these two indicators, I subtract 1 from the producer NPC.

Figure 5.5 depicts the changes in the NRA and producer NPC from 1986 to 2020. Because the World Bank stopped releasing the data on NRA after 2010, the coverage periods of the indicators differ. The figure clearly illustrates the agricultural policy cycle in China. The NRAs were negative from 1986 to 1993, suggesting that farmers were exploited by the Chinese government through considerably low purchase prices. However, the degree of exploitation was gradually alleviated, and the NRAs turned positive, but the ratios were approximately zero from 1994 to 2005. This change indicates that China's agricultural price policy became neutral, and China's objective to join the World Trade Organization (WTO) partially affected this change (Naughton, 2018). Although the upsurge of global food prices in 2007–2008 influenced the temporal backlash of the indicators, the NRAs for China reveal gradual but steady positive trends from 2005 to 2010. An almost similar policy cycle can be observed for the producer NPC, but the protective trend continued until 2020. These results indicate that China has pledged to change its neutral stance and has actively gotten involved in the protection of agriculture.

By contrast, Japan had consistently positive numbers throughout the period, and the shapes of both indicators have almost the same trend. However, the degree of agricultural protection in Japan is stronger than

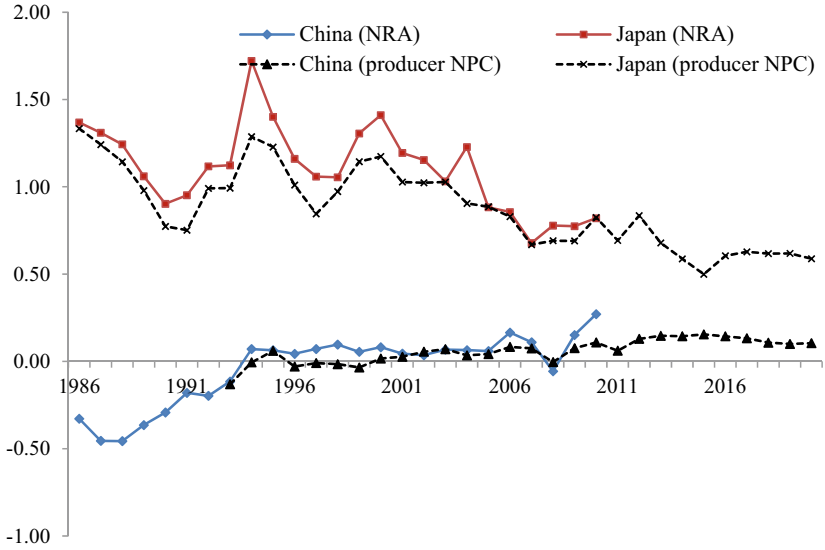

Fig. 5.5 Changes in NRA and producer NPC for China and Japan *(Source* Author's creation. The NRA is from the study of Anderson and Nelgen [2013]. The producer NPC is from the OECD PSE database: https://www.oecd.org/, accessed on August 21, 2021)

that in China, and the gap in the degree of protection began to diminish slightly since the mid-2000s. Although the indicators for Japan rebound during the late 2000s, the producer NPC experienced a gradual downward trend, decreasing from 1.17 in 2000 to 0.59 in 2020. The relaxation of agricultural protection in Japan probably stemmed from the changes in economic policies to revitalize agriculture and rural economy through international trade.

Previously, agricultural policies in Japan mainly focused on price and marketing control, using tariffs for key products to support farm households from the 1950s to the 1990s. Because of the Uruguay Round trade negotiations, Japan agreed to a preferential quota on rice imports and decided to introduce market mechanisms to rice distribution. Following the replacement of the GATT (General Agreement on Tariffs and Trade) with the WTO in 1999, Japan converted non-tariff border measures to tariff rate quotas (TRQs) for 28 commodities, including rice (OECD,

2021). To cope with the globalization of the economy, Japan enforced the Basic Law on Food, Agriculture, and Rural Areas in 1999. It aimed to establish a stable food supply by promoting domestic production and by improving the productivity of agricultural entities. Accordingly, Japan began to introduce direct subsidies for farm entities to stabilize their income, and the accumulation of farmland to core farm entities was promoted by the government to improve their productivities.

Japan also intensified negotiations with other countries to promote international trade and economic partnership and has signed bilateral economic agreements in recent years with several countries (e.g., Mexico, Chile, Australia, and Magnolia).[7] Furthermore, Japan exchanged large-scale trade agreements, including the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) in 2018, the Japan-EU Economic Partnership Agreement in 2019, and the Japan–U.S. Trade Agreement in 2020. These adjustments in agricultural policies and trade relationships have contributed to the gradual decrease in agricultural protection in Japan.

It appears that the experiences of structural adjustment in Japan would be instructive for China on how to balance agricultural protection/promotion with international rules. China officially enforced a policy of grain self-sufficiency in 2008 (more than 95% of grain should be produced domestically), but after joining the WTO, the target became more unrealistic due to massive soybean import from abroad. Therefore, since 2014, the Chinese government redefined grain self-sufficiency as maintaining "absolute" self-sufficiency in staple cereals (wheat and rice) but not in non-food grain. Accordingly, as explained in Sect. 5.2.4, China has continued to raise minimum support prices since 2009, leading to significant price gaps between domestic and international markets (Hoken, 2014; OECD, 2021).

This self-sufficiency policy involves substantial economic costs, such as expenses for supporting price, costs for preserving stockpiled grain, and related subsidies expenditures. Moreover, as part of the WTO membership negotiations, China's subsidies in the "amber box" (including price support payments) are limited to 8.5% of agricultural value added, and a fixed limit of low tariff grain import is allowed. Therefore, China has to reconcile grain self-sufficiency with international rules and implement appropriate agricultural policies.

China has initiated practical measures to promote structural adjustment under international rules. To reduce economic distortion and reinforce

price mechanisms, since 2016–2017, the government has abolished the official temporary purchase and storage policy at favorable prices and introduced direct payments based on the area planted for soybeans and corn. China also ratified the Regional Comprehensive Economic Partnership (RCEP) Agreement in 2021 and remains committed toward reducing or abolishing tariffs on selected agro-food products (OECD, 2021). These policies would contribute to the further development of Chinese agriculture.

5.4 Conclusions

The remarkable development of Chinese agriculture since the late 1970s was realized through institutional reforms and the diffusion of new technology. However, the reform of grain marketing frequently caused considerable confusion and fluctuation in their transactions. Moreover, because of the weak fiscal redistribution ability of the central government, a heavy financial burden on local authorities led to heavy taxes and an increase in local levies on rural residents during the 1990s. Therefore, pro-rural public policies have been implemented since the early 2000s. The policies intended to give more support to agriculture and rural villages, reduce the direct and indirect tax burden on farming, and implement policies to improve rural markets.

To deeply understand the structure of Chinese agriculture, this chapter compares the development path and agricultural policies of China and Japan. The results reveal that the development of agriculture has a common trajectory, but the socio-economic conditions and practical policies of Chinese agriculture have unique features. The development path of China's agriculture follows the path of Japan, transforming from land-saving to labor-saving technology and substituting labor with capital. However, contrary to those of Japan, mechanical services for plowing, planting, and harvesting in China are provided by specialized operators using large/medium-size tractors.

Moreover, confronted with rapid aging and a decrease in agricultural workers, policy supports for consolidating farmland through the land rental market and intermediate organizations have been intensified in both countries. The share of leased farmland in China has surpassed that of Japan since around 2010, and administrative enforcement by intermediary institutions has facilitated further transactions in China, but

also restricting rural residents' oppositions to land adjustment. Furthermore, since the late 2000s, China has experienced an agricultural policy cycle, and the protection of agriculture has been intensifying by raising minimum support prices for major grains, which is also the case in Japan but to a lesser degree. With the subsidy rule by the WTO, the price gaps between domestic and international markets appear to provoke serious conflict.

China is confronted with an issue of how to balance agricultural protection and promotion with international rules. The experiences of structural adjustment in Japan would be instructive for China to deduce appropriate institutional and policy implications that match the circumstances of Chinese agriculture.

Notes

1. Although the supply of public goods, including irrigation service, was stagnant due to the dissolution of collectives, privately owned and well-managed collectives that use power machinery, such as electric and diesel pumps, emerged in the 1990s (Lohmar et al., 2003).
2. In 2016, three types of subsidies (direct payment, comprehensive subsidy on agricultural inputs, and seed variety subsidy) were integrated into a single area payment scheme called "agricultural support and protection subsidy".
3. The standard work hours for agricultural labor in the *Compilation of Production Cost Data on Agricultural Products* are set at eight hours per day. Wage data are denominated by rural CPI (1998 = 100).
4. The definition of large/medium-size tractor in the *China Statistical Yearbook* has changed since 2016.
5. Data of Japan is from *Census of Agriculture and Forestry and Statistical Yearbook of MAFF*, and data of China is from *China Agricultural Census* (http://www.stats.gov.cn/, accessed on March 9, 2022). Although the *China Agricultural Census* published the summary tables on farm households according to their participations in farming and non-farming employment, the classifications among three waves of the census (1996, 2006, and 2016) are inconsistent.
6. In the agricultural census, abandoned land is defined as owned land that has not been cultivated for more than a year and whose owner does not intend to cultivate it in the next few years. MAFF began to collect the data from 1975.

7. Recent status of FTA/EPA and related initiatives are summarized in the website of the Ministry of Foreign Affairs of Japan (https://www.mofa.go.jp/policy/economy/fta/index.html, accessed on February 17, 2022).

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