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The Three Agricultural Problems in the Disequilibrium of World Agriculture

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The disequilibrium of world agriculture has been worsening as manifested by increasing food deficit in developing economies in contrast with increasing surplus in developed economies. Underlying this disequilibrium are policies determined by the three different agricultural problems confronted by countries depending on their different development stages. "Agricultural problem" is defined here as the problem of an overriding concern to policymakers with respect to designing and implementing policies for agriculture as part of policies to promote national economies in their own countries. As such, it may well be called the "basic problem in determining agricultural policies".

In his classic treatise, Theodore Schultz (1953) specified the two different agricultural problems confronted by low-income and high-income economies. He referred to the "food problem" as that faced by low-income economies; these economies characterized by rapid population growth and high food demand elasticity are under the constant risk of experiencing shortage in the supply of food relative to demand. The resulting high food prices pull up the costs of living and the wage rates of workers in non-farm sectors, and thereby suppress industrialization and overall economic growth. Therefore, the prime policy concern in low-income economies is to prevent food shortage from occurring.

Schultz argued that the "farm problem" faced by high-income economies is diametrically different from the food problem; because population growth slows down and food consumption is saturated in the high-income stage, there is a tendency in high-income economies for food demand to be exceeded by supply with the result that food prices and farm incomes decline. Under the powerful lobbying by farmers, agricultural policies in high-income economies are mainly geared toward preventing farm incomes from falling.

Later, Schultz (1978) identified these two agri-cultural problems as underlying the policies to exploit or tax agriculture in low-income countries in contrast to the policies to protect or subsidize agriculture in high-income countries. His hypothesis has been established as a paradigm among agricultural economists as it found support from several empirical studies (Anderson and Hayami 1986; Hayami 1988; Krueger et al. 1991).

Lowering food prices by such means as government compulsory procurement of farm products from producers at lower-than-market prices, or accepting food aid from developed countries are the policies adopted in low-income countries to secure the supply of cheap food to non-farm workers at the expense of farmers. In contrast, raising agricultural product prices by such means as border protection, and reducing domestic production by such means as acreage control are the policies to support farmers' incomes at the expense of consumers or taxpayers.

In this paper, the agricultural problem underlying policies to depress food prices and farm incomes in low-income countries is called the "food

problem" following Schultz's terminology, but the agricultural problem underlying policies to support farm incomes in high-income countries is called the "protection problem", instead of Schultz's "farm problem" or Hayami's (1988) "agricultural adjustment problem."

Despite the change in terminology, the basic framework adopted is the Schultz theory on the two agricultural problems. In addition, it would be useful to identify an additional agricultural problem specifically faced by middle-income countries. This problem is brought about by a lag in productivity growth in agriculture behind non-agriculture as a result of the successful industrialization that raised these economies to a middle-income stage.

At this stage as compared with the previous low-income stage, the food supply capacity rises and factors causing demand growth are weakened, but people's per capita incomes do not yet reach a level at which food consumption is completely saturated as in the high-income economies. As a result, terms of trade between agriculture and non-agriculture remain largely stable, despite significant decreases in agriculture's productivity relative to non-agriculture. Therefore, farmers' income level declines relative to non-farmers' corresponding to the widening productivity gap.

By observing non-farm workers' rapid escape from poverty, farmers who are left behind begin to realize how poor they are, even if their income level did not decrease or even slightly increased from the previous stage. Dissatisfaction of the farm population on their remaining to be poor despite visible improvements in other sectors often becomes a significant source of social instability. Thus, at the middle-income stage, it becomes a prime concern of policymakers in middle-income countries to prevent rural-urban income disparity from widening. This agricultural problem is called the "disparity problem" in this paper, because it is by nature the problem of income disparity between farm and non-farm sectors.

This paper tries to illustrate how these three agricultural problems are shaped and are binding agricultural policies designed in countries belonging to the three respective development stages, using the newest set of international comparative data. Following this introduction, Section 2 outlines the structure of disequilibrium in world agriculture. Section 3 delineates the three different agricultural problems operating in different regions in the world and identifies their relationships with the disequilibrium in world agriculture. Section 4 concludes with discussions on the perspective of reducing the disequilibrium.

WORLD AGRICULTURE IN DISEQUILIBRIUM

World agriculture is in disequilibrium with the coexistence of food shortage, hunger and malnutrition in some areas, and food surplus and excess nutrition intake in others. This disequilibrium is manifested in the growing imbalance of food supply and demand between developed and developing economies. In the early 1960s, the demand and supply of grains were almost balanced within developing countries as well as within developed countries (Table 1).

However, demand for grains in developing countries (including both low-income and middle-income countries) exceeded their domestic production by 40 million tons in 1980 and by 50 million tons in 2000, which were filled by imports from developed (high-income) countries. Why have low-income countries, in which the majority of population makes a living on agriculture and takes only a meager diet, turned out to be the net importers of food? Why have high-income countries, in which a very small fraction of the population engages in farming and takes more than optimum nutrition, increased their food export capacity? What were the factors underlying this widening food imbalance? To answer these questions, it is useful to examine the structure of food imbalance from both the demand and the supply sides.

Determinants of Food Demand

Total food consumption is equal to total population multiplied by per capita food consumption. The level of income is a major determinant of the growth of both population and per-capita food consumption. As shown in Table 2, the lower are the income levels, the higher are the population growth rates. Growth rate of per-capita GDP is also negatively correlated with income level, but not as clearly as its correlation with population growth rate. However, the effect of income growth significantly differs by income level. As the regression estimates in Figure 1 show, the income

Table 1. Supply-demand condition of grain in the world (million tons)

	1961-63 average			1979-81 average			1999-2001 average		
	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
Developed countries	283	287	-3	516	476	39	637	530	107
Developing countries	572	569	3	996	1,035	-39	1,424	1,530	-107
Middle-income countries	263	258	5	418	449	-31	484	565	-81
Low-income countries	309	310	-2	577	585	-8	939	965	-26

Notes
- a. Grain consists of barley, maize, millet, oats, rice, rye, sorghum, and wheat.
- b. 'Consumption' is calculated by subtracting 'net export' from 'output'.
- c. Developed countries are OECD member economies in which 1998 GNI per capita was $9,360 or more. Middle-income countries are economies in which 1998 GNI per capita was between $761 and $9,361 and non-OECD member economies in which 1998 GNI per capita was $9,360 or more. Low-income economies are economies in which 1998 GNI per capita was $760 or less. These income criteria are same as World Bank World Development Indicators, 2000.
- d. "World' is obtained by aggregating 'developed countries' and 'developing countries'. Countries for which necessary data are not available are not included in calculation (thus, 'world' in this table does not exactly match 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 as to make 'net export' in the world total zero).
- f. There are some summation errors because of rounding.

SOURCE: FAO. FAOSTAT Database 2000 and 2004.

Table 2. Average annual growth rates of total population and per capita GDP, 1960-2000

		Growth Rate		
	2000	1960-80	1980-2000	1960-2000
Population	(million persons)		(percent per year)	
World	5,897	1.9	1.6	1.8
Developed countries	886	1.0	0.7	0.9
Developing countries	5,011	2.2	1.8	2.0
Middle-income countries	1,475	2.0	1.4	1.7
Low-income countries	3,536	2.4	2.1	2.3
Per-capita GDP	($ per person)			
World	5,203	2.6	1.3	1.9
Developed countries	26,662	3.4	2.1	2.8
Developing countries	1,208	3.1	1.3	2.2
Middle-income countries	1,934	3.5	1.5	2.5
Low-income countries	429	1.6	1.6	1.6

Notes
- a. Developed countries are economies in which 2001 GNI per capita was $9,206 or more. Middle-income countries are economies in which 2001 GNI per capita was between $745 and $9,205. Low-income countries are economies in which 2001 GNI per capita was $744 or less.
- b. Because population growth rates are higher in lower-income countries, per-capita GDP in the world grows slower than that in the developing countries as well as that in the developed countries.

SOURCE: World Bank. World Development Indicators 2003.

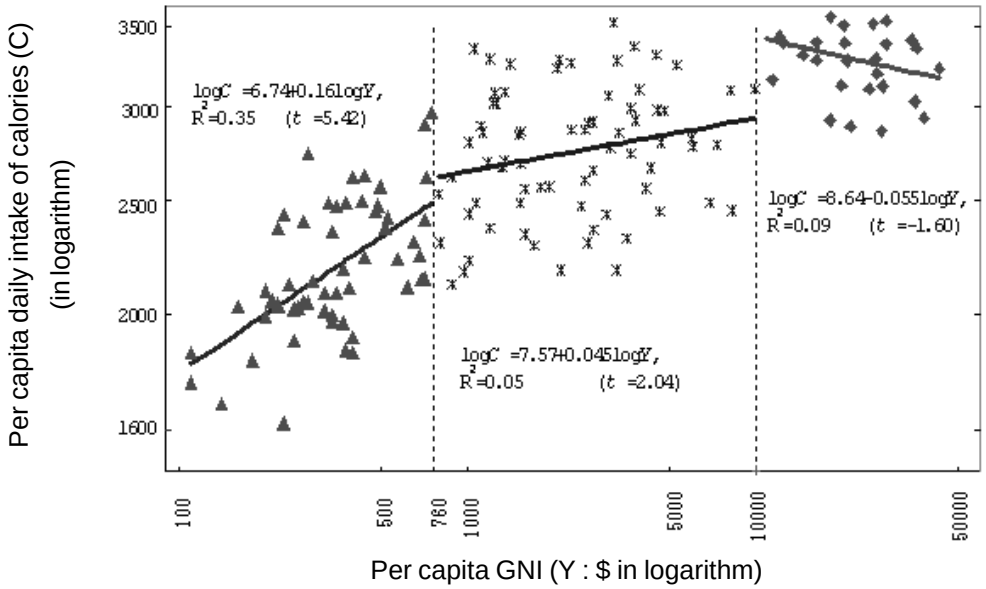

Fig. 1. Per Capita GNI (Y) and Per Capita Daily Intake of Calories (C), 1997 (SOURCE: World Bank, *World Development Indicators*, 2000.)

elasticity of direct calorie consumption per day per capita declines from 0.16 in low-income countries to 0.045 for middle-income countries, and turns to be negative (-0.055) in high-income countries.

It should be noted that if food consumption is measured by "primary calorie intake" including food and feed crops for producing food for human direct consumption, the income elasticity of food demand will be higher because richer people generally consume more protein-rich animal foods (Mellor 1983; Mellor and Johnston 1984). Thus, including feed crops, the demand elasticity for agricultural products may be around 0.5% for the developing countries. On the other hand, even including feed crops, demand for agricultural products in developed countries is already saturated.

Considering the above-mentioned factors namely, income elasticity, population growth and per-capita GDP, the annual growth rate of demand for food in terms of grains (including both food and feed grains) from 1960 to 2000 can be estimated as nearly 3% in developing countries (3 to 4% in low-income countries and 2 to 3% in middle-income countries) and much less than 1% in developed countries.

Determinants of Food Supply

Then, how about food supply situations? Table 3 shows the growth rates of domestic agricultural output (which are considered proxies for domestic food supply) in three country groups and the decomposition of their factors. Annual growth rates of agricultural output between 1965 and 2000 were 1.2% in developed countries, which was significantly lower than 2.2% for developing countries (2.4% in low-income countries and 2.0% in middle-income countries).

Even though the growth rate of domestic agricultural output in developing countries was higher than in developed countries by 1 percentage point, it was far less sufficient to compensate for the difference in the growth of demand by about 3 percentage points. It seems reasonable to assume that, in developing countries grouped together, the growth of domestic food supply lagged behind domestic demand by about 1 percentage point per year, whereas the supply increased faster than the demand by about 1 percentage point in developed countries; this is the basis of the growing food imbalance between developed and developing countries observed in Table 1.

The decomposition of output growth into increases in total input and total productivity is attempted in Table 3. Total input is the aggregate of conventional inputs applied to agricultural production, such as farm labor, land, machines and

Table 3. Comparison of average annual growth rates of agricultural output, inputs and productivities among country groups, 1965-2000

	Developed countries	Developing countries		
		Total	Middle-income countries	Low-income countries
Total output (Y)	1.2	2.2	2.0	2.4
Labor (L)	-1.6	1.5	0.1	3.4
Labor productivity (Y/L)	2.8	0.7	1.9	-1.1
Total input (I)	-0.3	2.2	1.3	3.5
Total productivity (Y/I)	1.5	-0.1	0.7	-1.1

Notes
a. Classification of country groups is same as Table 1.
b. Simple average of countries for which data are available.
c. Estimation methodologies are same as Kawagoe and Hayami (1985).
SOURCE: FAO. FAOSTAT 2000, 2002.

fertilizers following the methodology of Kawagoe and Hayami (1985). By subtracting growth rate of total input from that of total output, the growth rate of total productivity is obtained, which is considered a crude measure of technological change in agriculture. The major difference in technological progress should be obvious. In high-income countries, technological progress was able to more than offset significant decreases in conventional inputs, especially labor. On the contrary, total productivity recorded a negative growth in low-income countries. It was positive in middle-income countries but less than half the rate in high-income countries.

What explains the difference in growth rate of total productivity? New technologies and varieties can be developed and expanded through the public research and extension services. Upgrading of farmers' capacity to utilize new technologies is required. Also, knowledge and skill in the construction and operation of agricultural production infrastructure such as irrigation systems are necessary.

In other words, the capabilities of farmers, agricultural scientists, engineers and extension workers as well as administrators are critically important for improving productivity. This human capital is created by public and private educational investments in the past. It should be valid to assert that the differences in human capital endowment between developed and developing countries account for the difference in the growth of total productivity as shown in Table 3.

This difference of growth rate of total productivity between developed and developing countries plays an important role in the world food supply-demand condition. Table 3 shows that the annual growth rate of total productivity from 1965 to 2000 was about 1.5% in developed countries and almost 0% in developing countries. If this annual growth rate was 0.75% in both developed and developing countries, food supply would have increased 0.5% in developed countries and 3% in developing countries. In that case, the demand-supply condition of food in both countries would have been unchanged between 1965 and 2000.

Table 4 shows the comparative advantages of selected countries in terms of real labor productivity in agriculture relative to that of manufacturing. Among developing countries, India, the Philippines and Korea are selected as representatives of low-, lower-middle-, and upper-middle- income stages, respectively.

In developed countries, there was no significant difference in growth rate of labor productivity between the agricultural and manufacturing sectors. On the other hand, in developing countries, manufacturing's labor

Table 4 The average annual growth rates of real labor productivities in agriculture and manufacturing in selected countries, 1965-1995

	Average growth rate per year of labor productivity		Rate of change in comparative productivity
	Agriculture (1)	Manufacturing (2)	(1)-(2)
Developed countries			
USA	2.7	3.4	-0.7
UK	2.7	3.2	-0.5
France	5.2	3.6	1.6
Germany[a]	5.1	4.0	1.1
Japan	5.1	5.5	-0.3
Average[b]	4.2	3.9	0.2
Developing countries			
Korea	5.3	11.0	-5.7
Philippines	1.4	10.2	-8.8
India	1.7	2.3	-0.7
Average[b]	2.8	7.8	-5.0

Notes
a. 1965 values are estimated by aggregating data for the Federal Republic of Germany and those for the German Democratic Republic
b. Simple average of sampled countries.

SOURCES: FAO. FAOSTAT Database 2000; United Nations. Industrial Development Organization, Industrial Development Global Report, 1998 edition; United Nations. The Growth of World Industry, 1971, 1977, and 1984 editions; International Labor Organization. Yearbook of Labor Statistics, 1973 and 1979 editions.

productivity increased much faster than that of agriculture, indicating that comparative advantage in agriculture declined in developing countries and increased in developed countries according to the theory of international trade. The intersectoral differences in labor productivity growth were especially large in the Philippines and Korea, which have been undertaking rapid industrialization. This is consistent with the observation that food imports increased mainly in middle-income countries as shown in Table 1.

The difficulty of technology transfer from developed to developing countries is greater in agriculture than in manufacturing. Because agricultural production is a biological process, it is critically influenced by natural environments which are difficult to control artificially. Therefore, superior agricultural technologies and varieties developed in advanced countries located in the temperate zone can not readily be applied in developing countries under tropical environments.

In contrast, manufacturing production is largely a mechanical process operated in controlled environments in factories, so that its 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 borrowing technology from developed countries.

THE THREE AGRICULTURAL PROBLEMS

If the food trade between developed and developing countries were operating according to the principle of comparative advantage under free market competition, there should be no problem for developing countries to become net food importers. The reality, however, is that political distortions in both developed and developing countries are the major determinant of food trade. In high-income

countries, despite chronic oversupply of food, domestic farm production continued to be subsidized so heavily, resulting in substantial burdens on consumers and taxpayers.

On the other hand, in low-income countries, governments often employ agriculture-exploitation policies, further aggravating their food shortage. Why are developed and developing countries unable to escape from such a stalemate? An explanation on the three agricultural problems fundamentally binding agricultural policies at different stages in economic development may provide the answer.

The Food Problem in Low-Income Countries

In low-income countries, the major objective of the government is to promote industrialization. Before the Second World War, most of today's developing countries had been forced by colonial powers to be the suppliers of primary commodities and the markets for manufactured commodities under the pretext of "division of labor." Partly because of the developing countries' antipathy to colonialism, most developing countries adopted policies to promote industrial-ization upon their independence after the Second World War. Very popular during the three decades after the War was the so-called "import-substitution industrialization" (ISI) strategy.

A common policy mix under ISI for promotion of target industries was to raise the domestic prices of their products by means of border protection and, at the same time, allocate to those industries an import quota of capital and intermediate goods so that they could enjoy profits from import and foreign exchange licenses allocated to them under the over-valued exchange rate. Victims of this policy were not only consumers who are forced to purchase commodities at increased prices, but also unprotected industries. Agriculture especially suffered from lowered product prices due to the overvalued exchange rate, while agricultural workers had to purchase high-priced inputs produced by protected industries.

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

Besides beefing up government revenue, the supply of cheap food through such government interventions was necessary to prevent labor cost in the manufacturing sector from rising. Since the Engel coefficient in low-income countries is high, increases in food prices can be an excessive burden to pull up wage rates in the urban areas, sometimes stirring up riots. If low-income countries were able to earn plentiful foreign currency by exporting manufactured commodities, the price hike of food could be avoided by importing food through markets. However, the manufacturing sector in low-income countries usually lacked sufficient international competitive power.

The right approach for policymakers in low-income countries should have been to raise the productivity of agriculture by strengthening research, extension and education as well as by developing infrastructure such as irrigation systems. Yet, it takes a long time to build up human capital and infrastructure. Since the current need for securing the supply of cheap food is urgent, policymakers rarely resist the temptation to adopt policies that exploit the agricultural sector. These policies result in lowered farm product prices which in turn depress farmers' incentive to produce and invest in agriculture. Thus, the government needs to strengthen exploitation to secure the same amount of domestic food supply.

The farm population is large but politically weak. Because they are little educated and scattered over a wide space with underdeveloped communication infrastructure, agricultural workers rarely know how the prices of their products are lowered by government policies. Moreover, it is even more difficult for them to organize protest activities against politicians living in the far-away metropolis. In contrast, urban business and labor are much better organized for political lobbying, as their education is higher and they live closer together with better communication systems. As a result, politicians fear high food prices that could trigger urban riots but are little concerned about rural hunger in the remote hinterlands. It is under

such political economic conditions that agricultural exploitation policies are dictated by the exigencies of the food problem.

The Protection Problem in High-Income Countries

Agricultural protection in high-income countries stems from the difficulty of reallocating resources (particularly labor) from the agricultural to the non-agricultural sector. A common source of the need for adjustment in agriculture is the slow growth in the demand for food relative to the capacity to generate technical progress in agricultural production. In affluent economies, food demand increases very slowly because population growth rate is low and food consumption is largely saturated. On the other hand, the rate of increase in domestic food supply is high because of the high rate of investment in agricultural research, development and extension. As a result, domestic food demand tends to persistently lag behind that of domestic supply.

When excess food supply is faced with inelastic demand, the rates of return to resources used in agricultural production decline, unless the resources are transferred from agriculture to non-agriculture at a sufficiently rapid speed. In reality, the intersectoral transfer of resources takes time. It is difficult to reallocate labor from the rural to the non-farm sector at a rate rapid enough to achieve income parity between farm and non-farm population. Agricultural protection policies are initially adopted as a relief to mitigate the cost of this adjustment disproportionately shouldered by the farm population. However, similar to the exploitation policies, once protection is instituted, the momentum grows to keep it strengthening, because high product prices by such means as border protection, reduce farmers' incentive to make adjustments, and institutional rent created from government interventions further encourages rent-seeking activities.

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 as well as in GDP is small in high-income countries, so that the burden of agricultural protection per capita of the non-agricultural population is small.

Corresponding to rises in the income level, consumers' resistance to agricultural protection is reduced because the Engel coefficient decreases so low as to make insignificant the effect of rising food prices on the cost of living. Moreover, in the course of economic development, an increasingly larger portion of consumers' food expenditure is allocated to marketing and processing services and a smaller portion is allocated to the production of raw foodstuffs produced in the domestic agricultural sector.

With the decline in the effect of raw foodstuff prices on the cost of living, agricultural protection comes to have smaller effects on the wage rate, and hence is less strongly resisted not only by consumers but also by business employers and labor unions. Meanwhile, the small number of farmers with good education and communication constitutes a very powerful political bloc that politicians find hard to resist. In this way the equilibrium of politics with respect to agriculture in high-income economies is diametrically different from that of low-income economies.

The Disparity Problem in Middle-Income Countries

As mentioned above, the primary political objective in low-income countries is to "secure low-price food to urban workers" while that of high-income countries is to "prevent farmers' income level from falling further behind urban workers." In the course of economic development, there is a stage where both objectives are simultaneously important.

Figure 2 shows how the political objective changes according to the economic development. The food-problem stage is defined as the regime in which the concern of securing low-price food dominates agricultural policies. The protection-problem stage is the regime in which the concern of keeping farmers' income level balanced with urban workers dominates agricultural policies. Likewise, the "disparity-problem stage" is defined as the regime in which both concerns are more or less equally important. These three stages roughly correspond to the low-income, high-income, and middle-income stages, respectively.

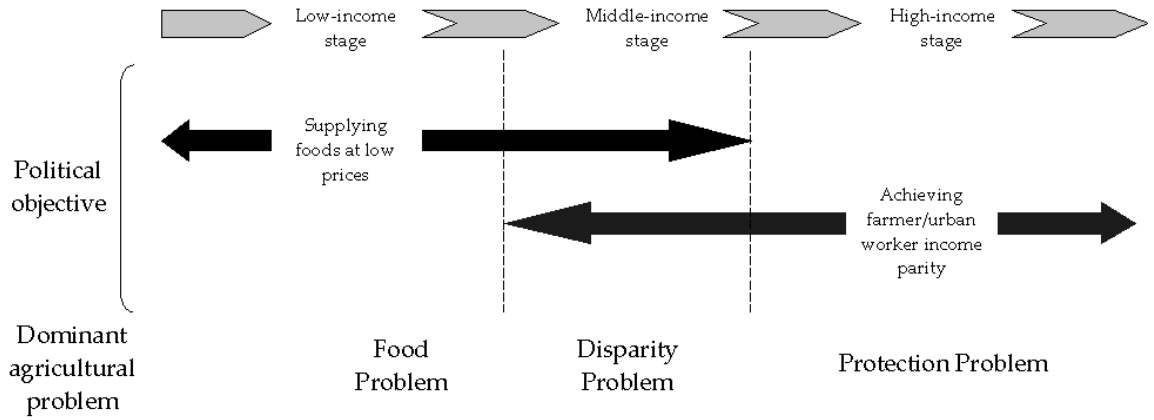

Fig. 2. The Agricultural problems at different stages of economic development

At the disparity-problem stage, the main concern of politicians is to alleviate poverty among farmers. However, "poverty" here means not absolute poverty but relative poverty. Absolute poverty among the farm population is less severe in middle-income countries than low-income countries. In the middle-income stage, alongside the progress of industrialization by means of technology borrowed from developed countries, is the rise of a new social class in urban areas composed of well-to-do families, including workers employed in large-scale modern enterprises. This group becomes a source of envy for farmers who eventually become envious and eventually develop a grudge against the social system for keeping them in poverty; this sometimes culminates in social disruptions.

This poverty problem is closely related with the so-called "dual structure" that emerges in the process of industrialization. The dual structure refers to the situation characterized by the coexistence of a formal sector consisting of large-scale, capital-intensive enterprises paying high wages to their employees and an informal sector consisting 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 laborers on a daily contract, 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. As a result, employment increases much slower than increases in 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 the employment in the formal sector is largely permanent, large-scale enterprises reduce order to subcontractors during the economic slump. Correspondingly, many laborers in the informal sector who come from farm households are forced to return to their home villages, as 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. In this way, during the economic recession, farmers suffer from dire poverty, intensifying their grudge against urban people.

Supported by the intelligentsia, farmers' dissatisfaction may evolve into serious anti-government movements. So, the government is

forced to adopt agricultural protection measures. However, this protection cannot adequately fill up the income gap between farmers and urban workers unlike the case of the high-income stage. Since the percentage of agriculture still remains relatively large, it is impossible for the government to secure sufficient finance for closing the gap. In addition, increases in food prices inflict major damage to a large number of small-scale enterprises in urban area, which heavily rely on cheap labor.

Developing countries can move up from the low-income stage to the middle-income stage by borrowing technology from developed countries. However, successful industrialization by means of technology borrowing tends to lead to a dual structure in the economy and the emergence of the disparity problem between farmers and newly-risen urban families. Under the dictate of the disparity problem, policymakers in middle-income countries are forced to muddle around in search of ways and means to protect farmers within the constraint of the food problem that is still lingering.

The 'poverty problem' in middle-income countries can be confirmed in Table 5. Note that

Table 5. Comparison of per capita GDP and agriculture's shares of economic active population and GDP

	Per capita GDP		Agriculture's share in economic activity		Agriculture's share in GDP (%)		Agriculture's per capita income/whole economy's per capita income[a]	
	1995 ($)	1965-95 average annual growth rate (%)	1965	1995	1965	1995	1965	1995
Developing countries								
Low-income countries								
Ethiopia[b]	101	0.0	92	84	58	52	63	62
Tanzania	168	0.0[c]	91	83	46	46	50	56
Bangladesh	324	1.3	86	61	41	25	47	41
India	387	2.2	74	62	44	28	59	46
Middle-income countries								
Indonesia	992	4.7	71	52	56	17	79	33
Philippines	1,084	1.1	61	43	26	22	43	51
Thailand	2,771	5.4	82	60	32	11	39	18
Mexico	3,801	1.5	49	25	13	5	27	20
Korea	10,844	6.9	55	14	24	6	44	46
Developed countries								
UK	18,848	1.9	3	2	3	2	92	96
France	26,298	2.3	10[d]	4	5[d]	2	50[d]	55
USA	26,908	1.6	5	2	4	2	65	65
Japan	41,294	4.2	26	5	10	2	37[e]	36[e]

Note
a. Let Na = employment in the agricultural sector; N = total employment, Ya = GDP in the agricultural sector; and Y = GDP. Then the last two columns give (Ya/Na)/(Y/N) which means the ratio of average income per farmer to per capita GDP.
b. Ethiopia in 1965 includes Eritria
c. 1988-95 growth rate
d. 1977 value
e. A majority of Japanese farmers earn their living mainly by off-farm income. if off-farm income is included, Japanese farmers' income level is at par with urban counterparts' (Hayami 1988).

SOURCES: FAO. FAOSTAT Database 2000
World Bank. World Bank Development Report 1992
World Bank. World Development Indicators CD-ROM 2000.

the analysis here ends at 1995 to rule out the influences of the Asian financial crisis that began in 1997. In Table 5, farmers' relative income is measured by dividing agriculture's share in GDP by agriculture's share in employment. In low-income countries, the farmer's relative income is 40-60% which is not so low compared with middle-income countries.

In Tanzania and Ethiopia which record zero percent growth for 1965-95, there was no decrease in farmer's relative income. In Bangladesh and India, which recorded moderate economic growth, farmer's relative income dropped slightly. In Indonesia and Thailand, which recorded high growth and escaped from the low-income stage in this period, farmers' relative income dropped sharply.

In the Philippines, which lagged behind the East Asian miracle growth, farmer's relative income did not drop. Interestingly, there is no decrease in farmer's relative income in high-income countries where the government could afford to spend substantial amounts to support farmers' incomes.

CONCLUSION

The growing imbalance in world agriculture today, as epitomized in increasing food deficits in low-income economies in contrast with increasing surpluses in high-income economies, is not simply an offshoot of different demand and supply structures corresponding to different income levels. Rather, it has been aggravated by policies taken in response to 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 protection problem in the high-income stage.

Under the regime of the food problem, policymakers in low-income countries have been inclined to adopt policies geared toward securing low-priced food to urban consumers at the expense of farm producers. In contrast, under the regime of the protection problem, politicians in high-income countries have not been able to resist pressures from the farm lobby to institute policies to raise farmers' incomes to the level of non-farm workers. Great inefficiency and inequity resulting from these contrasting policy distortions have already been amply documented (Johnson 1973: Schultz 1978), and the need to reduce these distortions has been widely recognized. In fact, major international collaborative efforts have progressed in that direction for the past two decades.

As the woe of the ISI became evident with the debt crisis in the 1980s, the International Monetary Fund and the World Bank initiated the so-called "structural adjustment policy" (SAP) to restore competitive markets as the central mechanism of resource allocations. SAP was an instrument to press developing countries to reduce government interventions and regulations on markets by imposing conditionality in advancing loans.

Along this line, significant reforms were undertaken in agriculture, including the abolition of government monopoly agencies in agricultural product, and input marketing. It is undeniable that the somewhat hasty SAP reforms involved several failures. The attack on SAP reforms by Joseph Stiglitz (2002) among others, grew out of the recognition that reforms to reduce government control and intervention may be ineffective or even damaging to low-income economies since these interventions create market failures where the market suffers from highly imperfect information.

While this argument is theoretically valid, it may be refuted on the grounds that in the economies characterized by high degrees of information imperfection, government failures may be even more damaging than market failures. This is likely to be especially the case in Africa where national boundaries were determined through the politics of colonial powers and, therefore, national integrity and government authority have been very weakly established. Considering the great woe produced by agricultural exploitation policies in the past, market-oriented reforms must continue to be promoted. Of course, maximum care must be taken that the reform plan is consistent with county-specific conditions, in terms of reform instruments and time sequences of implementation (Hayami 2004).

The need to curb agriculture protection in high-income economies has been internationally acknowledged, and policy reforms in that direction have been promoted through GATT/WTO multilateral trade negotiations. Agreements at the GATT Uruguay Round on tariffication and reduction in domestic agricultural supports were indeed a historic achievement in reversing the trend

of increasing agricultural protection since the Great Depression in the 1930s. A major question is if this momentum will be sustained in the WTO Doha Round.

The role of developing countries in this new round has increased greatly relative to the previous GATT rounds. Therefore, the stance of developing countries, especially large emerging nations such as Brazil, China and India will be decisive for the success of agricultural negotiations. Developing countries have all the right to demand the reduction in export subsidies which are extremely harmful to agriculture in many developing countries. On the other hand, developing countries must show their willingness to accept due obligations for liberalization. The negative stance of demanding special exemptions on the agricultural trade rules specific to developing countries will simply benefit farm lobbies in developed countries.

The disparity problem has received relatively little attention. However, this can be a very serious problem in middle-income countries aiming to catch up with high-income countries. Japan, during the inter-war period, represents the best example in failing to adequately cope with this problem (Hayami 1988). The growing dissatisfaction and frustration among farmers arose from the feelings of being left behind urban prosperity as the result of successful industrialization based on borrowed technology. This culminated in social disruptions including terrorism. This constituted a major support for militarism to gain power, ending in the tragedy of the Pacific War.

Recent political instability and terrorism in Indonesia, the Philippines and Thailand might be reflecting an aggravation of the disparity problem besides other problems. Indeed, agricultural policy coordination in this stage is extremely difficult because the government has to face two contradictory objectives namely, "securing low-priced food in support of industrial development" and "preventing farmers' income level from falling further behind urban workers." How to cope with these contradictory requirements should be a major concern for both agricultural economists and development economists.

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