



FFTC Agricultural Policy Platform (FFTC-AP)

Available online at: <http://ap.ffc.agnet.org/index.php>

Japan's Unique Position in the World Food Balance

Dr. Yoshihisa GODO
Department of Economics
Meiji Gakuin University
1-2-37 Shirokane-dai, Minato-ku, Tokyo 108-8636
Japan

email: godo@eco.meijigakuin.ac.jp

ABSTRACT

The pattern of global food trade changed dramatically between the pre- and post-WWII periods. Before WWII, developed countries colonialized today's developing countries and imported mainly primary products, including foods, from them. In contrast, after WWII, developed countries became net exporters to developing countries. However, Japan presents an exception: Japan, which is now one of the most developed countries in the world, is one of the biggest importers of foods. Why have developed and developing countries swapped positions post WWII? Why is Japan different from other developed countries? By addressing these questions, this study explores the agro-political dynamics of developing countries, developed countries, and Japan.

INTRODUCTION

Industrialized developed countries appear to have non-agricultural societies compared to developing countries where the agricultural sector accounts for a large share of the population and gross domestic product (GDP). Indeed, before WWII, a majority of today's developed countries imported foods (raw agricultural commodities) from their overseas colonies.

The structure of global food trade changed dramatically after WWII. Now, a majority of developed countries are net exporters of foods. However, Japan presents an exception. While Japan is one of the most developed countries in the world, it has become a major importer of food. The purpose of this study is threefold. First, this study explores how the pattern of food trade changed after WWII. Second, it discusses the changing agro-political dynamics in developed and developing countries, which resulted in a new imbalance of food production and consumption in the world. Third, it examines the uniqueness of Japan's position in the world food trade.

CHANGING PATTERN OF FOOD TRADE BETWEEN DEVELOPED AND DEVELOPING COUNTRIES

Before WWII, developed countries established several colonies in the less-developed areas of the world. Besides territorial ambition, there were economic reasons behind the colonialism. During that period, developed countries were in the midst of heavy industrialization. In the heavy industry, there is a strong scale economy. Thus, factories in developed countries rushed to expand production scales. Consequently, many of these countries suffered from overproduction of manufactured goods. They used their colonies as an outlet for their overflowing manufactured commodities. Simultaneously, by importing cheap foods from the colonies, developed countries could maintain the wage rate of factory workers because food expenditure accounted for a major part of their living costs.

Colonialism was repudiated in international society immediately after WWII. Former colonies became independent from their suzerain states. At first, those newly-established developing countries continued to export foods to developed countries. As can be seen in Table 1, even in the early 1960s, developed (or developing) countries were still net importers (or exporters) of foods from developing countries.

Table 1. Global Supply-Demand Conditions for Grains

	1961-1963 average			1979-1981 average			1999-2001 average			2010-2012 average		
	Output	Consumption	Net export	Output	Consumption	Net export	Output	Consumption	Net export	Output	Consumption	Net export
World	855	855	0	1,511	1,511	0	2,060	2,060	0	3,025	3,025	0
Developed countries	283	287	-3	516	476	39	637	530	107	681	608	74
Japan	20	23	-3	14	36	-12	12	39	-26	11	36	-25
Developing countries	572	569	3	996	1,034	-39	1,424	1,530	-107	2,344	2,418	-74
Middle-income countries	263	258	5	418	449	-31	484	565	-81	1,133	1,194	-61
Low-income countries	309	310	-2	577	585	-8	939	965	-26	1,211	1,223	-12

- Notes. a. Grains include barley, maize, millet, oats, rice, rye, sorghum, and wheat.
b. "Consumption" is calculated by subtracting net export from production.
c. Developed countries are OECD member economies in which the 1998 GNI per capita was \$9,360 or more. Middle-income countries are economies in which the 1998 GNI per capita was between \$761 and \$9,361, and there are some countries which have high-income but should not be included in developed countries: e.g., Kuwait, United Arab Emirates, and Brunei. These are 'non-OECD member economies in which the 1998 GNI per capita was \$9,360 or more'.
Low-income countries are economies in which the 1998 GNI per capita was \$760 or less. These income criteria are same as those set by the World Bank (*World Development Indicators*, 2000).
d. "World" is obtained by aggregating "Developed countries" and "Developing countries." Countries whose data are unavailable are excluded from the calculation (thus, "World" in this table does not exactly match the FAO's estimates for the world total).
e. "Net export" in low-income countries is calculated from those in developed and middle-income countries (so that "net export" in the world total equals zero).
f. There are few summation errors because of rounding.
g. Developed countries include Japan.

Source: FAO, *FAOSTAT Database*, 2000, 2004, 2016.

However, the situation has changed drastically over the last 50 years. Developed (or developing) countries had transformed from net importers (or exporters) to net exporters (or importers) of foods by 1980. Since then, developed (or developing) countries have been exporting foods to developing countries (or importing foods from developed countries).

Why have low-income countries, where a majority of the population lives on agriculture and has meager diets, become net importers of food? Why have high-income countries, where a very small fraction of the population engage in farming and have optimum nutrition, increase their food exports? To answer these questions, it is useful to examine the structure of food imbalance from both the demand and the supply perspectives.

Determinants of Food Demand

Total food consumption is defined as the total population multiplied with per-capita food consumption. Income level is a major determinant of the growth in both population and per-capita food consumption. As shown in Table 2, the lower the income levels, the higher the population growth rate¹.

Table 2. Average Annual Growth Rates of the Total Population and Per-capita GDP, 1960-2015

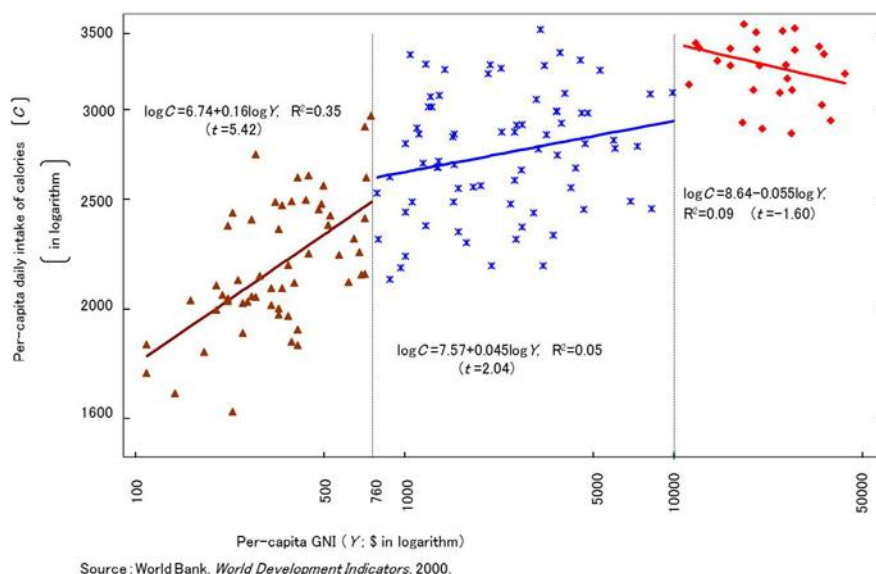
	2000	Growth rate (percent per year)			
		1960-80	1980-2000	2000-15	1960-2015
Population					
	(million persons)				
World	5,897	1.9	1.6	1.2	1.6
Developed countries	886	1.0	0.7	0.7	0.8
Japan		1.1	0.4	0.0	0.5
Developing countries	5,011	2.2	1.8	1.3	1.8
Middle-income countries	1,475	2.0	1.4	1.2	1.6
Low-income countries	3,536	2.4	2.1	1.6	2.1
Per-capita GDP					
	(\$ per person)				
World	5,203	2.6	1.3	1.5	1.8
Developed countries	26,662	3.4	2.1	1.0	2.3
Japan	38,511	5.7	2.6	0.7	3.2
Developing countries	1,208	3.1	1.3	4.2	2.7
Middle-income countries	1,934	3.5	1.5	4.3	3.0
Low-income countries	429	1.6	1.6	2.3	1.8

- Notes.
- Developed countries are economies in which the 2001 gross net income (GNI) per capita was \$9,206 or more. Middle-income countries are economies in which the 2001 GNI per capita was between \$745 and \$9,205. There are some countries which have high-income but should not be included in developed countries: e.g., Kuwait, United Arab Emirates, and Brunei. These are 'non-OECD member economies in which the 1998 GNI per capita was \$9,360 or more'. Low-income countries are economies in which the 2001 GNI per capita was \$744 or less.
 - Since the population increases faster in lower-income countries, the growth rates of per-capita GDP for the world fall short of those for developed and developing countries.
 - Developed countries include Japan

Source: Japan, Statistics Bureau, Ministry of Internal Affairs and Communications; World Bank, *World Development Indicators*, 2000, 2016.

The correlation between the growth rates of per-capita GDP and income level is not clear. However, the impact of income growth on food consumption significantly differs by income level. The regression estimates in Fig. 1 shows that the income elasticity of direct calorie consumption per day, per capita, declines from 0.16 in low-income countries to 0.045 in middle-income countries, and is negative (-0.055) in high-income countries.

Fig. 1. Per-capita GNI (Y) and per-capita daily intake of calories (C), 1997



It should be noted that grains are utilized not only for human direct consumption but also for feeding livestock. In developed countries, the number of health-conscious consumers that eat lesser livestock products is increasing. In contrast, in developing countries, meat consumption is growing due to income growth and westernization of eating habits. This also promotes the disequilibrium in food consumption between developed and developing countries.

Determinants of Food Supply

With globalization, technologies are actively transferred between countries. However, technology transfer is more difficult in agriculture than in manufacturing². This is because agricultural production is a biological process that is critically influenced by the natural environment, which is difficult to artificially control. Therefore, superior agricultural technologies and varieties developed in advanced countries located in the temperate zone cannot readily be applied in developing countries that have tropical environments. In contrast, manufacturing production is largely a mechanical process operated in the controlled environments of factories; so manufacturing technology is much easier to transfer from developed countries to developing countries. Thus, agriculture's comparative advantage tends to decline in developing countries, especially in middle-income countries achieving rapid industrialization by technology transfer from developed countries.

THE POLITICS BEHIND INTERNATIONAL FOOD TRADE

If food trade between developed and developing countries operated according to the principle of comparative advantage under free-market competition, developing countries would have no issues in becoming net food importers. However, political distortions in both developed and developing countries are the major determinant of international food trade. In high-income countries, despite a chronic oversupply of food, domestic farm production continued to be heavily subsidized, resulting in heavy burdens on consumers and taxpayers. In contrast, in low-income countries, governments often employ agricultural-exploitation policies, further aggravating their food shortage.

Why are developed and developing countries unable to escape from this stalemate? This study addresses this question by examining the agricultural problems fundamentally influencing agricultural policies at different stages in economic development³.

The Food Shortage Problem in Low-Income Countries

In low-income countries, the government's main objective is to promote industrialization. Before WWII, most of today's developing countries had been forced by colonial powers to become the suppliers of primary commodities and the markets for manufactured commodities under the pretext of "division of labor." Partly due to developing countries' antipathy to colonialism, most developing countries adopted policies to promote industrialization upon their independence after WWII. The "import-substitution industrialization" (ISI)⁴ strategy became very popular among developing countries post-WWII. A common policy mix under ISI for promotion of target industries was to raise the domestic prices of their products by border protection and simultaneously allocate an import quota of capital and intermediate goods to those industries so that they could enjoy the profits from the imports and foreign exchange licenses allocated to them under the overvalued exchange rate.

The victims of this policy were not only consumers who were forced to purchase commodities at increased prices, but also unprotected industries. In particular, agriculture suffered from the lowered product prices due to the overvalued exchange rate, and had to purchase high-priced inputs produced by protected industries.

Moreover, many low-income countries introduced "marketing boards" whereby the government monopolized the collection of agricultural commodities from farmers at lower-than-market prices. The government often received food aid from developed countries to earn profits by selling this food in the market. These governmental revenues were used to subsidize the domestic manufacturing sector in addition to enlarged government consumption.

Besides obtaining government revenue, the supply of cheap food by such government interventions was aimed at preventing labor costs in the manufacturing sector from rising. Since the Engel coefficient in low-income countries is high, the increases in food prices can increase wage rates in urban areas, sometimes leading to riots. If low-income countries were able to earn plentiful foreign currency by exporting manufactured commodities, the food price hike could be avoided by importing food from international markets. However, the manufacturing sector in low-income countries usually lacked sufficient international competitive advantage.

Thus, policymakers in low-income countries should seek to raise agricultural productivity by strengthening research, extension, and education. However, building human capital and infrastructure takes a long time. Since the current need for securing cheap food supply is urgent, it is difficult for policymakers to resist the temptation of adhering to agricultural-exploitation policies. Once exploitation policies are adopted, momentum works to strengthen them further, since lowered agricultural product prices diminishes the farmers' incentive to produce and invest in agriculture, compelling the government to increase agricultural exploitation to secure the same amount of domestic food supply.

In low-income countries, the agricultural population is large but politically weak. Since farmers have little education and are scattered over a wide area with underdeveloped communication infrastructure, they rarely know how the prices of their products are lowered by government policies. Under this environment, it is especially difficult for them to organize political protests against politicians living in distant cities. In contrast, urban businesses and labor are better organized for political lobbying, since they are better educated and live closer

to each other with better communication systems. Thus, politicians fear high food prices that could trigger urban riots but have little concern for about rural hunger in remote hinterlands. Under such political economic conditions, agricultural-exploitation policies persist in low-income countries.

Additionally, since the world financial crisis in the early 1980s, many low-income countries have accumulated external debts and are under pressure from international financial organizations to assure foreign currencies to pay their debts. Consequently, the governments in low-income countries promote the production of cash crops, such as flowers and cacao, instead of subsistence crops, which further discourages their domestic food production. Therefore, many low-income countries suffer from chronic food shortage. This problem should be called “food shortage problem,” which is serious in low-income countries.

The Overprotection Problem in High-Income Countries

Compared to low-income countries, agricultural production is heavily protected in developed countries. This agricultural protection stems from the difficulty in reallocating resources (particularly labor) from the agricultural to the non-agricultural sector. Another reason is slow demand growth for food relative to the technical progress in agricultural production. In affluent economies, food demand increases very slowly because the population growth rate is low and food consumption is largely saturated. In contrast, domestic food supply growth rate is high because of the high rate of investment in agricultural research, development, and extension. Thus, domestic food demand growth tends to lag behind that of domestic supply.

When excess food supply is faced with inelastic demand, the rates of return for the resources used in agricultural production decline, unless the resources are transferred from the agricultural sector to the non-agricultural sector at a sufficiently rapid speed. In reality, the inter-sectoral transfer of resources takes time, and it is difficult to reallocate labor from the rural to the urban sector at a rate rapid enough to achieve income parity between the farm and non-farm population. Agricultural protection policies were initially adopted to mitigate the cost of this adjustment, disproportionately shouldered by the farm population.

However, similar to exploitation policies, once protection policies are instituted, momentum strengthens them further, because high product prices caused by border protection reduces farmers’ incentive to reduce production cost, and the institutional rent created by government interventions further encourages rent-seeking activities⁵.

Agricultural protection policies would not have been instituted unless they were accepted by the non-farm population. In general, resistance to agricultural protection policies is weak in high-income countries. Agriculture’s share in labor employment and the GDP is small in high-income countries, so the burden of agricultural protection per capita of the non-agricultural population is small. Corresponding to increasing income levels, consumers’ resistance to agricultural protection is reduced because the Engel coefficient becomes so low as to make the effect of rising food prices on the cost of living insignificant. Moreover, with economic development, an increasingly large amount of consumers’ food expenditure is allocated to marketing and processing services, while a smaller portion is allocated to the production of raw food products in the domestic agricultural sector. With declining effect of raw foodstuff prices on the cost of living, agricultural protection has a smaller effect on the wage rate, and hence, is less strongly resisted by not only consumers but also business employers and labor unions. Meanwhile, the small number of farmers with good education and communication constitutes a very powerful political block that is hard for politicians to resist. In this way, the political equilibrium regarding agriculture in high-income economies is

diametrically different from that in low-income economies. This should be called “overprotection problem” in high-income countries in contrast with “food shortage problem” in low-income countries.

The Disparity Problem in Middle-Income Countries

As mentioned above, the prime political objective in low-income countries is to secure low-price food for urban workers while that of high-income countries is to prevent farmers’ income levels from falling further behind those of urban workers. In the course of economic development, there is a stage wherein both these objectives become simultaneously important. Fig. 2 shows how the political objective changes with economic development. The “food-shortage-problem stage” is defined as the stage wherein concern regarding securing low-price food dominates agricultural policies; and the “overprotection-problem stage” as the stage wherein concern regarding balancing farmers’ and urban workers’ income levels dominates agricultural policies. The “disparity-problem stage” is defined as the stage wherein both the above concerns are more or less equally important. These three stages roughly correspond to the low-income, high-income, and middle-income stages respectively.

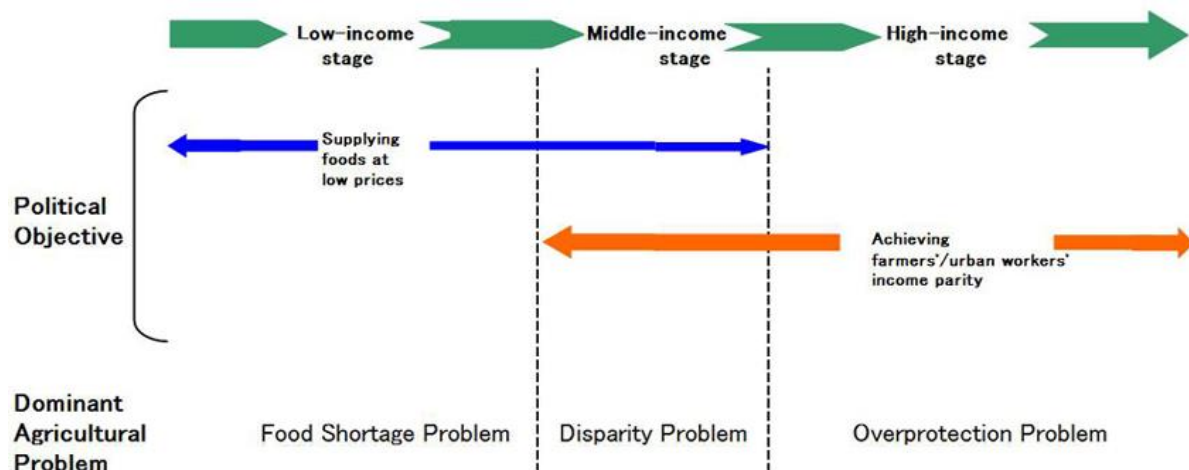


Fig. 2. Agricultural problems at Different Stages of Economic Development

At the disparity-problem stage, the prime concern of politicians is to relieve farmers from poverty. However, “poverty” here means not absolute poverty but relative poverty⁶. Absolute poverty among farm population is less severe in middle-income countries than in low-income countries. In the middle-income stage, where industrialization progresses by borrowing technology from developed countries, newly-risen well-to-do families, including workers employed in large-scale modern enterprises, form a new social class in urban areas. Observing an income difference from the newly-risen urban families, farmers become envious and eventually develop grudges against the social system that keep them in poverty, occasionally culminating in social disruptions.

This poverty problem is closely related with the so-called “dual structure” economy that emerged in the process of industrialization⁷. The dual structure refers to a situation characterized by the coexistence of a formal sector comprising large-scale, capital-intensive enterprises paying high wages to their employees and an informal sector comprising of small-scale, labor-intensive enterprises based on cheap labor. The formal sector is largely closed to laborers in the informal sector, including employees in small-scale enterprises,

casual contract laborers, petty traders, and self-employed manufacturers. With labor codes and unions exclusively applicable to large-scale enterprises, their labor costs are high despite the abundant availability of low-wage laborers in the informal sector. Therefore, strong incentives are at work among entrepreneurs in the formal sector to increase capital intensity by adopting labor-saving technologies. Thus, employment increases at a much slower rate than the output. The income gap tends to widen cumulatively between employees in the formal and the informal sectors.

Typically, the informal sector functions as a buffer in the labor market. Many small-scale enterprises engage in production as subcontractors of large-scale enterprises. Since employment in the formal sector is largely permanent, large-scale enterprises limit their use of subcontractors during an economic slump. Correspondingly, many laborers in the informal sector who came from farm households are forced to return to their parents or relatives in their home villages, when they are laid off. In addition to the economic burden of feeding these returnees, farmers face sharp drops in farm product prices because of the low price-elasticity of food demand. Thus, during an economic recession, farmers suffer from dire poverty, intensifying their grudge against urban people.

Supported by the sympathy of the intelligentsia, farmers' dissatisfaction may elevate into serious anti-government movements. Therefore, the government is forced to adopt agricultural protection measures. However, this protection is not strong enough to reduce the income gap between farmers and urban workers, unlike in the high-income stage. Since the percentage of agriculture still remains relatively large, it is impossible for the government to secure sufficient financing to close the income gap. Additionally, increased food prices cause major damage to a many small-scale enterprises in urban areas, which heavily rely on cheap labor. Developing countries can escape from the low-income stage to the middle-income stage by borrowing technology from developed countries. However, successful industrialization by technology transfer tends to result in the formation of a dual structure economy and the emergence of the disparity problem between farmers and newly-risen urban families. Under the conditions of the disparity problem, policymakers in middle-income countries are forced to search for ways to protect farmers within the constraint of the lingering food shortage problem.

JAPAN'S UNIQUE POSITION IN THE WORLD FOOD BALANCE

Japan is one of the major developed countries; however, its food balance is different from other developed countries'. As can be seen in Table 1, Japan has been a net importer of foods. Additionally, the gap between agricultural production and consumption increased until 2000. Why is Japan different from other developed countries?

There are various possible reasons. First, Japan had a late-start in industrialization compared with developed countries in Europe and North America. Using the latecomer's advantage, Japan's income grew so rapidly that Japan reached the high-income stage during this period of rapid resource transfer from the agricultural to non-agricultural sector. Indeed, the percentage of agricultural laborers in the total labor force was 32% in 1960, which was much higher than other developed countries⁸. This percentage declined drastically to 6% in 2000.

Second, unlike other developed countries, Japan's major crop is rice. Unlike corn and wheat, which are major crops in Europe and North America, rice is not popularly used for feeding and materials for food processing⁹. Thus, Japan's research and development on rice has been directed toward improving taste rather than increasing yield. Moreover, by employing a government-led rice-production cartel, called the acreage control program, the

Japanese government succeeded in keeping domestic rice prices higher than the market price¹⁰. As such, the Japanese government provided strong income support for farmers without increasing crop production.

However, the agricultural situation changed after 2000, in both Japan and other developed countries. As can be seen in Table 1, the overproduction of foods in developed countries declined from 2000 to 2010. A major reason is that, under the framework of the World Trade Organization, developed countries introduced less production-stimulative protection measures, such as decoupled-type agricultural subsidies. Thus, developed countries, as a whole, began amending their conventional programs to increase agricultural production.

In contrast, Japan's net food imports stopped increasing. One reason is the decline in food consumption due to depopulation and aging. Another reason is that, while the acreage control program had been operated by agricultural cooperatives' collaborating with the government, imposing the acreage control program nationwide is becoming more difficult because agricultural cooperatives lost their organization abilities in the last two decades¹¹. Additionally, under the slogan of "increasing Japan's food sufficiency," the government started various subsidy programs for increasing crop production, e.g., subsidies for production of feeding rice and agricultural exports¹². Thus, Japan's agricultural policy is going in the same direction as employed by other developed countries until 2000.

CONCLUSION

The current world food imbalance is epitomized by food deficits in low-income countries and surpluses in high-income countries. These conditions are not merely the results of differences in demand and supply structures corresponding to different income levels but have been aggravated by policies dictated by the three agricultural problems in different stages of economic development: the food problem in the low-income stage, the disparity problem in the middle-income stage, and the overprotection problem in the high-income stage¹³.

Due to the food shortage problem, policymakers in low-income countries have been inclined to adopt policies geared toward securing low-priced food for urban consumers at the expense of farm producers. In contrast, due to the overprotection problem, politicians in high-income countries have not been able to resist the pressure from the farming lobby to institute policies that raise farmers' incomes to the level of non-farm workers. Significant inefficiency and inequity resulting from these contrasting policy distortions have already been amply documented and the need to reduce these distortions has been widely recognized¹⁴.

In contrast, the disparity problem in middle-income countries has received relatively little attention. However, this can be a serious problem for developing countries trying to catch up with high-income countries. Japan during the inter-war period represents the best example of failing to adequately cope with this problem¹⁵. The growing dissatisfaction and frustration of farmers, who felt they were denied urban prosperity resulting from successful industrialization based on borrowed technology, culminated in social disruptions including terrorism; this was a major factor that allowed militarism to gain power, ending in the tragedy of WWII. Recent political instability and terrorism in newly-industrialized economies, such as China and Thailand, might reflect the aggravation of the disparity problem, besides other problems. Agricultural policy coordination in this stage is extremely difficult because the government has to face two contradictory objectives: securing low-price food to support industrial development and preventing farmers' income level from falling further behind that of urban workers. Coping with these contradictory requirements should be one of the top concerns for both agricultural economists and development economists.

In the global food market, Japan occupies a unique position. While Japan is one of the most developed countries, it is also one of the major food importers in the world. As discussed in the previous section, this is because rice is a major crop in Japan, but a minor crop in other developed countries, and Japan's government-led rice-production cartel has worked effectively as a protection measure for farmers' income. However, Japan's agro-political dynamics are now changing. Recently, under the slogan of "increasing Japan's food self-sufficiency," the Japanese government introduced various measures to increase domestic crop production. This also contrasts with other developed countries, which are now replacing conventional agricultural protection measures with less trade-distortive ones.

Notes

1. As can be seen in Table 2, the population growth rate in low-income countries slowed down significantly for the period 2000-2015. Accordingly, the food deficit in low-income countries decreased sharply since 2000, as shown in Table 1.
2. Otsuka and Larson (2016) comprehensively discuss the problems and possible solutions for the international transfer of crop varieties and farming technologies.
3. In the classic treatise, Schultz (1953) discusses how the nature of agricultural problems changes according to the economic development stages. Since the agricultural conditions and environment have changed completely since then, Schultz's discussion should not be applied to today's agriculture. However, his focus on the relationship between the nature of the agricultural problem and economic development stages is useful even now. In fact, his discussion inspired this study.
4. Szirmai (2005) provides a compact and concise review of import-substituting industrialization.
5. In the 1994 Marrakesh Agreements, the World Trade Organization set rules for capping and reducing trade-distorting domestic agricultural supports for developed countries. The effectiveness of the Marrakesh Agreements is debatable, as discussed in Orden, Branford, and Josling (2011) and Anania and Bureau (2005). However, there is still a possibility that the World Trade Organization's efforts contributed to reducing the food surplus in the 2000s, as shown in Table 2.
6. United Nations (2005) provides the theoretical background and measurement methodologies for absolute and relative poverty.
7. The dual structure model was first established by Lewis (1954), and extended and formalized by Ranis and Fei (1961). For further details, see Hayami and Godo (2005), and Todaro and Smith (2012).
8. These data are available from the homepages of the Statistic Bureau, Ministry of Internal Affairs and Communications, and the Ministry of Agriculture, Forestry and Fisheries. Due to changes in survey methodologies, the data is not relevant for 2005 and thereafter.
9. Additionally, the international trade market for rice is small compared to that for wheat and corn, which are major crops in Europe and North America. According to the Food and Agriculture Organization (FAO; *FAO Stat Database* 2016), the total global trade of rice in 2013 was 37.8 million tons, much smaller than that of wheat (177.9 million tons) and corn (120.1 million tons).
10. Godo (2013) provides a compact and concise description of the acreage control program.
11. Godo (2014) discusses the major reasons for the decline in agricultural cooperatives' organizational abilities.
12. Since the establishment of the Food, Agriculture, and Rural Areas Basic Act in 1999, the Japanese government set an official target for Japan's food self-sufficiency and designed a

- roadmap to achieve it. This plan and roadmap is revised every five years.
13. When a country that has attained a certain level of development finds it difficult to make the leap required to become an advanced country, the situation is referred to as the middle-income trap. As highlighted by the World Bank (2012), escaping from the middle-income trap is one of the critical issues facing development economists. The disparity problem can be seen as a symptom of the middle-income trap.
 14. For example, see Otsuka (2013) and Orden, Branford, and Josling (2011).
 15. For further details, see Hayami (1988).

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Date submitted: June 4, 2017

Reviewed, edited and uploaded: June 12, 2017