THEORETICAL ANALYSIS OF THE RICE EXPORT SYSTEM IN THAILAND

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I. INTRODUCTION

RICE IS by far the most important product in Thailand: its contribution in total agricultural production and total export is unsurpassed by any other commodity. It is also the most important food for Thai people. The aim of this paper is to analyze the present rice export system in Thailand in the light of economic theory.

The present rice export system in Thailand is rather complicated due to the following four factors:

(1) There are both private and government export;[1]

(2) Three different export duties are levied on private rice export, i.e., (a) "rice export premium" (specific),[2] (b) "rice export tax" (ad valorem), and (c) "local tax" (specific);

(3) Quotas are applied to private export;[3]

(4) Private exporters are forced, when exporting a certain quality of rice, to sell equivalent quantity of rice to the government at a prescribed price lower than the prevailing market price. For example, when an exporter has a contract to export fifty tons of rice, he is forced to sell another fifty tons to the government at a certain lower price. The government holds those rice purchases as reserve stocks and releases them as time requires at lower than market price, in order to stabilize the domestic rice price and alleviate the situation of hardship for the low-income people. This policy is hereafter referred to as "export-linked

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The present paper was originally published in Japanese in December 1975 issue of *Tōnan Ajia kenkyū*, Vol. 13, No. 3, and is a result of joint research begun in the summer of 1974 by Dr. Hiroshi Tsujii and myself. It complements both an article in Japanese by Tsujii entitled "Economic Analysis of Rice Premium Policy of Thailand," published in the same issue of *Tōnan Ajia kenkyū*, and a revised paper which also appears in this issue. Tsujii's articles examine the historical and institutional aspects of the rice export policy in Thailand, and it is hoped that his articles to be read in conjunction with the present one.

[1] The Thai government only exports rice which it purchases at prevailing market prices. It is not supposed to export rice purchased through low-price forced selling system.

[2] The rice export premium was renamed "rice export levy" in December 1974.

[3] Export taxation has been used over a hundred years in Thailand and apparently has never been stopped since its inception. The export quota system, though, has been repeatedly repealed in the postwar period (nothing is known of its situation before the war). The present export quota system came into effect sometime during 1972 when the global food shortage appeared.

low-price forced selling," or "low-price forced selling" for short. It requires private exporters to derive extra profit from rice export to offset losses incurred in low-price forced selling to the government.[4]

Considering the complexity of this rice export system, some adjustments are needed for a theoretical analysis. First of all, the three types of export duties can be considered as one.[5] Second, government rice export will be excluded, because its volume is exogenously determined, in the sense that the government makes its decision political as well as economic considerations. Government export will be discussed, however, in Section IX. Third, to discuss in proper perspective the present export system with export tax, export quota, export-linked low-price forced selling, and release of reserve stocks, the analysis in this paper will consist of four stages: (1) rice export system with only the export tax; (2) rice export system with export tax and export quota; (3) rice export system with export tax and low-price forced selling; (4) rice export system with export tax, low-price forced selling, and release of reserve stocks.

II. EQUILIBRIUM IN THE SYSTEM WITH EXPORT TAX

An analysis is first made, on the equilibrium in a perfectly free rice export system, given the following three assumptions.

(1) No government export nor export quota.

(2) Domestic marketing cost of rice is zero with no intermediate dealers. That is, producer's rice price equals consumer's rice price.

(3) Rice exporters are effectively competitive with each other. Their costs of purchase, collection, and shipping for export are at zero.

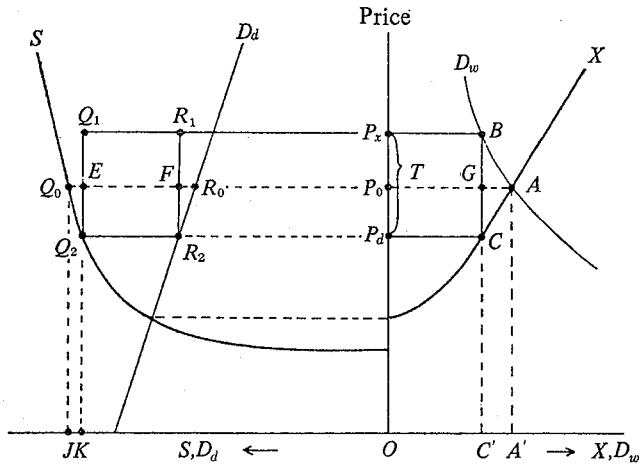
The first quadrant in Figure 1 represents the export market, the fourth is for the domestic market. Supply schedule is obtained from rice sales by producers, that is to say, from subtracting producers' self-consumption from total production,[6] and is represented by curve S (downward sloping instead of upward sloping because it is plotted on the fourth quadrant). Curve D_d represents domestic

[4] The reserve stock policy, referred to as "low-price forced selling system" in this paper, was first adopted in 1962, quickly repealed in the following year, and adopted again in 1966. The present reserve stock policy started in 1972 following 1968 repeal. During the period up to 1968, the ratio of the quantity of low-price forced sales to that of exports was never higher than 15 per cent. When the policy reappeared in 1972, the rate was set at 5 per cent and then raised to as high as 200 per cent in August 1973. It was later lowered to 50 per cent, but again increased to 100 per cent in December 1974.

[5] A specific duty is chosen to represent three different kinds of export duties, because rice export premium, which is specific, is largest in value.

[6] The farmers' rice sales must equal the total rice production minus personal consumption. Since personal consumption is a type of "reserve demand," it could be considered as demand. Here, however, the demand curve is so depicted as to represent only consumers' demand, whereas the supply curve only represents the farmers' sales and not their total production. Otherwise it would be difficult to deal with concepts such as consumer surplus and producer surplus in a diagrammatic form.

Fig. 1. Equilibrium in the System with Export Tax



demand for rice, or rice purchases by Thai consumers.[7]

Curve X in the first quadrant is an excess supply curve, or exportable surplus curve, derived from curves S and D_d. Curve D_w is oversea demand for Thai rice. The oversea demand curve would be horizontal, if Thailand were a small and unimportant supplier in the international rice market. However, Thai rice as a part of world rice trade is actually large enough to affect the world rice price appreciably by changing quantities of her rice export. Therefore, the oversea demand curve (for Thai rice) slopes downwards. According to Tsujii's econometric study, price elasticity, or relative price elasticity to be exact, of oversea demand for Thai rice is virtually unity.[8]

Needless to say, the equilibrium export price will be reached at point A, assuming a perfectly free export system. That is to say, P_0 will be the level at which all of producer price, consumer price, and export price of rice coincide.

When the government introduces the export tax whose rate is shown by BC

[7] A comment is perhaps needed on positive sloping of the supply curve. Behrman has shown that a rise in producer price in Thailand is usually responded to by an increase of the area planted in rice and then increased rice production. See J. R. Behrman, *Supply Response in Underdeveloped Agriculture—A Case Study of Four Major Annual Crops in Thailand, 1937–1963* (Amsterdam: North-Holland Publishing Co., 1968). No study would have yet established with sufficient factual evidence, regarding whether or not supply of rice (or rice production minus farmers' self-consumption) increases in response to a rise in producer price. Thus, positive sloping of the supply curve in Figure 1 is hypothetical in this respect. However, the positive slope of the supply curve is not significant to the present paper. Rather, positive sloping of the exportable surplus curve is a necessary and sufficient condition.

[8] See H. Tsujii, "An Econometric Model of the International Rice Market and Analysis of the National Rice Policies in Thailand, Indonesia, Japan and the United States," Discussion Paper No. 75 (Kyoto: Center for Southeast Asian Studies, Kyoto University, 1974), p. 54. The price elasticity of oversea demand for Thai rice in Tsujii's paper is regarding the export prices of Thai rice deflated by the international price index of this commodity.

in Figure 1, export price will rise to P_x, and domestic price will decline to P_d, consequently decreasing the quantity of export. The value amount of rice export will remain unchanged, however, if the oversea demand for Thai rice has a price elasticity of unity. The government's revenue from rice export tax will be shown by the rectangle area P_xP_dCB.

Now, if we assume *equilibrium in a perfectly free export system* as a standard, gain or loss to each of the three categories of economic units (that is, producers, consumers, and the government) are respectively as follows:

Loss to producers: Decrease in producer surplus as shown by trapezoid $Q_0\,Q_2\,P_d\,P_0$.

Gain to consumers: Increase in consumer surplus as shown by trapezoid $R_0\,R_2\,P_d\,P_0$.

Gain to government: Increase in tax revenue as shown by rectangle $Q_1\,Q_2\,R_2\,R_1$.

And,

$$\begin{aligned}&(\text{government gain})+(\text{consumer gain})-(\text{producer loss})\\&=Q_1Q_2R_2R_1+R_0R_2P_dP_0-Q_0Q_2P_dP_0\\&=Q_1EFR_1-(Q_0Q_2E+FR_2R_0)\\&=P_xP_0GB-GCA.\end{aligned}$$

Thus, if $P_xP_0GB>GCA$ holds, the introduction of such an export tax will generate an increase of total gain to the Thai economy of P_xP_0GB minus GCA, in so far as total gain to an economy is defined as the sum of consumer surplus, producer surplus, and government revenue.

And, if price elasticity of the oversea demand (the curve D_w) is unity, it holds that,

$$P_xP_0GB-GCA=GC'A'A-GCA=ACC'A'.$$

Thus, the total gain to the economy generated by the introduction of export tax will be plotted as area $ACC'A'$.[9]

On the other hand, introduction of rice export tax in Thailand will induce a reduction of consumer surplus in the rice-importing countries. If the gain to Thailand and the loss to importing countries are added up, the result will be

$$(P_xP_0GB-GCA)-P_xP_0AB=-BCA.$$

That is, export tax levied by Thailand will generate, the loss (represented by BCA) to the global economy. However, as far as Thai economy as a whole is concerned, export tax on rice is likely to generate economic gain, as above Stated.

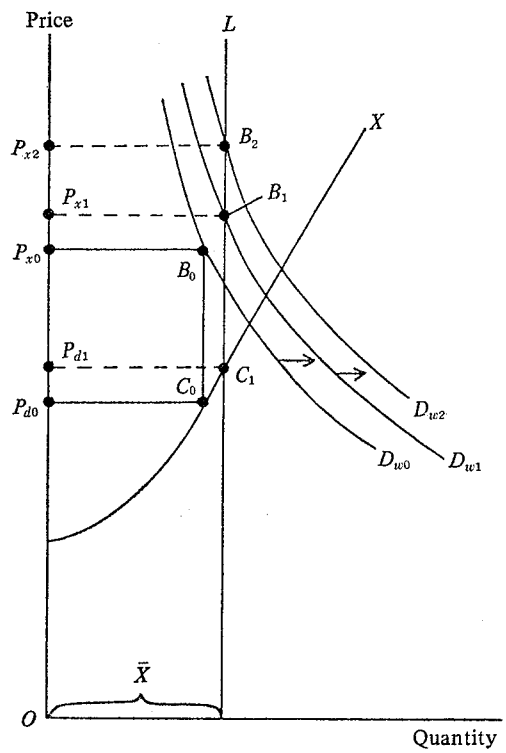
[9] The larger the price elasticity of oversea demand curve (D_w) and also the smaller the price elasticity of exportable surplus curve (X), the smaller the balance of P_xP_0GB minus GCB will be. At any rate, as long as P_xP_0GB is larger than GCB, export tax on rice will be beneficial to the Thai economy.

III. EQUILIBRIUM IN THE SYSTEM WITH EXPORT TAX AND EXPORT QUOTA

The export quota system will include (1) government restrictions on quantity of export of a commodity over a set period of time, and (2) the government's assignment of quotas on each private exporter. In most cases, the primary objective of such a system will be in effectuating (1), and (2) will be just a means to smoothly carry out the objective. Therefore, effects of the export quota system on market equilibrium will be properly analyzed when the system is understood as a means of restricting quantity of export. In Figure 2, $\bar{X}$ represents the prescribed upper limit of the volume of rice export, whereas curves X and D_{w0} are the exportable surplus of and the oversea demand for Thai rice, respectively. Supposing an export tax of $B_0 C_0$, the volume of rice export will be $P_{x0} B_0$, where P_{x0} and P_{d0} are export and domestic prices, respectively. Thus, restricting export volume at $\bar{X}$ does not affect the equilibrium in this case.

Suppose that the oversea demand for Thai rice expands for one reason or another, and its curve shifts rightward from D_{w0} to D_{w1}, D_{w2}, and so on. Through the shift to D_{w1}, the volume of rice export increases to $P_{x1} B_1$ $(=\bar{X})$, and export and domestic prices are at P_{x1} and P_{d1} respectively (where $B_1 B_2$ is equal to

Fig. 2. Equilibrium in the System with Export Tax and Export Quota



B_0C_0). Thus, the restriction on export volume still does not affect equilibrium.

With a further rightward shift from D_{w1}, however, restriction on export volume starts to affect equilibrium: The shift to D_{w2} is not followed by changes in export volume and domestic price, but the export price will rise to the level of P_{x2}. In the expanded gap between export and domestic prices of $P_{x2}P_{d1}$, the portion $P_{x1}P_{d1}$ will constitute government tax revenue, whereas the remainder $P_{x2}P_{x1}$, will be excess profit to private exporters.

This shows the export quota system, which is used in Thailand in addition to imposition of an export tax will have a primary objective of stabilizing the domestic rice price, when the oversea demand for Thai rice increases rapidly. Considering the overwhelming importance of rice for the diet of Thai people and their extremely high Engel coefficient, that is expected, it will be easily understood how crucial is the stabilization of domestic rice price.

Theoretically, when oversea demand shifts from D_{w1} to D_{w2}, it is not always necessary to restrict export volume at $\overline{X}$ in order to keep the domestic price at the level of P_{d1}: Domestic price could be kept at P_{d1}, by increasing the rate of export tax from B_1C_1 to B_2C_1. However, in order to maintain the domestic price at a certain level only by adjusting the rate of export tax, the government must know in advance exactly where point B_2 would fall, an altogether impossible proposition. Furthermore, in real life, the oversea demand for Thai rice will not shift in neat notches but it will increase (or decrease) continuously. Therefore, it will be virtually impossible technically as well as institutionally to adjust the rate of export tax to keep the domestic price at the P_{d1} level. In view of these practical difficulties, it will be necessary and effective, to have a system of restriction of export volume as a safety measure against any sudden increase in the oversea demand, which would push up the domestic price level.[10]

Let us suppose, as a contrasting corollary, that the oversea demand decreases from D_{w1} to D_{w0}. In this case, both domestic and export prices will decline, no matter whether the export system has just export tax or both export tax and quota. That is, when the oversea demand curve shifts leftward, existence of export quota in addition to export tax functions neither negatively nor positively in stabilizing the domestic price level.

IV. EQUILIBRIUM IN THE SYSTEM WITH EXPORT TAX AND LOW-PRICE FORCED SELLING

Thus, the function of the export quota system is to put an effective brake on rises in the domestic rice price in the face of expanding oversea demand. It appears likely, in my view, that this function will usually remain dormant.[11]

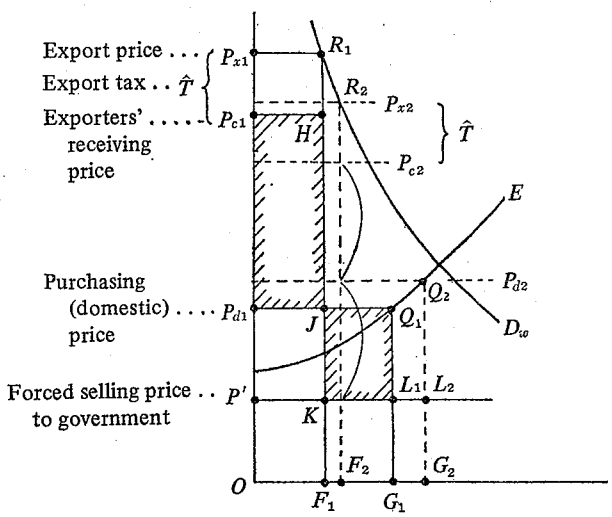
[10] There is, however, one shortcoming to this safety measure: because of export restriction, the amount of rise in export price, $P_{x2}P_{x1}$, will go into the pockets of private exporters. But this shortcoming is not as grave as it may appear, because this excess profit to exporters could be curtailed after a certain time lag by increasing the export tax rate.

[11] To prove this assumption, it needs to be shown only that the actual quantity of rice exports were smaller than the restricted quantity of export over a period of time. Available data prevents the demonstration of such evidence.

If the conjecture is correct, effects of the presence of an export quota system can be ignored, providing that the analysis is confined to rice export operations under normal conditions.

The rice export system in Thailand is, as already mentioned, composed of an export tax, export quota, and export-linked low-price forced selling. If the existence of the export quota can be reasonably regarded as negligible under normal conditions, it is possible to conclude that export tax and low-price forced selling are the components of the Thai export system effectively operating under normal conditions. The next step, then, is to examine the equilibrium with export tax and low-price forced selling.

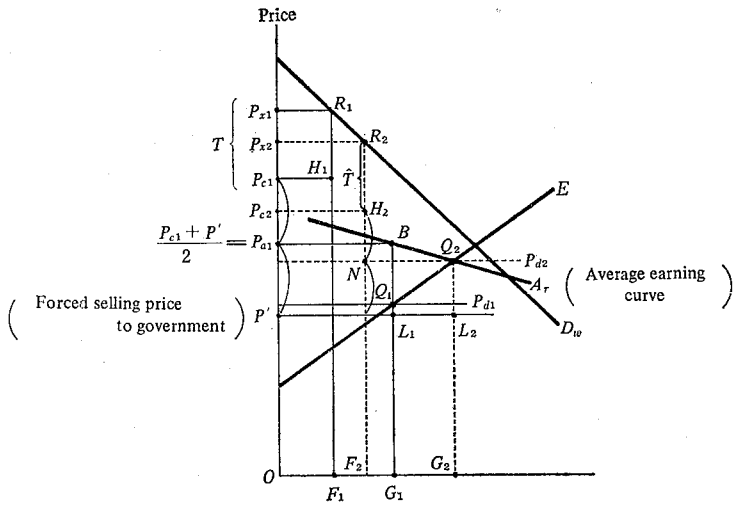
Fig. 3. Process to Equilibrium in the System with Export Tax and Low-Price Forced Selling



Curve E in Figure 3 is equivalent to the curve X in Figures 1 and 2. It is more appropriate in this case, however, to think of it as an excess supply curve than as exportable surplus curve. Suppose that private exporters buy an amount of rice OG_1 from the domestic market. Then, their purchasing price (or the domestic market price) will be at point Q_1, or P_{d1}. Suppose further that half of the purchased rice, OF_1, is exported, assuming that the ratio between the quantity of the low-price forced selling rice and the quantity of export rice are at unity. Then, the export price will be at either point R_1 or P_{x1}. P_{c1}, the balance of this export price minus export tax $\hat{T}$ (fixed), is the price which is received by exporters. A balance of P_{c1} minus P_{d1} then constitutes a gain to exporters per unit of rice exported. The remaining half of the rice bought up by the exporters is forced to sell to the government at a lower price level P', determined previously. Then, the balance of P_{d1} minus P' constitutes a loss to the exporter per unit of rice sold to the government. If the balance of P_{c1} minus P_{d1} is larger than that of P_{d1} minus P', as shown in Figure 3, that difference represents excess profit for the exporters. In so far as the exporters have excess profits and make their

purchasing decisions atomistically, they are likely to increase their purchases, and hence their exports, giving rise to expectations of further increasing excess profits. In consequence, the total volume of rice purchased by exporters will increase from OG_1 to OG_2, whereupon the purchasing price will rise from Q_1 to Q_2, which in turn will expand the exporter loss per unit of rice sold to the government from Q_1L_1 to Q_2L_2. On the other hand, an increase in the total export volume from OF_1 to OF_2 will depress export price to R_2, and thus the price received by exporters will slide to P_{c2} down from the previous P_{c1} level. That is to say, the exporter gain per unit of rice exported will narrow down to $P_{c2}P_{d2}$ from $P_{c1}P_{d1}$. Then equilibrium will be reached when the exporters' gain ($P_{c2}P_{d2}$) from exports coincides in amount with their loss ($P_{d2}P'$), in selling to the government in other words, when their excess profit becomes zero. In Figure 3, the equilibrium price in the domestic rice market will be reached at point P_{d2}, whereas P_{x2} will be the export equilibrium price.[12]

[12] The equilibrium mechanism in the system with export tax and low-price forced selling will be more clearly explained in the accompanying figure.



Supposing that exporters buy rice at a total volume of OG_1, of which OF_1 is exported and the remaining F_1G_1 is sold to the government at a price P'. The export price will then be P_{x1}, with the exporters' receiving price obtained by subtracting the export tax will be P_{c1}. The mean price received by exporters can be obtained by taking an average between exporter receiving price and the forced selling price, as in $(P_{c1}+P')\div 2=P_{a1}$. In other words, the exporters as a whole can be regarded as they sell rice amounting to a total volume of OG_1 at an average price of $BG_1=P_{a1}$. Because the exporters buy rice at a price of $Q_1G_1=P_{d1}$, their total sale will bring an excess profit of BQ_2 per unit of rice sold. Now, when exporters manage to expand quantities of purchases as well as exports according to the principle of profit maximization, this will depress the export price, the exporter receiving price, and hence the mean exporter receiving price. Therefore, the locus points along line A_r, which represent combinations of exporter total purchases and average exporter receiving prices, will slope downward, going through point B. (Line A_r may be termed an "exporter average revenue curve" because it represents changes in average revenue earnings in response to changes in total purchases.)

Equilibrium in the system with export tax and low-price forced selling can be shown in the following simultaneous equations, where $D_w(P_x)$ stands for oversea demand function and $E(P_d)$ excess supply function,

$$2D_w(P_x)=E(P_d), \tag{1}$$

and

$$(P_x-\hat{T})-P_d=P_d-P'. \tag{2}$$

Equation (1) gives a supply and demand equilibrium in the export market for Thai rice; equation (2) shows that the gain to exporters through export equals loss through low-price forced selling, that is to say, excess profit being zero. Since we are assuming that the rate of tax ($\hat{T}$) and the forced selling price (P') are given, the solution to this set of simultaneous equations gives export and domestic prices in equilibrium.[13]

So far the ratio between the quantity of low-price forced selling and that of exports has been assumed to be at unity. If this ratio is generalized as θ, then equation (1) will be transformed into the following formula:

$$(1+\theta)\cdot D_w(P_x)=E(P_d). \tag{3}$$

Thus, equilibrium values of P_x and P_d are determined by solving the simultaneous equations (2) and (3).

V. EFFECTS OF CHANGES IN POLICY VARIABLES ON EQUILIBRIUM IN THE SYSTEM WITH EXPORT TAX AND LOW-PRICE FORCED SELLING

(Since the analyses in Sections V through VII are theoretically complicated, the reader may wish to skip this part.)

As implied in equations (2) and (3), the equilibrium values of P_x and P_d are dependent upon values of the three policy variables of P' (the price at which exporters are forced to sell to the government), $\hat{T}$ (the rate of export tax), and θ (the quantity ratio of low-price forced sales to exports), which could be changed as the government desires. In the following paragraphs, discussion will be devoted to the effects of changes in these policy variables on equilibrium.

Then, equilibrium will be reached at point Q_2 where line A_r intersects excess supply curve E. In other words, export price and exporter receiving price will be R_2F_2 and H_2F_2 respectively, and exporter total purchase will be determined at OG_2 and exporter total export at OF_1. Then, the mean exporter receiving price will be $NF_2=Q_2G_2$, where excess profit becomes zero. This explanation and the graph are based on suggestions given me by Prof. R. Yasuba of Kyoto University.

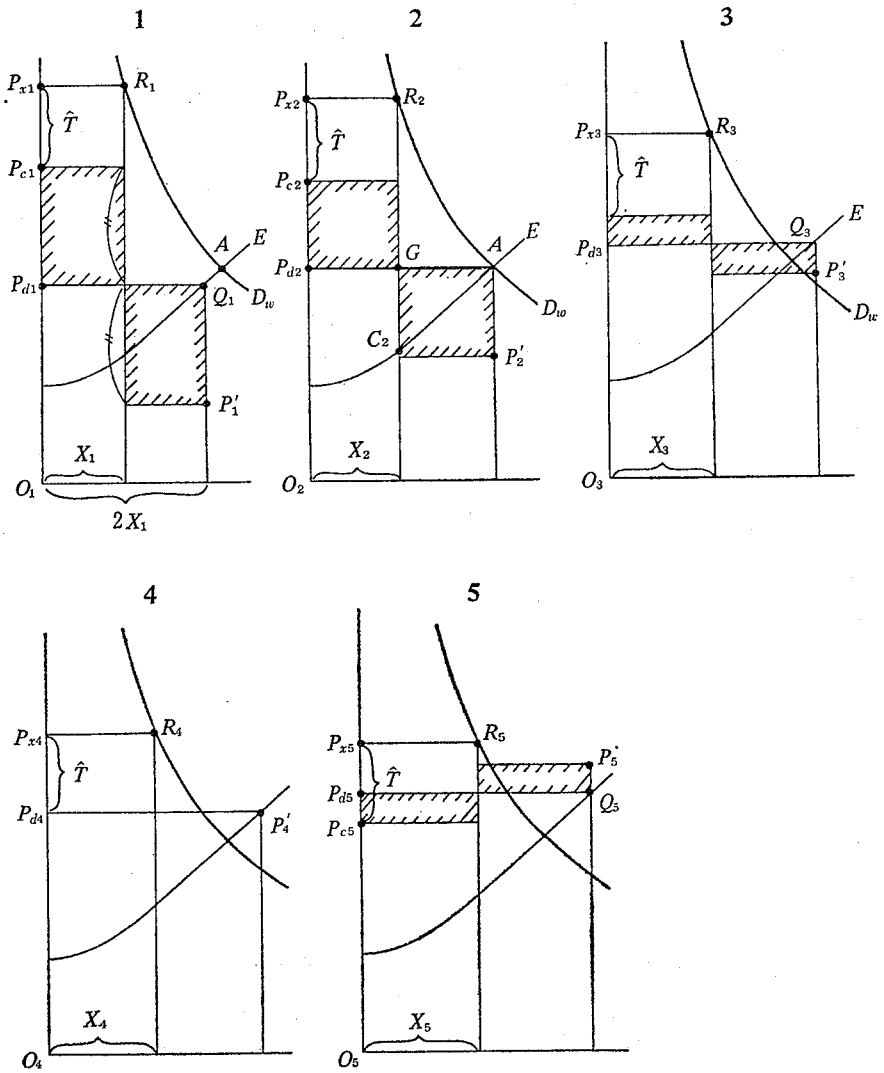
Even when an export quota system is operating in addition to export tax and low-price forced selling, near equilibrium with zero excess profit will be reached, as long as export restrictions imposed are larger than OG_2 as shown in the above graph, and exporters are effectively competitive.

[13] Equation (2) can be altered to read: $[(P_x-\hat{T})+P']/2=P_d$. This means, that the average exporter receiving price (obtained from the exporter receiving price and the forced selling price) is equalized to the exporter purchasing price, with excess profit accordingly reaching zero.

A. *Effects of Changes in Forced Selling Price (P')*

Figures 4-1 through 4-5 chart the effects of the changes in the forced selling price (P'_1 through P'_5) on the equilibrium in the rice export system with export tax and low-price forced selling. (The ratio of the quantity of forced sales to that of exports, θ, is assumed to be at unity and the rate of export tax $\hat{T}$ is assumed to be constant.) As seen in these figures, gradual rises in price P' from P'_1 up to P'_5 will be accompanied by (1) increases in the volume of rice purchased

Fig. 4. Effects of Changes in Forced Selling Price on Equilibrium in the System with Export Tax and Low-Price Forced Selling



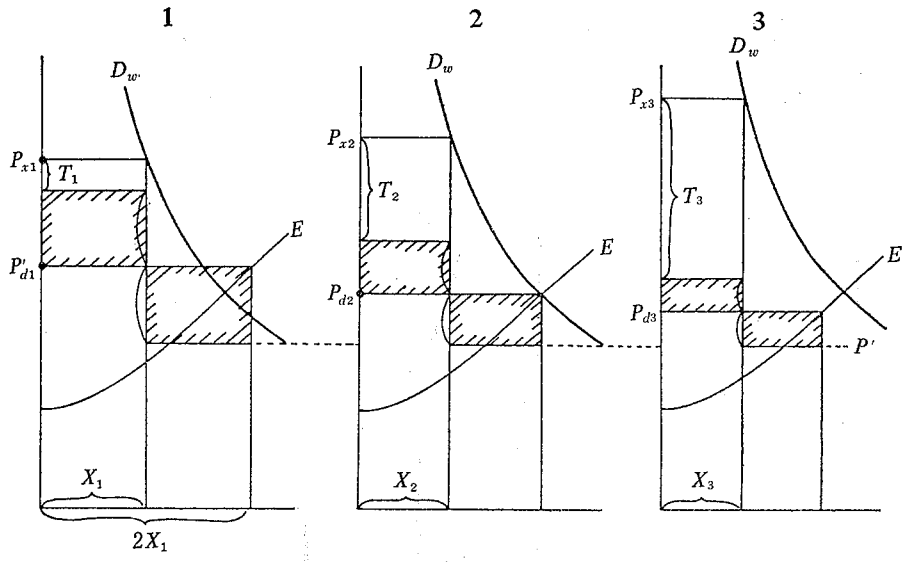
and exported by exporters, (2) declines in the export price (P_x) and rises in the domestic price (P_d), and (3) narrowing in the gain in exports (which equals the loss in the sales to the government). In Figure 4-4, the domestic market price equals the price of forced selling to the government which is no longer "low-priced." When P' rises even further to level P'_5 in Figure 4-5 where domestic price P_{d5} is now lower than the government purchasing price P'_5, exporters gain through sales to the government which are no longer "forced," and they incur losses through exports due to the exporter receiving price P_{c5} being lower than P_{d5}.

B. *Effects of Changes in the Rate of Export Tax* ($\hat{T}$)

Figures 5-1 through 5-3 reveal the effects of changes in the export tax rate (T_1 through T_3) on the equilibrium in the rice export system with export tax and low-price forced selling. (The ratio of forced sales to exports, θ, is assumed to be at unity and forced selling price, P', constant.)

Increases in the rate of export tax will result in (1) decrease in the quantity of rice purchased and exported by exporters, (2) increase in export price and decline in domestic price, and (3) narrowing in the gain and the loss. When the rate of tax is increased further over T_3, the equilibrium reached would be similar to that in Figures 4-4 or 4-5.

Fig. 5. Effects of Changes in Rate of Export Tax on Equilibrium in the System with Export Tax and Low-Price Forced Selling

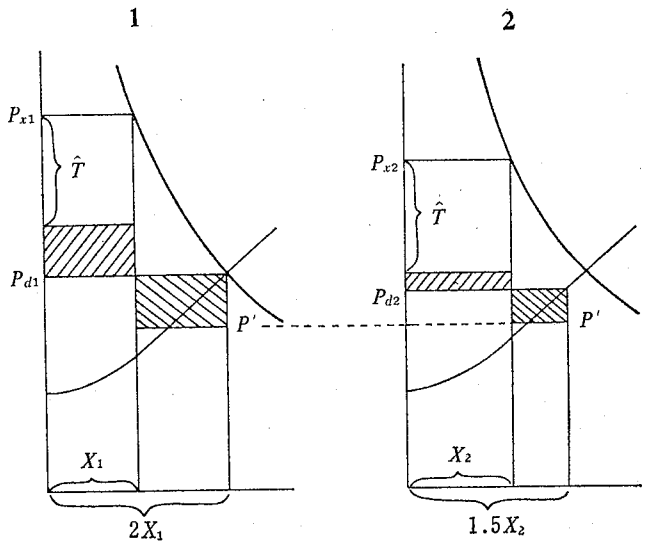


C. *Effects of Changes in the Ratio of Low-Price Forced Selling* (θ)

Figures 6-1 and 6-2 show the effects of changes in the ratio of forced sales from 1 to 0.5 on the equilibrium in the rice export system with export tax and low-price forced selling. (P' and $\hat{T}$ are held constant.) The decrease in the ratio

will be followed by (1) reduction in the quantity of exporter purchase but an increase in their export, (2) decline in both domestic and export price, and (3) narrowing in the gain and the loss. When the ratio is reduced to zero, equilibrium will be assimilated to that indicated in Figure 1.

Fig. 6. Effects of Changes in Ratio of Low-Price Forced Sales on Equilibrium in the System with Export Tax and Low-Price Forced Selling



VI. ECONOMIC GAIN AND LOSS THROUGH EXPORT TAX PLUS LOW-PRICE FORCED SELLING

It is reasonable to regard the equilibrium in a perfectly free export system as a standard for judging any gains or losses in any other export system. Then, how will be gain or loss of the present rice export system in Thailand with export tax and low-price forced selling? This problem can be depicted by using a simple diagram in Figure 4-2.

The amount of government revenue from the rice export tax is the product of $\hat{T}$ and X_2. But this is not the only gain that will accrue to the government: The government can purchase rice at price P'_2 which is lower than the prevailing market price in a perfectly free export system (P_{d2}). The gain which the government obtains through purchasing at P'_2 is the product of GA and AP'_2. (This equals that of $P_{c2}P_{d2}$ and $P_{d2}G$.) Therefore, the total gain of the Thai government in the present system (with the export tax and low-price forced selling) will be represented by rectangle $P_{x2}P_{d2}GR_2$.

On the other hand, the domestic price in the present system is at point P_{d2} in Figure 4-2, which is at the same level as in a perfectly free export system. This means that both consumer surplus and producer surplus are unaffected by the policy of the export tax and low-price selling. Thus, the total gain of Thai

economy (that is, the sum of consumer surplus, the producer surplus, and the government gain) in the present system is larger by rectangle $P_{x2}P_{d2}GR_2$ than would be obtainable in a free export system.

Comparing the total gain of the Thai economy in the present system with that of the export system with only the export tax, whose rate is depicted by $R_2\,C_2$, the former will be larger by triangle AGC_2.

Similarly, in the cases of Figure 4-1 and Figure 4-3, the total gain of the Thai economy in the present system is larger than those in both the free export system and export system with only the export tax. It is possible to explain this in diagrammatic forms.

From the foregoing analysis, it is possible to say that the present rice export system in Thailand with both the export tax and low-price forced selling is a good institutional device to benefit the whole economy.

Compared with a free export system, the present system in Thailand apparently decreases the sum of consumer surplus and producer surplus in rice-importing countries by trapezoid $P_{x2}P_{d2}AR_2$. The sum of the total economic gains for Thailand and the rice-importing countries will be reduced by the present rice export system in Thailand, as shown in triangle R_2GA.

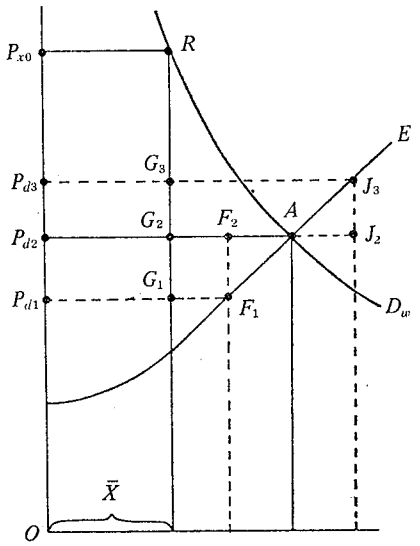
VII. EQUILIBRIUM IN THE SYSTEM WITH EXPORT TAX AND MARKET-PRICE FORCED SELLING

We may conceive of an alternative rice export system with an export tax and a *market-price* forced selling to the government (M-system), which could reach the same state of equilibrium as that of the current rice export system of Thailand, using an export tax and low-price forced selling (L-system). That is to say, if the rate of the export tax $P_{x2}P_{c2}$ in Figure 4-2 is increased to $P_{x2}P_{d1}$ and at the same time the forced selling price is raised from P'_2 to P_{d2}, then the export and domestic prices and the quantities purchased and exported by exporters would reach the same equilibrium as in the L-system. (This applies to Figures 4-1 and 4-3 as well.) It must be noted that the M-system would function as the L-system only so long as the Thai government is previously aware of the exact location of point A. Since it is virtually impossible in real world to identify the location, the M-system could hardly attain the expected equilibrium.

In the following paragraphs, however, discussion will pertain to the basis of M-system, because diagram of M-system is simpler and more suited to the intended purpose than that of L-system.

In Figure 7 quantity of rice export is given as $\overline{X}$ and export price at P_{x0}. How will maximization of the total gain for Thailand be achieved by manipulating the two policy variables of rate of export tax ($\hat{T}$) and ratio of the quantity of forced selling to that of export, which will together determine the level of domestic equilibrium price P_d? Assuming rate of export tax of $P_{x0}P_{d2}$ and ratio of 1, equilibrium will be reached at domestic price level P_{d2}. In this case, the total gain to Thailand will be larger by the area $P_{x0}P_{d2}G_2R$, when compared with that in the free export system.

Fig. 7. Equilibrium in the System with Export Tax and Market-Price Forced Selling (Export Volume Is Given)



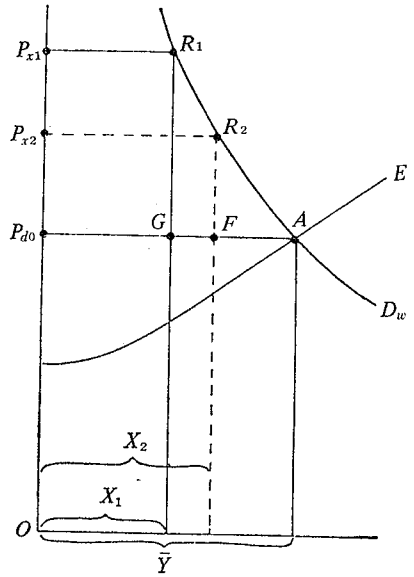
Note: Both rate of export tax and ratio of forced sales change.

When the rate of the tax is increased to $P_{x0}\,P_{d1}$ and the ratio is reduced to 0.5, the domestic equilibrium price will be at P_{d1}. In this case, the total gain will be larger by a balance of the area $P_{x0}P_{d2}G_2R$ minus triangle F_2F_1A than that in the free export system.[14] With a decrease in the rate of the tax to $P_{x0}P_{d3}$ and an increase in the ratio to 1.5, the domestic equilibrium price will be at P_{d3}. In this case, the total gain will be larger by a balance of the area $P_{x0}P_{d2}G_2R$ minus J_3AJ_2 than that in the free export system.[15] It is thus clear that the total gain of Thai economy will be at maximum when the two policy variables are so set as to lead domestic equilibrium price to a level where curves E and D_w intersect.

[14] The government's tax revenue in this case is shown by area $P_{x0}P_{d1}G_1R$. Gain accruing to the government which buys rice at amount G_1F_1 at a lower market price P_{d1} is shown by area $G_2G_1F_1F_2$. On the other hand, the domestic market price, lower by $P_{d2}P_{d1}$ than that in the free export system, will generate a loss to the sum of consumer surplus and producer surplus in Thailand, shown by the trapezoid $P_{d2}P_{d1}F_1A$. Then, when these gains and losses are added up, the total gain in this case will be larger by a balance of the area $P_{x0}P_{d2}G_2R$ minus F_2F_1A than that in the case of the free export system.

[15] In this equilibrium, the government will get tax revenue of area $P_{x0}P_{d3}G_3R$, but incur a loss represented by area $G_3G_2J_2J_3$, because it buys up rice amounting to a volume of G_3J_3 at higher market price P_{d3}. Thai producers and consumers will get a net combined gain of area $AP_{d2}P_{d3}J_3$ due to the increased market price. The total gain of Thai economy will be then increased by a balance of the area $P_{x0}P_{d2}G_2R$ minus J_3AJ_2, when compared with the free export system.

Fig. 8. Equilibrium in the System with Export Tax and Market-Price Forced Selling (Domestic Price Is Given)



Note: Both rate of export tax and ratio of forced sales change.

Assuming domestic market price being at point A in Figure 8, equilibrium export price will be at R_1 when the rate of export tax is $P_{x1}P_{d0}$ and the ratio of forced selling is 1, and equilibrium export price will be at R_2 when the rate is $P_{x2}P_{d0}$ and the ratio is 0.5. Maximum total gain to Thai economy will be achieved when the product of the rate of export tax and the quantity of export is maximized, because the product represents the balance of the total gain to Thai economy in the M-system minus that in the free export system.

In comparing the L- and the M-system, I am of the opinion, as already noted, that (1) both systems are little different and could realize essentially the same equilibrium, and that (2) the M-system is more amenable to theoretical analysis, whereas the L-system would be the system used in real life.

The L-system has two merits in itself, compared with a system with only export tax (the T-system). The first merit is that the L-system will generate larger total gain than the T-system. The second merit is that the relationship between the rate of export tax and the level of domestic price stays rigid in the T-system, whereas it is flexible in the L-system. In the T-system an increase in the rate of export tax will necessarily result in a reduction of domestic price as shown in Figure 1. Concurrently, supply (and possibly production) of rice will have to decrease. Thus, when the government wants a sizeable increase in the revenue from rice export tax but does not want to raise the domestic market price of rice, the T-system is powerless. The L-system, in opposition, could maintain domestic market price at the same level as in the free export system,

if wanted, and bring in increased tax revenue at the same time as seen in Figure 4-2. Of course, the L-system is able to raise or lower the domestic market price, if necessary. That is, the L-system has greater strategic operationability to its credit.

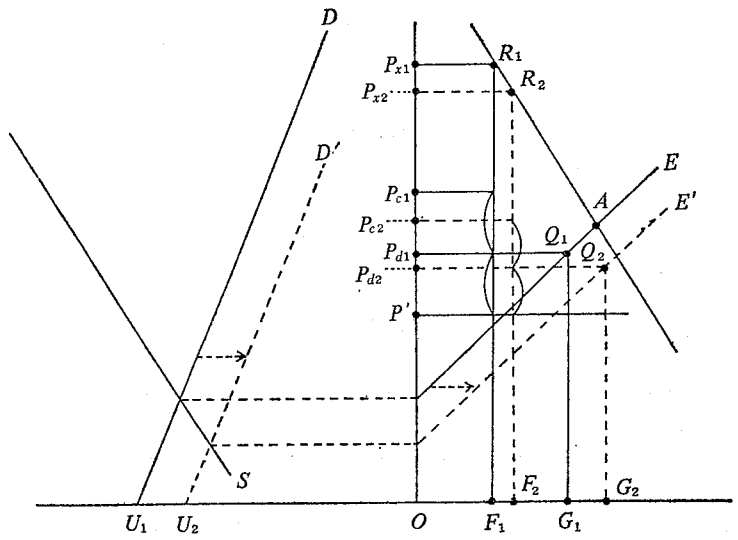
VIII. EQUILIBRIUM IN THE SYSTEM WITH EXPORT TAX, LOW-PRICE FORCED SELLING, AND RELEASE OF RESERVE STOCKS

The analysis has so far proceeded on the assumption that the rice purchased by the Thai government through the export-linked low-price forced selling system creates a reserve stock which is not expected to be released. However, the system is intended, through timely releases of the stocks, to stabilize the domestic market price of rice and thereby alleviate hardship on the low-income urban population. Thus, examination will have to be made of what equilibrium will be realized in the system with export tax, low-price forced selling, and release of reserve stocks.

The government now has six policy variables: (1) rate of export tax, T, (2) forced selling price, P', (3) ratio of the quantity of forced selling to that of export, θ, (4) time of stock release, (5) volume of rice released, and (6) price at which stocks are released. If it is assumed that reserve stocks are released once a year, variable (4) could, for simplicity, be excluded from consideration.

When the government releases a certain portion of its reserve stocks at prices lower than the prevailing market price, this portion will be quickly bought up and the demand for rice in the free domestic market will be reduced by that much. The solid lines in Figure 9 correspond to the equilibrium in the system

Fig. 9. Effects of Stock Release on Equilibrium in the System with Export Tax and Low-Price Forced Selling



with export tax and low-price forced selling before stocks are released (θ is taken to be 1). How will the equilibrium be affected by the release of reserve stocks?

As long as the price of released rice is lower than the prevailing market price, the demand curve in the free domestic market will shift leftwards by the amount released (rightward shift in fourth quadrant) (Figure 9). Through the shift of the demand curve from D to D' due to a release of amount U_1U_2, the excess supply curve E will be forced to shift rightwards by as much to E'. In the new equilibrium; (1) quantity of exporter total purchase and that of export will increase (the increase in the total purchase will be, however, smaller than U_1U_2, the amount released), (2) both export and domestic prices (P_x and P_d respectively) will decline, (3) gain to the exporters per unit of rice exported and loss per unit of rice forced to sell to the government will be reduced, and finally (4) supply will decline, and domestic demand will increase.

The quantity of reserve stock release shown as U_1U_2 in Figure 9 happened to be plotted at a lower level than that of low-price forced selling F_1G_1 before the release. But if U_1U_2 is equalized to F_1G_1 in order to keep the reserve stocks on the same level, the excess supply curve will shift rightwards by exactly volume F_1G_1. In this case, the increase in the exporter total purchase will be smaller than F_1G_1.

In Figure 9, points Q_1 and Q_2 are depicted as lower than point A: That is to say, the domestic equilibrium prices before and after the stock release are plotted as smaller than that in the free export system. It must be pointed out that Q_1 and Q_2 could be placed higher than point A, when the rate of export tax is reduced, the forced selling price is raised, and/or the ratio of the forced selling is increased. That is to say, there is no general way of knowing how Q_1 and Q_2 will be positioned vis-à-vis point A. This rests entirely on how the policy variables are determined. Therefore, it is not possible to assert a priori that the current export system in Thailand works against the interests of farmers by depressing the domestic market price to a level lower than would be expected in the free export system. Only empirical analysis can prove or disprove such a claim. The point need be stressed all the more, especially since the government's revenue from rice export tax is being invested into expansion and improvement of agricultural infrastructure. I am of the opinion that the current export system is beneficial to the economy of Thailand and possibly to farmers as well, but cannot yet prove this with facts and figures.

IX. APPENDIX TO EQUILIBRIUM IN THE SYSTEM WITH EXPORT TAX

Equilibrium will be examined in the free export system on the one hand and in the system with export tax on the other, in the following three cases:

(1) the case in which oversea demand curve for Thai rice is horizontal instead of downward sloping,

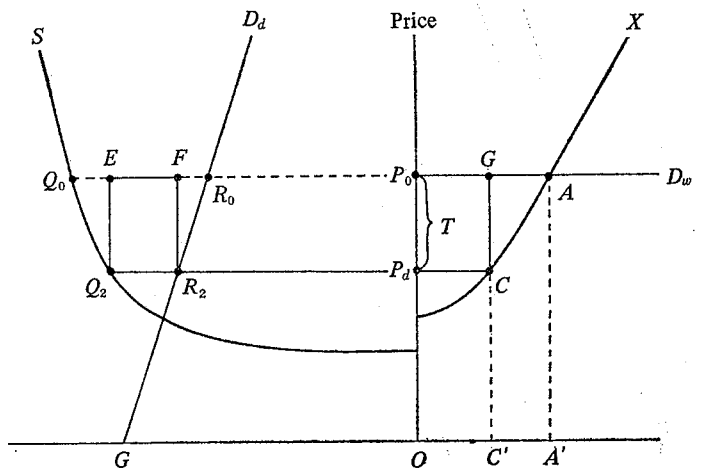
(2) the case in which government export exists in addition to private export,

(3) the case in which dealers mediating between farmers and consumers exist and take a certain rate of profit margin.

(1) *Equilibrium in the case of horizontal oversea demand curve*

Given oversea demand curve represented by horizontal line D_w in Figure 10, both export and domestic prices in the free export system will fall to P_0 with an export volume of P_0A. With an export tax whose rate is represented by GC, the domestic price will decline to P_d, whereas the export price will remain unchanged at P_0; there will be a rise in the consumer surplus and a decline in the producer surplus, and new tax revenue for the government in the exporting country. The total gain of the economy will then be reduced by triangle GCA, Export will decline both in volume and value, and supply will also decline with a probable fall in production. Many opponents to taxation on rice export in Thailand appear, in my view, to implicitly assume a horizontal oversea demand curve like that of Figure 10.

Fig. 10. Equilibrium in the System with Export Tax and Horizontal Oversea Demand Curve



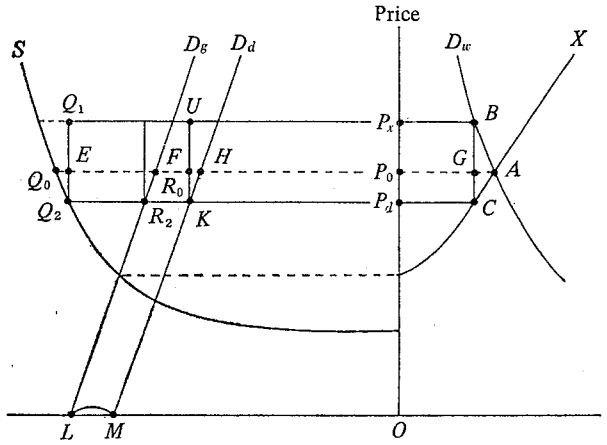
(2) *Equilibrium in the case in which government export exists*

As already suggested in Section II, the volume of government export is assumed to be exogenously determined. In Figure 11, curve D_d represents domestic demand, whereas LM is a volume of government export, or put differently, a volume of government purchase in the domestic market. Thus, curve D_g represents the combined private and government demand for rice. The excess supply curve X is derived from curves S and D_g, and signifies private exportable supply. Curve D_w represents oversea demand for private rice export of Thailand. In the free export system, domestic and export equilibrium prices will be at P_0.

Now, if the exporting country introduces an export tax whose rate amounts to BC, equilibrium will be reached at P_x for the export price and at P_d for the

domestic market price. Then assuming that the government purchasing price is equal to P_d and the government export price is equal to P_x, the introduction of the rice export tax will increase the total gain (i.e., sum of consumer surplus, producer surplus, and the government revenue) in the exporting country by a balance which is rectangle Q_1EFU minus triangle GCA in Figure 11.

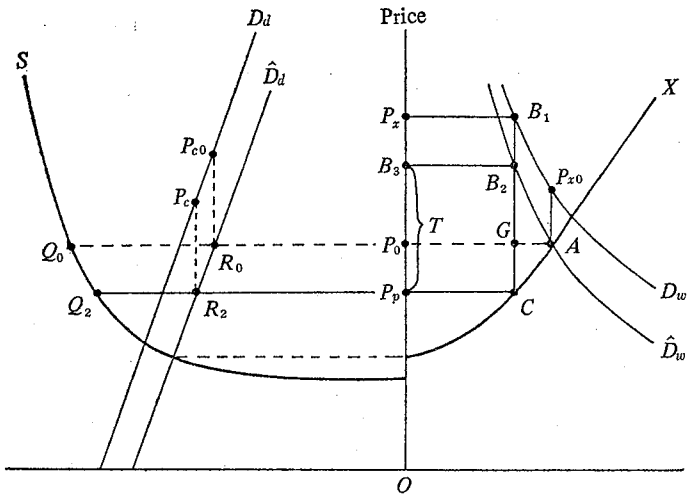
Fig. 11. Equilibrium in the System with Export Tax and Government Export



(3) *Equilibrium in the case in which dealers exist between farmers and consumers and take a certain rate of profit margin*

In Figure 12 curve D_d represents consumer demand and P_cR_2 rate of profit

Fig. 12. Equilibrium in the System with Export Tax and Dealers' Margin



margin to dealers. Curve $\hat{D}_d$ then means the domestic demand to which farmers face. The excess supply curve X will then be derived from curves S and $\hat{D}_d$. Assuming that dealers act as exporters, B_1B_2 represents the profit margin to exporters per unit of rice shipped. Curve D_w represents oversea demand, and $\hat{D}_w$ oversea demand which Thai farmers face. Given the free export system, equilibrium will be at P_0 for domestic producer price, at P_{c0} for domestic consumer price, and at P_{x0} for export price.

Introducing an export tax whose rate is B_2C, the producer price (or dealer purchasing price) will go down to P_p, and the consumer price will be at P_c. The dealer export price will go up to P_x, the sum of dealer purchasing price P_p, export tax T, and export margin.