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# Comparison of Rice Policies Between Thailand, Taiwan, and Japan—An Evolutional Model and Current Policies

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## 7. COMPARISON OF RICE POLICIES BETWEEN THAILAND, TAIWAN AND JAPAN --- AN EVOLUTIONAL MODEL AND CURRENT POLICIES\*

### INTRODUCTION

Rice is the staple food and the most important agricultural product for most Asian countries. It is eaten by approximately half the human race. About 90 percent of the world's total rice production is harvested and consumed in Asia, and rice provides the main dietary source of energy in the region. And for hundreds of millions of people in Asia, this crop is virtually the only source of livelihood. It occupies between half and two thirds of the arable land available in the major food-producing countries and a much larger share of the most fertile soils. The rice crop also contributes up to 20 percent of the total GDP of these countries. In addition rice is an important export and import item for many Asian countries.

Rice remains predominantly a subsistence food crop. More than half the world's harvest of paddy is retained on the farm and does not enter market channels. In many Asian countries rice is the wage good and its price is closely related to the standard of living and the welfare of people and it critically affects the labor cost in these countries. Fluctuation in rice prices thus has an important effect on economic and political stability in these countries. Therefore, rice is often called the grain of life and is known as a political good.

Because rice is important in so many respects to most Asian countries, rice policy occupies an important position in the agricultural policies of these countries. The characteristics of the rice policy of a country change as the economy of the country grows. In a growing economy the demand and supply conditions for rice also change. With this setting in mind the objectives of this chapter are, first, to present a model of interdependent evolution between rice supply and demand with regard to the economic development of an Asian country and to

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check this model with the actual but smoothed trends of rice supply and demand in Japan, Taiwan, and Thailand; second, to compare current rice policies between these three countries, which are at different stages of development, and to try to see the changes in the characteristics of rice policy with regard to economic development utilizing the results of the first objective; and third, to induce policy implications regarding rice from the first and second objectives.

The method used for the construction of the model is an economic abstraction obtained from the detailed study of statistical trends in rice production, exports, imports, inventory investment, stocks, and consumption in Japan, Taiwan, and Thailand from the nineteenth century up to 1980; macroeconomic, institutional, and technological information; and information regarding rice policies. Econometric methods such as multiple regressions are not used for the abstraction. The method used for the comparison of current rice policies is an application of the static partial equilibrium supply and demand model for rice, which describes the means and the degree of government intervention in the supply, demand, and trade of rice and its effect on the price of rice at various levels in rice market channels.

#### A MODEL OF INTERDEPENDENT EVOLUTION BETWEEN RICE SUPPLY AND DEMAND WITH REGARD TO ECONOMIC DEVELOPMENT

##### The Basic Hypothesis and Some Basic Characteristics in the Interdependence between Rice Supply and Demand

My basic hypothesis in presenting the model of interdependent evolution is that there is a standard interaction pattern between rice supply and demand with regard to the economic development of those Asian countries where rice occupies an important position in their agriculture, the economy, and society. (Henceforth these countries will be called rice countries.) On the demand side in these rice countries, rice changes its economic characteristics from that of a normal good to that of an inferior good as real per capita income grows with economic development. The demand for rice changes rather quickly in response to the long-run increase in incomes and prices due to economic development. The supply of rice, however, changes slowly in response to long-run or trendwise changes in rice

prices and factor prices. In other words, rice supply in the long run changes in accordance with technological improvements in rice production and in production of factors and with improvements in agricultural infrastructure, both of which are initiated by the price changes of rice and factors and are closely related to government agricultural policies and expenditures and to private efforts. Rice supply in the long run is also affected by the inherently discontinuous nature of the technological improvements in rice and factor production. Both the demand for and supply of rice are affected by some biased, long-lasting rice and other agricultural policies and by macro intersectoral structural changes due to economic development.

### The Evolutional Model

The model appears in Figure 1. As this figure shows, the demand and supply interaction follows five stages.

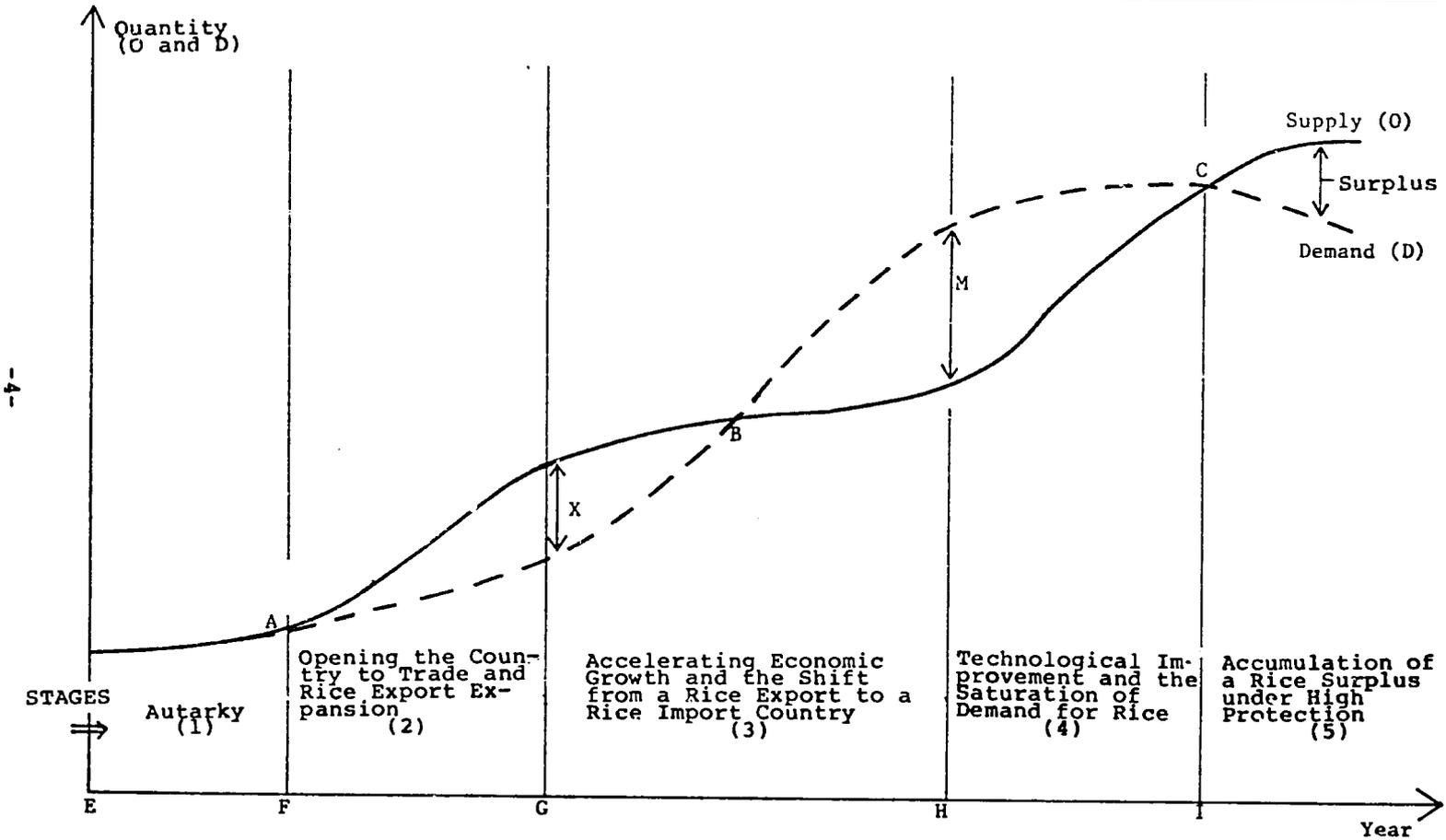
First Stage: Autarky. This is a period where the economy as a whole as well as the rice economy are closed and self-sufficient. Rice supply, which is equal to demand, is stagnant or grows very slowly.

Second Stage: Opening the Country to Trade and Rice Export Expansion. By opening the country to the international market the comparative advantage in rice production in relation to other crops or industrial activities is felt and pursued by the rice country. Rice supply thus increases rapidly. This growth in the rice supply can be accelerated through the government's pursuit of beneficial rice policies, research and development, and the construction of an agricultural infrastructure for rice production.

On the demand side, rice is a normal good with high income elasticity, real per capita income grows very slowly, and even with rapid population growth total demand for rice grows more slowly than does total supply. Thus rice exports increase during this stage.

Third Stage: Accelerating Economic Growth and the Shift from a Rice Export to a Rice Import Country. This is the stage when a rice country shifts from exporting to importing rice. The growth of the rice supply decelerates because of some of the following reasons. First, faster growth in the nonagricultural

Figure 1. Model of interdependent evolution between rice supply and demand with regard to economic development



sector absorbs more factors of production and savings than the rice sector, and government efforts and expenditure for the rice sector are shifted to the nonagricultural sector as the economy grows. Second, the shortage in the supply of certain factors of production leads to a decline in the rate of growth of rice production. And third, a slump in improving the technology of rice production may be caused by the inherent discontinuity in technological improvement or by the decrease in economic and social pressures for technological improvements because of the rice surplus (export) situation enjoyed during both the second stage and the early part of the third stage.

The rate of growth of the demand for rice accelerates as the nonagricultural sector grows at increasing speeds along with both the per capita real income and the total population. Thus total supply and demand cross each other at point B during the third stage, and the rice country shifts from exporting rice to importing it.

Fourth Stage: Technological Improvement and the Saturation of Demand for Rice. Rice imports increase from the late third stage into the fourth stage and the growing social, economic, and political pressures for an increase in the rice supply lead to greater government and private efforts in the areas of rice policy, research and development, and investment in agricultural fixed capital for rice production. These efforts result in the time-lagged acceleration of the growth of the rice supply. But as real per capita income grew rapidly during the third stage and continues to grow during the fourth stage, the income elasticity of the demand for rice starts to decline and approaches zero during the fourth period. Thus the growth rate of the total demand for rice decelerates during this period and crosses the total supply of rice at point C where the fourth stage ends.

During this stage the level of protection of the rice sector, by price supports, for example, is usually raised because of the rice shortage (import) situation that exists in the late third and early fourth stages and because of the income gap between the agricultural and nonagricultural sectors caused by the faster growth of the nonagricultural sector during these stages.

Fifth Stage      Elimination of a Rice Surplus under High Protection. During this stage the trend in the demand for rice that began during the third stage continues, and income elasticity becomes negative as per capita income continues to grow. Thus the total demand for rice starts to decline, whether in the late fourth or in the early fifth stage. The rice supply grows partly because of the momentum that carries over from the previous stage, and a rice surplus begins to accumulate. But this surplus cannot be exported without government export subsidies because the level of protection of rice production was high during the fourth stage and the domestic price of rice rose to a much higher level than that of the world price of rice. Therefore, in this stage, the government has to execute policies that reduce rice production by direct production control and by reducing the protection level. These measures dispose of the rice surplus and increase the demand for rice by changes in the relative prices of foods under government control. Administrative measures such as school lunch programs and rationing also have an effect on the surplus of rice.

What has just been described is a standard five-stage model derived from trends in rice statistics and economic, institutional, and technological information to explain the interdependent evolution between rice supply and demand with regard to the economic development of an Asian rice country. This model is a standard one, and the actual evolutionary process in each country varies in various ways as we will see. The length of each stage can differ, and the crossing points B and C can shift to either the right or the left depending on the level and degree of the curvatures of the O and D curves in Figure 1. Figure 1 shows that an Asian rice country tends typically to, first, export rice, second, import rice, and third, accumulate a rice surplus under high protection during the course of its economic development. This order of events occurs because of such developmental events as the opening of a country to trade; the acceleration of its nonagricultural growth, which causes a long-run shift in the economic property of rice from that of a normal to an inferior good and a decline in the government's attention to the rice sector; the inherent discontinuity in technological improvement relating to rice production; and the lagged supply

response resulting from technological changes and the government's agricultural development efforts.

Actual Evolution of the Demand and Supply of Rice in Japan, Taiwan, and Thailand

In this section I would like to compare the evolutionary model described above with the actual trends of the demand for and supply of rice in Japan, Taiwan, and Thailand. The hand-smoothed trends of the demand for and supply of rice for these three countries are presented in Figures 2, 3, and 4.

The Case of Japan. The trends in the demand for and supply of rice in Japan since 1880 shown in Figure 2 are consistent with the evolutionary model. Japan opened its economy in 1859 and the economic structure was forced to adjust drastically to the international economy<sup>1</sup> according to Japan's comparative advantage. Japan imported rice right after its opening. These imports occurred during the later years of the Edo regime and the early years of the Meiji regime (after 1868) because of political disorders and crop failures. But from 1872 onward, Japan exported rice almost annually in considerable quantities. Rice exports continued until 1889.<sup>2</sup> Japan then was an agrarian country in comparison with western nations, and she had a comparative advantage mainly in the commodities of her primary industry. Major export items from Japan in the late Edo and early Meiji periods were tea, silk thread, copper, wax, and fishery products. Rice had a potential comparative advantage, and this was realized between 1872 and 1889. As Figure 2 shows, autarky probably occurred before 1859. The second stage lasted until around 1885.

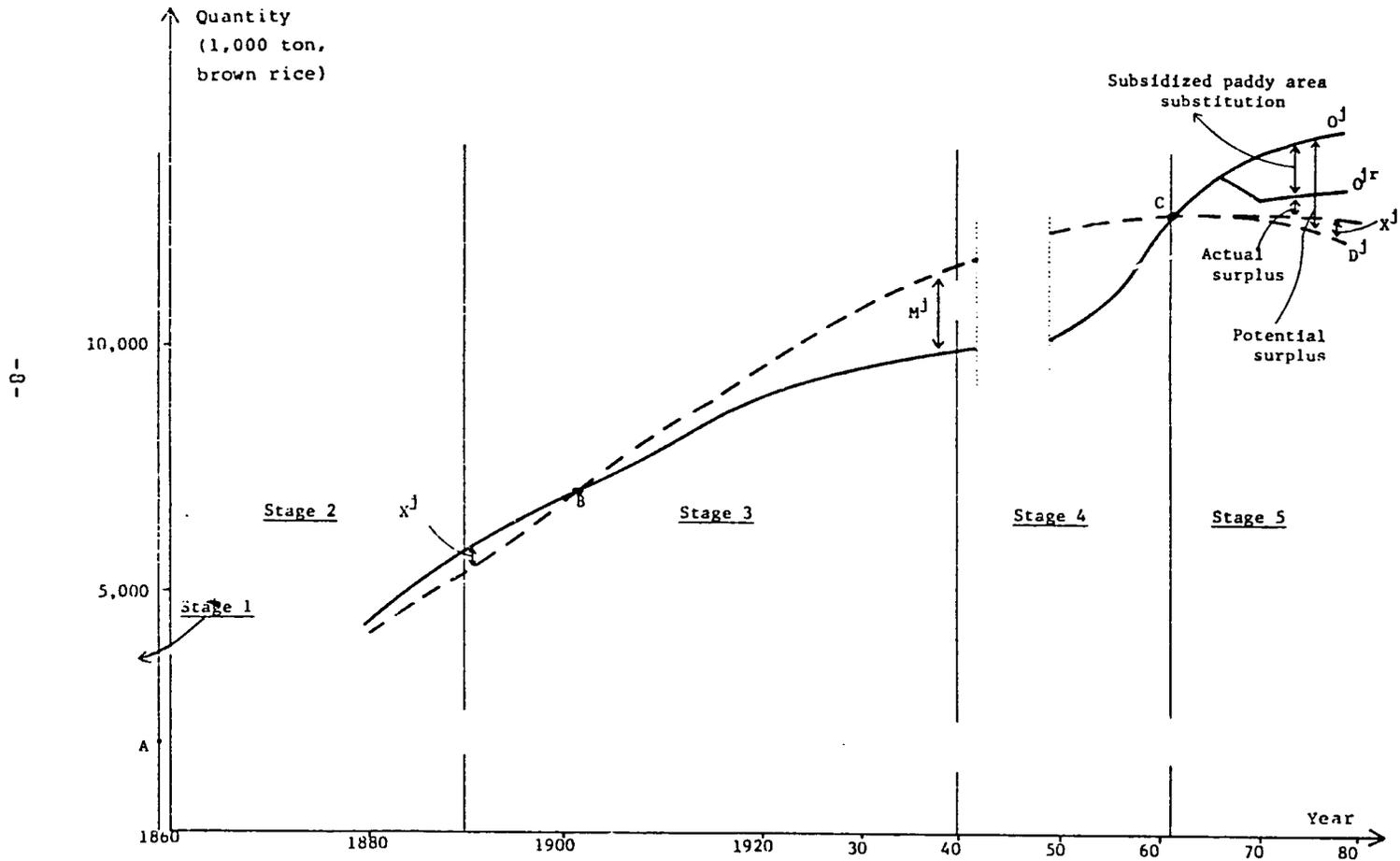
Japan shifted from exporting to importing rice in 1890 and continued to do so until the early 1960s. The third stage lasted until around 1940 when actual rice imports reached their historical maximum. During this stage the whole economy as well as per capita output grew faster than in the previous stages,

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<sup>1</sup>Mitsuhaya Kajinishi, ed., Nihon Keizaishi Taikei, Kindai, Jo [Japanese Economic History, Grand Series, Modern Era, Vol. 1] (Tokyo: University of Tokyo Press, 1965), pp. 5-13.

<sup>2</sup>Shiro Morita, Komono Hyakunen [Rice, One Century] (Tokyo: Ochanomizu, 1966), pp. 274-275.

Figure 2. Trend in Demand for and Supply of Rice in Japan: 1860-1980



and the industrial sector, especially, grew at about double the speed of the whole economy and faster than in the previous stages.<sup>3</sup> Since income elasticity of demand for rice was considered to be very high, the total demand for rice must have grown very rapidly. But because of the fast structural change of the economy and the diversion of resources for military purposes, the agricultural sector became a declining sector in terms of its GDP share<sup>4</sup> and labor share, among others. Government and private efforts in research and development and in the construction of an agricultural infrastructure for rice production decelerated and the total rice supply also decelerated from the late 1920s to the early 1940s. This period corresponds to the Inter-war Stagnation Period designated by Yamada and Hayami in their growth account study of the Japanese agricultural sector.<sup>5</sup> Rice imports increased rapidly during the third stage. Large shares of these imports were from Taiwan and Korea, which became colonies of Japan in 1895 and 1910, respectively.

The fourth period ranges from the early 1940s to the early 1960s. During this period the economy, per capita income, and the industrial sector grew faster than in the previous periods. Per capita income had reached such a high level that the income elasticity of demand for rice approached zero and the growth of the total demand for rice decelerated. But a potential large shortage, which existed during the late third period because Japan was importing rice mostly from her colonies (Taiwan and Korea) at a lower price than the world rice price, was realized by the defeat of the Japanese Empire in 1945. Most Japanese suffered severely from the food shortage. This large shortage

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<sup>3</sup>Kazushi Ohkawa, Miyoei Shimohara, and Mataji Umemura, eds., National Income, Vol. 1: Estimates of Long-term Economic Statistics of Japan Since 1868 (Tokyo: Toyo Keizai Shinposha, 1974).

<sup>4</sup>Ibid.

<sup>5</sup>Saburo Yamada and Yujiro Hayami, "Agricultural Growth in Japan, 1880-1970," in Agricultural Growth in Japan, Taiwan, Korea, and the Philippines, ed. Y. Hayami, V. W. Ruttan, and H. M. Southworth (Honolulu: University Press of Hawaii, 1979), pp. 33-58.

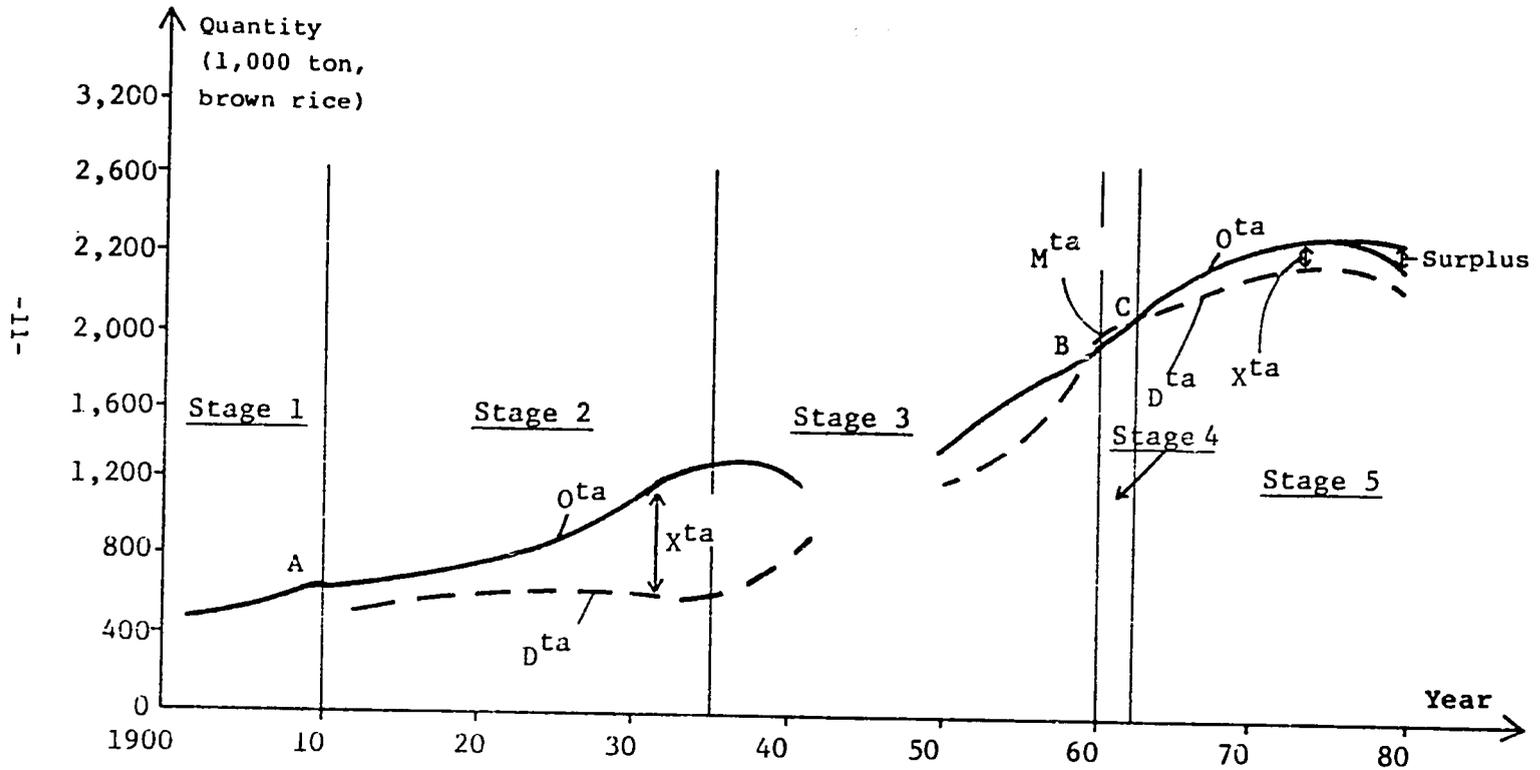
of rice led to increased government and private efforts to improve technology, invest in agricultural fixed capital, and raise the protection level for rice in order to increase rice production in Japan. Thus the growth of rice supply accelerated. The demand for and supply of rice became balanced in the early 1960s.

A rice surplus has tended to accumulate in the fifth stage, which ranges from the early 1960s to the present. During this period the growth of total income as well as per capita income has accelerated further, and the income elasticities of demand for rice have turned to negative.

The total demand for rice started to decline during the 1960s. The supply of rice continued to grow based on the momentum transferred from the fourth to the fifth stage. The rice surplus grew to a very high level but could not be commercially exported because the extremely high level of rice production was supported by a domestic rice price that was four to five times as high as the international rice price. The government tried to dispose of the surplus as animal feed and as an export commodity through large government subsidies. The government also instituted a heavily subsidized policy to reduce rice production in 1969 by withdrawing land from rice production or by transferring land from rice to other crops. Thus the actual rice supply was reduced from  $O^j$  to  $O^{jr}$ , the total demand was increased by the amount of rice exports,  $X^j$ , and the actual surplus was reduced to  $O^{jr} - (D^j + X^j)$ , as shown in Figure 2. But the potential surplus has been very large, as is indicated by the difference between  $O^j$  and  $D^j$ .

The Case of Taiwan. The historical evolution of the interdependence between the demand for and supply of rice in Taiwan shown in Figure 3 is also consistent with the evolutionary model presented in Figure 1. Although the time span of the fourth stage is very short we can identify five stages and three crossing points, A, B, and C. The demand and supply relation for rice in Taiwan from 1900 to 1982 changed from rice exports to a short period of imports, and then to a recent period of rice exports and a surplus. The factors that explain these changes through the five periods are mostly similar to those in the case of Japan. Therefore the following analysis will point out only those factors that are specific to the case of Taiwan.

Figure 3. Trend in demand for and supply of rice in Taiwan: 1900-1980



First, before Japan colonized Taiwan in 1895, Taiwan was a part of the Chinese Empire, and as no rice trade data on Taiwan before 1911 were available, it is not clear when the first autarky stage ended. Point A in Figure 3 is thus depicted tentatively.

Second, the demand for rice did not grow during the second stage though total population grew rapidly. This stagnation in rice demand was due to the squeeze of income caused by the taxes and monopoly sales imposed by the Japanese colonial regime.

Third, the rapid increase in the rice supply during the second stage could be considered an enforced realization of the comparative advantage in rice production in relation to other products. This realization was accomplished through increased investment in irrigation and through agricultural research by the colonial government and was symbolized by the development and dissemination of the Ponlai variety of rice.

Fourth, based on the trends described by the second and third points, a large surplus of rice was procured at a price lower than the world rice price by the Japanese colonial government, who then exported most of it to Japan during the second stage of Taiwan's development.

Fifth, from the late 1940s to the early 1970s, rice exported by the government was procured mainly as land tax in kind and through the compulsory purchase of paddy and the paddy-fertilizer barter institution at prices lower than market or international levels. These were partial government interventions in the rice market during the post-World War II period, but they did reduce the average price received by the rice farmers.

Sixth, the rapid increase in the domestic demand for rice that was caused by the fast economic growth during the last half of the third stage (1950-1960) did not increase the net rice imports of Taiwan very much.

Seventh, the growth in rice demand tended to decelerate during the fourth and fifth stages (1960-1975), and reversed itself around 1975. The growth in the total supply of rice also decelerated from the late 1960s onward. But, beginning in 1974, the government procurement price of rice was higher than the domestic wholesale price of rice, even though the procurement price was already much higher than the international price of

rice. Thus surplus rice, which cannot be exported without considerable government export subsidies, has been accumulating since the late 1970s.

The Case of Thailand. The historical relation of the trends of the demand for and supply of rice for Thailand presented in Figure 4 does not seem to correspond to the evolutionary model discussed above. But the relation can be explained as a variation of the model. As shown in Figure 4, five stages are demarcated but the third, fourth, and fifth stages have slightly different properties in comparison with the corresponding stages of the evolutionary model. These differences will be discussed below.

Thailand opened her economy in 1855. Thus autarky, the first stage, existed before the middle of the nineteenth century. Point A separates the first stage from the second. After opening the country the comparative advantage in rice production as against other products was realized by the Thai people's individual efforts, with some assistance from the government.<sup>6</sup> Thus rice exports continued to grow rapidly up to around 1920<sup>7</sup> when the second stage terminated.

From approximately 1920 to 1940, the third stage, the growth of total rice supply stagnated because growth in the area planted with rice in the Central Region stagnated and the increase in other regions was only in unirrigated, less fertile areas. Rice production technology remained almost the same during the third stage. Thus average land productivity declined rapidly, especially in the regions other than the Central Region.<sup>8</sup> Because of the shortage in easily accessible fertile land in the Central Region and because of the expansion of paddy area to the less fertile, unirrigated areas in the other regions, total rice supply stagnated. The total demand for rice did not grow rapidly because the growth of the economy and its industrial sector did not accelerate during the same period. There was no shift from exports to imports in the rice trade of

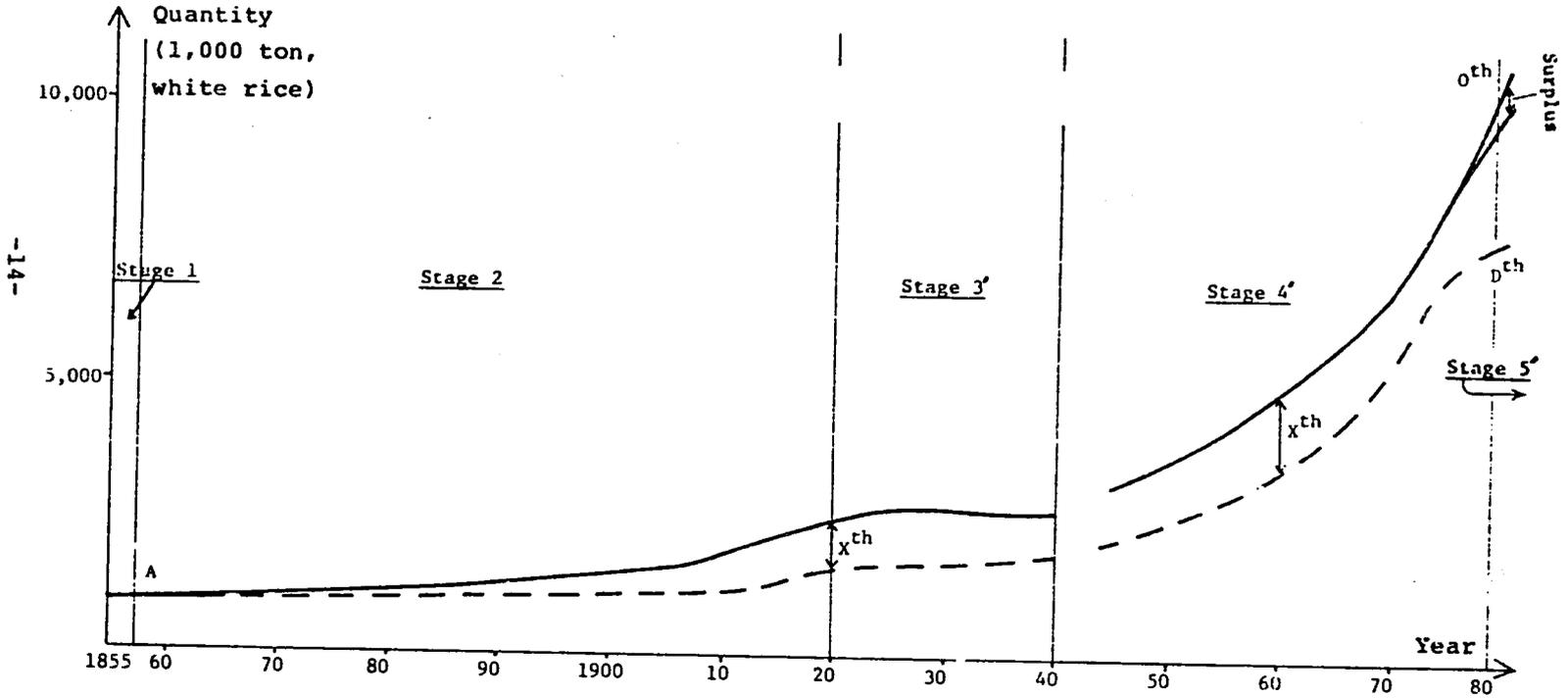
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<sup>6</sup>James C. Ingram, Economic Change in Thailand, 1850-1970 (Stanford: Stanford University Press, 1971), pp. 43-44.

<sup>7</sup>Ibid., pp. 37-40.

<sup>8</sup>Ibid., pp. 43-50.

Figure 4. Trend in demand for and supply of rice in Thailand: 1855-1980



Thailand during this stage. This is the important difference between Thailand's third stage and the third stage in the evolutionary model and therefore the former is designated as stage 3'.

The fourth stage ranges from about 1945 to the late 1970s when the total rice supply grew very rapidly because of area expansion, improvement in irrigation, and limited adoption of the seed-fertilizer technology. The total rice demand also increased rapidly because of rapid population growth and income growth. But Thailand remained a leading rice exporter during this stage. This is why this period is designated as stage 4'. The growth in the total demand tended to decelerate in the late part of stage 4', probably because of the decline in the income elasticity of demand for rice.

Stage 5' starts around 1980. During this period the growth in the total domestic demand for rice decelerates further, and may decline in the near future. Because the total rice supply has kept its momentum, it will grow rapidly at least during the early 1980s. A surplus stock has accumulated in 1982 and this will be a serious problem for the next few years. This surplus is, however, very different in its economic characteristics from the rice surplus in Japan and Taiwan. The recent rice surplus in Japan and Taiwan cannot be exported without large government export subsidies because of the protection of rice production in these countries. But the rice surplus in Thailand can be exported at more or less the international rice price level, and it is the surplus that appears under a negative protection that is carried out by large rice export levies such as the rice premium.

The long-run trends of the demand for and supply of rice did not cross each other as shown in Figure 4, but they have the shapes of the trends of the standard model depicted in Figure 1. The reasons they did not cross each other are that, first, the rapid increase in rice demand was delayed because of the prolonged delay in the economic growth of Thailand in comparison with Japan and Taiwan; this delay is a typical situation for many developing countries. And, second, the comparative advantage in rice production as against other products in Thailand has been much stronger than in Japan or Taiwan, so that even under the strong negative protection policy of rice production

the total rice supply has grown much more than the total demand for rice. These are the reasons why the Thai case is a variation of the evolutionary model for the interdependent changes in the demand for and supply of rice.

#### Applicability and Policy Implications of the Evolutional Model of Rice Demand and Supply.

As noted in the beginning of this chapter, rice is one of the most important economic, social, and political goods in Asia. If we can successfully build a model to describe the interdependent change in the long-run trends of rice supply and demand in a rice country, it can be used to formulate rice policies in order to cope with future problems predicted by the model.

By comparing the evolutionary model and the actual cases, we can conclude that the model is applicable to East Asian rice countries which have experienced a very high economic and industrial growth in their long-run economic history. The evolutionary model is applicable in a limited sense to Thailand and, probably, to Burma and Vietnam, which have not gone through very rapid economic and industrial growth and which have strong comparative advantages in rice production. Although the shapes of the individual, long-run demand and supply trends drawn in Figure 1 are applicable separately in the case of Thailand and probably of Burma and Vietnam, the interactions between the two trends are not. In these countries the long-run supply trends have always been above the long-run demand trends because of their comparative advantage in rice production, except that in Vietnam long wars have decreased rice output and forced it to become a rice importer for the last two decades.

What can we say about rice countries that have traditionally imported rice such as Indonesia, Malaysia, the Philippines, and India with respect to the evolutionary model? We have not analyzed the long-run trends in rice demand and supply in these countries, but we can induce from the analysis above that their long-run demand and supply trends probably have shapes similar to those in Figure 1, and that the long-run demand trends have been above the long-run supply trends in these countries during the last century.

Thus we can say that the model is compatible with the historical experiences of East Asian countries such as Japan and Taiwan and, probably, Korea, and that the shapes of the long-run trends in rice demand and supply are separately applicable to other rice countries in Asia, though their interactions are not.

Regarding the shapes of these trends, if it is assumed that an economy grows continuously over time in the long run, the trend of demand for rice will have a long S shape with a peak on the right top side of the trend. The supply trend, on the other hand, may have more than one period of stagnation. The stagnation depicted in Figure 1 is assumed to be caused by a spurt in industrialization that can occur more than once in the history of an economy. Supply stagnation may also be caused by a lack of growth in the supply of the critical factors of rice production and by a temporary stagnation in the technological improvement of rice production.

Taking these qualifications into account, we can predict the potential long-run demand and supply situation for a rice country by applying the evolutionary model to the actual variations in the demand for and supply of rice. It is important to note that it is the prediction of the potential and not of the actual demand and supply trends which is involved here because actual demand and supply are widely disturbed by government interventions, as shown in Figure 2 for the case of Japan. This prediction can be quantitatively done by the econometric method. Knowing the potential demand and supply situation, the government can take appropriate precautionary measures to avoid probable disasters.

In the case of Japan, the potential surplus of rice that seems to be increasing rapidly is predicted by the application of the evolutionary model. The actual surplus of rice, however, is not very large after 1970 (Figure 2). This potential surplus is reduced by extremely large government subsidy expenditures to the actual surplus level. Since total government expenditures will be severely limited in the 1980s and the potential surplus is an indication of large economic loss, the Japanese government must execute the proper policies to reduce the increasingly large potential surplus.

## COMPARISON OF THE CURRENT RICE POLICIES OF THAILAND, TAIWAN, AND JAPAN

Current rice policies in Thailand, Taiwan, and Japan can be compared by applying a static partial equilibrium demand and supply model to the rice markets of these countries. The results of the comparison are presented in Figure 5. The unit of scale for each axis is the same for all three countries so that a comparison can be easily made.

### The Case of Thailand

The figure for rice policy in Thailand is drawn in the center of Figure 5. The domestic market is drawn on the left-hand side of the figure and it measures demand and supply as they move away from the origin,  $O^{Th}$ ; the export market is drawn on the right-hand side. Since Thailand has been a leading rice exporting country from the late nineteenth century onward, Thai rice has established its reputation as a long-grained, high quality rice in Asian countries and since the international rice market is almost separated from national domestic rice markets by the rice policies of most Asian countries, Thailand can be considered as facing an imperfectly competitive world rice market; that is, the world demand curve for Thai rice,  $D^{ThW}$ , is sloped downward and to the right, as depicted in Figure 5.<sup>9</sup>

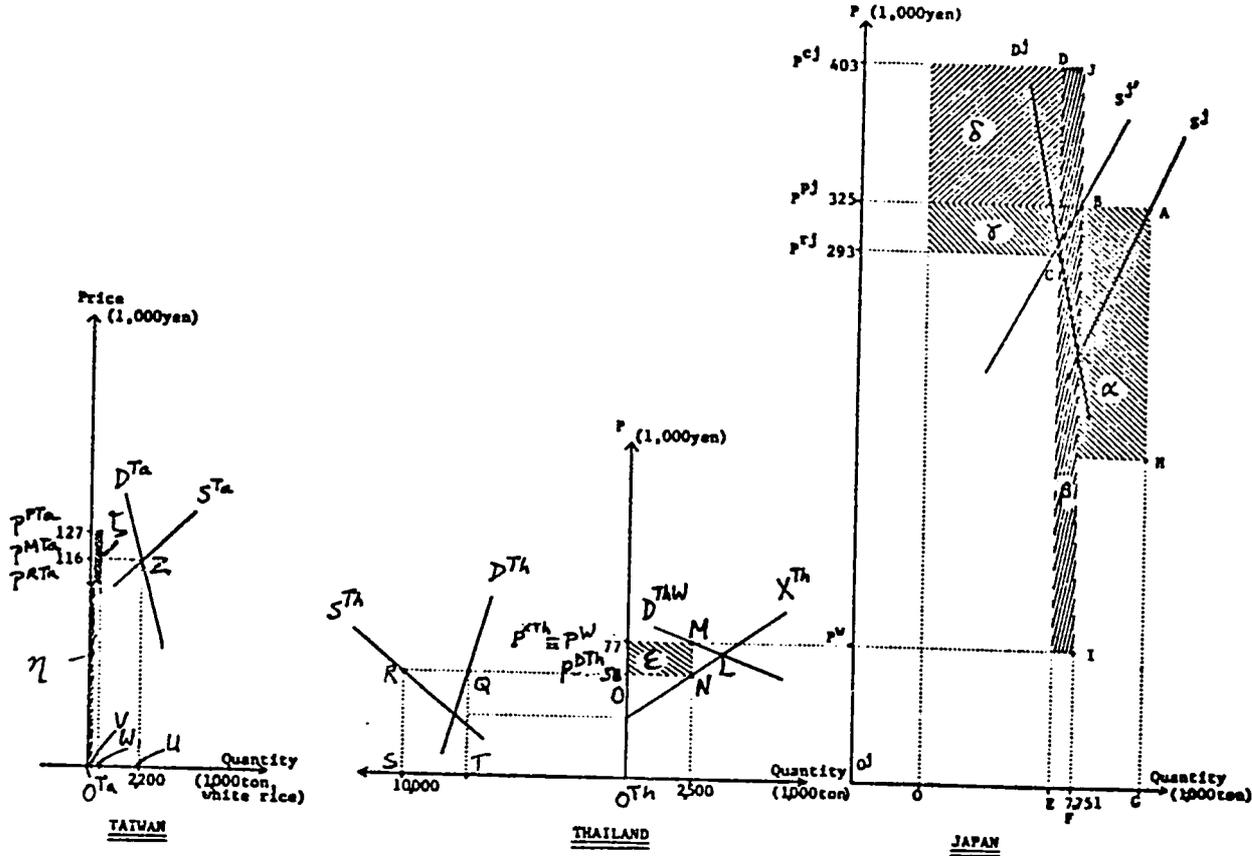
The rice policy that most affects the equilibrium of the rice market in Thailand is in the form of rice export levies<sup>10</sup> known as the rice premium policy (a specific rice export

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<sup>9</sup>The price elasticity of the world demand for Thai rice for the 1950s and 1960s was estimated by the author to be near unity. See Hiroshi Tsujii, "A Quantitative Model of the International Rice Market and Analysis of the National Rice Policies, with Special Reference to Thailand, Indonesia, Japan, and the United States," in Agricultural Sector Analysis in Asia, ed. Max R. Langham and Ralph H. Retzlaff (Bangkok: Singapore University Press, 1982), pp. 291-321; or Hiroshi Tsujii, "An Economic Analysis of the Rice Premium Policy of Thailand," in Southeast Asia: Nature, Society and Development, ed. S. Ichimura (Honolulu: University Press of Hawaii, 1977), pp. 291-320.

<sup>10</sup>See Tsujii, "Rice Premium Policy."

Figure 5. Comparison of the rice Policies of Thailand, Taiwan, and Japan, 1980



tax policy). Although the rice premium policy was formally established in 1955, the custom and institutions for absorbing large public and/or private revenues from rice exports had existed from the late 1940s.<sup>11</sup> The rice premium was a very heavy tax; from 1955 to 1970, it ranged from 21 to 35 percent of the average export price of rice. The revenues from the premium also contributed large shares (6-17 percent) of the total government revenues from 1950 to 1969.<sup>12</sup>

The importance of the rice premium policy in terms of its shares in the export price and total revenue has declined considerably since the early 1970s, except in the food crisis year of 1974 when the share of the rice premium in the export price was 34 percent and in the total revenue was 8 percent. But large price differences between the export price and the domestic wholesale price of rice have persisted from 1969 to the present. This indicates considerable government intervention through export levies, quotas, and restrictions (especially reserve stock and cheap rice policies). Thus rice production in Thailand has been considerably suppressed by government intervention. (The large revenues the Thai government was obtaining from rice exports had been earmarked recently for the sole use of agricultural development [the Farmers Aid Fund]).

In 1980 the difference between the wholesale price and the export price of rice was about 19,000 yen per ton.<sup>13</sup> Given this difference, the domestic and export markets' equilibriums are attained at points M, N, Q, and R. The amount of rice exported is 2.8 million tons, at the price of 77,000 yen per ton. This quantity is the same as the excess supply at the wholesale price

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<sup>11</sup>Ibid., pp. 292-312.

<sup>12</sup>Ibid., pp. 302-303.

<sup>13</sup>Export price is the average price for all grades of rice exported, and the wholesale price is for 15 percent grade rice, which is priced at about average wholesale price. The exchange rates used in this chapter for 1980 are U.S.\$1 = 217.25 yen = 36 NT\$ = 20 baht.

of 58,000 yen per ton. The total domestic supply is about 10 million tons. The shaded area,  $\epsilon$ , is the total revenue obtained by the government through its interventions in rice exports.<sup>14</sup>

The export price of Thai rice,  $p^{XTh} = 77,000$  yen per ton, is considered to be the international price level of rice, as Thailand has been the leading rice exporting country since the late nineteenth century.

### The Case of Japan

As was briefly discussed in the section where the long-run evolution of rice demand and supply for Japan was described, the rice policy of Japan is the exaggerated reverse of Thai rice policy. Rice production in Japan is protected at too high a level and this produces a large potential surplus that cannot be exported without large government subsidies. This surplus production capacity is reduced by a highly subsidized land transfer policy that shifts land to other crops. The rice that does accumulate is disposed of through such highly subsidized methods as exports or sales as feed.

The results of rice policy are described by the right-hand side of the graph for Japan. International rice trade is monopolized by the government through the Food Agency, which completely separates the domestic rice market in Japan from the world rice market.<sup>15</sup> A negligible amount of rice is traded by the Food Agency, and therefore only the domestic rice market is drawn in the case of Japan.

$s^j$  is the original supply curve of Japanese rice growers.  $s^{j'}$  is the actual supply curve shifted to the left by  $\bar{\Delta B}$ , which represents the land transfer from rice production to other crops.  $D^j$  is the total domestic demand curve for rice. The

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<sup>14</sup>If an export quota is also applied, private exporters obtain a part of  $\epsilon$  as excess revenue from the quota.

<sup>15</sup>Japonica rice is produced in Japan while the world rice market is dominated by Indica rice, which is very different in its taste and grain shape from japonica rice. This adds to the degree of the separation of the Japanese rice market.

rice growers retain and consume  $\overline{O^jO}$  amount of rice. Thus  $S^j$  and  $D^j$  are drawn with point O as their origin. If there is no government intervention in the domestic rice market, the autarky domestic equilibrium is attained at point K. But the government intervenes in the domestic market by the total control method; that is, by controlling all the rice supplied and demanded by the market.<sup>16</sup> The government purchases all the rice from the farmers that was agreed to at the procurement price,  $p^{pj}$ , which was 325,000 yen per ton in 1980. Since the actual supply curve is  $S^{j'}$ , the total supply is determined at point B as the length of  $\overline{OF}$ . The total subsidy for the land transfer policy is represented by the shaded area,  $a$ , where the length  $\overline{AH}$  is assumed to be the subsidy per ton of rice production reduced by the policy.

As mentioned above, the export price of rice from Thailand,  $p^{XTh}$ , is considered to be a good index of the international price level of rice,  $p^W$ . The Japanese government purchase price,  $p^{pj}$ , is more than five times as high as  $p^W$ . This large difference indicates the high level of protection of the rice production in Japan.

The demand for rice in Japan is also controlled by the government through its price policy. The government resells its procured rice at  $p^{rj}$ ; that is, at the wholesale price of 293,000 yen per ton. Assuming  $D^j$  is the derived demand curve for rice at the wholesale level, then the quantity of domestic demand for rice is determined at point C as  $\overline{OE}$ .

In 1980 the government purchased the quantity of rice,  $\overline{OF}$ , at price  $p^{pj}$  and resold the amount  $\overline{OE}$  at  $p^{rj}$ . Thus the loss caused by the difference between the government's purchase price and the resale price is the shaded area,  $\gamma$ , which is

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<sup>16</sup>Small quantities of rice known as "free rice" leak out of this total control, but these are illegal.

$\overline{OE} \times \overline{p^{Dj}} \overline{p^{Rj}}$ .<sup>17</sup> But the government control of rice involves marketing, storing, and other costs, and these costs amounted to 78,000 yen per ton. The transaction involving  $\overline{OE}$  thus needs an additional government expenditure expressed by the shaded area  $\delta$ .

The amount of rice the government purchased is  $\overline{OF}$ , and the total cost price of the purchased rice is  $P^{Cj}$ , which was 403,000 yen per ton in 1980. Since the amount of rice resold by the government is  $\overline{OE}$ , the surplus rice for 1980 is  $\overline{EF}$ . It is natural to have a surplus or a shortage of rice under the total quantity control rice policy since marketed rice supply and the total demand are more or less separately determined by government purchase and resale prices. Assuming that the surplus is exported,<sup>18</sup> the total government cost as export subsidy is the shaded area  $\beta$ .

The quantities indicated by points A, H, C, and K, and the prices indicated by points K and J are not actual, exact values since the price elasticities of  $S^j$  and  $D^j$  are not measured and are thus drawn with hypothetical elasticities.

To summarize, the total government expenditure needed for the control of rice demand and supply and the disposal of the surplus are the large shaded areas  $\alpha$ ,  $\beta$ ,  $\gamma$ , and  $\delta$ ; the difference between  $p^W$  and  $p^{Dj}$  is the government subsidy that protects rice producers and this amounts to about 248,000 yen per ton, and is biased toward the larger farms since they sell a greater

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<sup>17</sup>Strictly speaking the total amount,  $\overline{OF}$ , purchased by the government should be separated into government controlled rice and Jishuryutsumai (independently marketed rice). But both categories of rice are still under the government's total quantity control. The prices of the second category of rice are not directly controlled, but its marketing is subsidized. For the sake of simplicity, these two categories are not explicitly shown in Figure 5. The free (illegal) rice that is marketed is also neglected for the same reason.

<sup>18</sup>Most of the disposal of the accumulating rice surplus since 1976 has been through rice exports.

quantity of rice; the difference between  $p^{c_j}$  and  $p^{r_j}$  is the subsidy that consumers of rice get and this amounts to 110,000 yen per ton; and  $\overline{EG}$  indicates the potential surplus and  $\overline{EF}$  the actual surplus. In this figure actual surplus is equated with rice exports, but in general they are not equal in the short run. This inequality is presented in the fifth stage of the trends of the demand for and supply of rice in Japan in Figure 2.

### The Case of Taiwan

Taiwanese rice policy is an intermediate case between that of Thailand and that of Japan regarding the protection level and government intervention in the domestic rice market. Since external rice trade is monopolized by the government,<sup>19</sup> the domestic market is completely separated from the international rice market as in the case of Japan. Thus only the domestic rice market is depicted in the diagram for Taiwan. The Taiwanese government intervenes in the domestic rice market by the amount  $O^{TaW}$ . This is partial quantity control, whereas Japan has total quantity control and Thailand virtually none.<sup>20</sup> The Taiwanese government's procurement price,  $p^{PTa}$ , is higher than the world price,  $p^W$ , but much lower than Japan's procurement price,  $p^{P_j}$ , thus the level of protection is also between that of Japan and Thailand.

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<sup>19</sup>H. Chen, W. Hsu, and Y. Mao, "Rice Policies in Taiwan," in Joint Commission on Rural Reconstruction, Agricultural Economic Research Papers (Taipei: JCRR, October 1978), p. 236.

<sup>20</sup>The Thai government has controlled some quantities by the compulsory sale of rice by exporters to the government's Public Warehouse Organization at a price lower than the market price for a specified ratio (the reserve ratio) of the quantities of rice exports by private exporters; by reselling to the public the rice purchased through the compulsory sales as cheap rice, that is, rice at a price slightly lower than the retail price; and by the government purchase of paddy from farmers and mills at a price higher than the market price. The quantities in these interventions range from 217,000 to 755,000 tons during the period 1974-1980 for the first two measures and are negligible for the third measure and thus are neglected in Figure 5.

In 1980 the Taiwanese government's Food Bureau procured paddy through land tax in kind, "compulsory"<sup>21</sup> and free rice purchases, and other measures.<sup>22</sup> The amount procured through land taxation is depicted as  $O^{Ta}V$ , and through compulsory and free purchases as  $\overline{VW}$ . Paddy procured by the other three measures is neglected due to the small quantity involved. Before 1973, paddy procured by the fertilizer-paddy barter policy under the government fertilizer monopoly had amounted to large quantities, but the policy was abolished in 1973. This policy was notorious since the barter ratio used by the government was greatly disadvantageous to the farmers in comparison with the international relative price.

The total amount procured by the government,  $\overline{O^{Ta}W}$ , is disposed of as free rations to military personnel and officers' dependents; free rations to government employees and teachers; market stabilization sales at a lower-than-market price; subsidized rice exports; domestic sales at the cost price; and feed use of deteriorated rice. From interviews at the Food Bureau and other places in 1979 and 1980, it was learned that there were about 300,000 tons of surplus rice (carryover from the previous season), and that the government was trying to cope with the surplus by encouraging a shift from rice to other crops and by importing feedgrains using the foreign exchange earned by rice exports. The domestic demand curve,  $D^{Ta}$ , and supply curve,  $S^{Ta}$ , are drawn with the point W as their origin. At their intersection, Z, the wholesale price of rice,  $P^{MTa}$ , is determined.

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<sup>21</sup>This became noncompulsory purchase in 1973 when the official purchase price became higher than the wholesale price of paddy. Before 1973 the reverse was true.

<sup>22</sup>These measures are the installment repayment in paddy to the government for the land that was transferred to the tenants during the postwar land reform program; the repayment in paddy of the value of the public land sold to farmers and payment of the rent of the public land leased to farmers; and the repayment in kind for the rice production loan of the Food Bureau. The total amount procured by these measures has been declining and now amounts to only small quantities.

As described above, the Food Bureau gets some of its rice ( $O^{TaV}$ ) free (through such measures as the land tax in kind) and some ( $VW$ ) at above-market prices such as at  $p^{RTa}$ . The Food Bureau disposes of some of its rice free of charge, and some at cost or below-market prices. Thus, assuming that the total amount of rice procured by the Food Bureau,  $O^{TaW}$ , is resold at an average resale price of  $p^{RTa}$ , the total government expenditure for rice control is the difference between the shaded areas,  $\xi - \eta$ , plus marketing costs. Depending on the level of  $p^{RTa}$ , this expenditure or deficit varies. The exact value of  $p^{RTa}$  can be calculated, but in Figure 5 it is tentatively located.

Since the quantity control of the Taiwanese government is partial, there is a large private rice market. This private market has a special property that does not exist in Japan or Thailand because of a government policy called the Institution of Food Control Divisions. This policy forces private rice marketing business to be disaggregated into seven food control divisions, which cover Taiwan, and the private shipment of rice between divisions needs government permission. Although this permission is now said to be easily obtainable, this institution does reduce marketing efficiency by reducing the speed of inter-division demand and supply adjustments and by prohibiting the realization of scale economies by the private rice marketing sector. Of course this makes it easier for the Food Bureau to control the rice market.

## RICE POLICY AND ECONOMIC DEVELOPMENT OF RICE COUNTRIES -- JAPAN, THAILAND, AND TAIWAN

### Some Hypothetical Relations between Rice Policy and Economic Development in a Rice Country

After investigating the interdependent evolution between rice supply and demand<sup>23</sup> and long-run changes in rice policy in Japan, Thailand, and Taiwan, and comparing the current rice

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<sup>23</sup>John Mellor has discussed phases of food demand and supply changes with regard to economic development in John W. Mellor, The Economics of Agricultural Development (Ithaca: Cornell University Press, 1966), chapters 4 and 13.

policies of these three countries, three hypothetical relationships between rice policy and economic development can be induced. First, when a rice country is at a low level of economic development, its government tries to extract as much rice or rice-related revenue as possible by various measures such as the suppression of farmers' income by taxation and monopoly sales (prewar Japan, Taiwan, and Korea and postwar Taiwan); the administratively enforced, compulsory procurement of rice at a price lower than market price (postwar Japan, the Rice Reserve Policy of Thailand, and pre- and postwar Taiwan); and the enforcement of rice export levies (postwar Thailand), which was also meant to stabilize the domestic rice price. The negative protection of rice production was a common feature then.

Second, when a rice country develops into a high-income country, the protection of rice production becomes positive. As a rice economy develops, the nonagricultural sector grows faster than the agricultural sector, and the income gap between the workers in these sectors tends to increase. This increasing income gap becomes a major policy issue and the level of protection of rice production is increased by supporting the domestic rice price. As the domestic rice price increases and government expenditures on research and agricultural infrastructures for rice production grow, rice supply increases with some time lags. But the total demand for rice responds to the price increase quickly and starts to decrease, since rice shifts from a normal good to an inferior good as per capita income grows. Consequently a rice surplus, under high protection, accumulates, and subsidized production control and surplus disposal policies become necessary (recent Japan and Taiwan).

Third, a rice-exporting country like Thailand may face a rice surplus under a negative protection policy for rice production, since the growth in the total demand for rice slows down because the income elasticity of demand for rice decreases as the economy grows, and since the total supply of rice keeps growing due to past government and private efforts in research and the construction of agricultural infrastructures for rice production.

These three relations between rice policy and economic development in a rice country are highly hypothetical since they

are induced from a time-series and cross-section study of rice policies and rice markets in only three rice countries: Japan, Thailand, and Taiwan. More general relations can be identified if more rice countries are compared.

### Policy Implications of the Present Study

Based on the time-series and cross-section study of rice policies and rice markets in Japan, Thailand, and Taiwan, three policy implications are drawn.

First, the total demand for rice changes in the long run along the long-S pattern with the economic development of a rice country, as rice shifts from a normal good to an inferior good. The total rice supply grows in the long run in a stepwise fashion because of the intermittent nature of the technological improvements in rice production, the spurt in the economic growth of the nonagricultural sector, and because the effects of technological improvements in and the construction of agricultural infrastructures for rice production tend to remain for some time. We can thus predict a rice surplus or shortage with some certainty in the near future in both developed or less developed rice countries, based on the investigation of the trends of total rice demand and supply and the related factors mentioned above. Knowing the future level of a rice surplus or shortage, we can propose certain precautionary policy measures. We can do this with or without an econometric model.

Second, by comparing the total and partial quantity control rice policies, the flexibility and healthiness of the partial control policy can be pointed out. Under a partial control policy, a large private rice market is left to operate, and a distorted rice policy such as an extremely high support price for rice cannot be realized because an extreme distortion such as this can be quickly felt socially through the simple existence of the private market equilibrium. Under a total control policy, the equilibrium function of the private rice market does not work and a highly deviated rice policy can be enforced, as in the case of Japan, which results in the extreme waste of resources represented by the large potential rice surplus or the large government subsidy shown by the shaded area for Japan in Figure 5. Since the primary, socially agreed upon policy objectives are self-sufficiency in rice and the stability of the

domestic rice market in most Asian rice countries, partial domestic quantity control with an effective control of the international rice trade by the government should be the proper policy mix. If the income transfer that is made under the total control policy is politically inevitable, it should be done not by a rice price policy but by a policy which is close to a lump sum income transfer policy, and to the degree that social equity is not distorted much by this policy.

And third, at a low level of economic development, a large economic surplus is squeezed out of the rice economy in terms of rice or government revenue. Important policy options then arise of finding ways to better utilize the surplus for economic development, that is, the increase of per capita income as well as the improvement of income distribution. Some less developed Asian rice countries do not seem to be efficient in their use of surpluses and they can learn from the experiences of East Asian rice countries to use their surpluses more effectively.

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