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The effects of rice premium policy on Thailand's rice economy

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INTRODUCTION

Rice is the most important agricultural product in Thailand. It is the main staple for Thai people and its contributions to total agricultural production, total employment and total export are unsurpassed by other commodities. About 70 percent of all families in Thailand are still engaged in the agricultural sector, 70 percent of which is rice farming. Although Thai exports have become increasingly diversified for other crops, such as cassava, sugar and maize, rice exports still account for 20 percent of the total value of Thai exports.

Since rice is such an important factor in the Thai economy, the government has imposed export policies for regulating the volume of export to secure an adequate domestic rice supply, to prevent fluctuation in world prices from affecting domestic prices and to generate government revenue. The most important and frequently used policy is the rice export premium. There are several debatable aspects of the effects of the rice export premium on the Thai economy. The major issue is the distributive burden of the export taxes among farmers, exporters, domestic consumers and foreign consumers. Rice farmers are the single largest economic class in Thailand and on the whole they are also the poorest class. Critics of the rice premium argue that farmers bear most of the burden of the taxes because they believe that the foreign demand for Thai

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rice is price elastic to very elastic. On the other hand, the proponents of the taxation of rice exports who believe that the foreign demand for Thai rice is price inelastic have argued against that most of the burden is shifted forward to foreign buyers.

In order to investigate how the relative burden of the rice export tax is distributed, this study tries to assess and evaluate the policy's effect on the export and domestic price levels as well as the impact of the policy on the national welfare. The issue of relative burden of the rice export tax is first analyzed in a theoretical model using a diagram. The export rice policy is discussed and analyzed with an emphasis on the rice export market in relation to rice exports, consumption and production. Welfare implications of such a policy have also been investigated. Second, the issue is presented in an empirical study using the econometric model. The model is a dynamic simultaneous equation system consisting of domestic supply, domestic consumption, export demand, export supply, domestic wholesale price, paddy price (the unmilled rice price) and the market clearing condition. The model quantitatively evaluates the effects of policy variables on the exports and the price levels.

CHAPTER 1

THE WORLD RICE SITUATION

1.1 Trends in consumption

Rice is considered to be the world's principal food grain, even though the global production of wheat is greater than that of rice. About one-fourth of the wheat crop is used for non-food purposes compared with only 7 percent for rice. Rice is the national food staple in most developing countries. Nearly two billion people depend on rice for over 80 percent of their diet. China, India and Indonesia together claim almost two-thirds of the global rice consumed annually, with China alone consuming nearly 40 percent.

An individual's consumption of a given food commodity presumably depends on its price relative to the prices of substitute commodities. The other major factors which determine total world demand for rice are population and real income, or purchasing power of income, and tastes or preferences. Besides a population increase and a change in and preference in favor of rice, a net increase in real income per capita generally will increase total world demand for rice.

An overall indicator of the pattern of world rice consumption is annual per capita rice consumption. Based on rice consumption patterns, countries can be divided into three major groups[1]: habitual consumers, consumers in the

process of changing diet form and bread consumers.

Most habitual consumers live in Southeast and Far East Asia and account for the bulk of the world's rice consumption. In these regions per capita rice consumption is at the highest level; rice consumption reaches 130 to 170 kilograms per capita annually. The demand for rice is generally inelastic regarding changes in prices and income[2]; the absolute value of the price elasticity of demand probably is below 0.5, indicating the dominance of rice and the lack of perceived alternatives[3].

Consumers in the process of changing their diet patterns, e.g., from millet or sorghum to rice, do so because of income growth or changes in relative prices. They do not have the well-defined preference of the habitual rice eater. Therefore, they can be influenced by changes in relative price and income; the absolute value of the price elasticity of demand for rice could be 1.0 or even higher[4] implying that there is much substitution between rice and other food. This type of consumer may be found in West Africa and in parts of Latin America. The annual consumption rate is approximately 50 to 70 kilograms per capita.

The final group of countries are the bread eating ones, where rice is eaten occasionally as a special dish. Annual per capita rice consumption is less than 15 kilograms per capita. The demand for rice in these countries is not affected greatly by economic factors. It

appears that demand for rice is also inelastic for this type of consumer. With this condition, changes in price or income have little effect on the demand for rice. The world's bread regions include Europe, North Africa and North America.

Table 1 illustrates the per capita consumption of rice for selected countries during four time period. The pattern of food consumption shows a shift in favor of rice in some countries and little or none in others. The quantity of rice demand has increased steadily in China and Indonesia, whereas Japan has experienced a steady decline in rice consumption. The traditional rice consuming countries, such as Thailand, have experienced little or no change in their per capita rice consumption. In the United States, consumption has also increased steadily, although varying among ethnic groups.

World rice consumption has increased as a result of population growth, higher per capita income, increased domestic production in many countries and low import rice prices, allowing people in many countries to substitute rice for coarse grains. Some nations, such as China, India and South Korea, have increased their own production because of the consumption increase. In other areas, such as the Middle East and Africa, rice imports have more than doubled since the mid-1970s[5]. Even with declining oil revenues in the past few years, most of these countries have been able to take advantage of low rice prices,

attractive credit terms and food aid programs to maintain import and consumption levels.

TABLE 1. PER CAPITA CONSUMPTION OF RICE IN SELECTED
          COUNTRIES. (in kilograms per year)

Country	1964-66	1974-76	1979-81	1986
Algeria	0.5	0.4	1.1	1.1
Brazil	51.3	44.2	49.5	50.7
China	82.6	92.7	99.6	113.9
Egypt	27.7	36.5	34.3	31.8
India	66.9	68.6	72.5	76.6
Indonesia	93.7	116.8	133.9	145.8
Iraq	13.9	24.6	34.9	37.8
Japan	119.4	94.9	87.4	80.7
Thailand	178.3	180.2	171.2	163.8
United States	5.4	6.9	8.9	8.9
USSR	2.9	5.9	9.1	6.3
W. Europe	3.8	3.9	4.1	4.5
World	51.6	56.2	59.9	63.7

Source : Rice Outlook and Situation Report, 1986.

1.2 Trends in Production

        Rice is grown on all of the continents with the exception of Antarctica. World rice production has doubled since 1960 and continues to climb. The upward trend in production can be attributed to increases in both acreage and yield. Since 1960, more progress has been made in increasing the yield potential of the tropical rice plant, than had occurred in the first 50 years of this century, indicating that with expanded irrigation systems, new higher yielding varieties of seeds, increased fertilizer use, and the necessary infrastructure, the rice supply may continue to follow the current upward trend and keep pace

with population growth. A number of countries considered to be less developed have nevertheless been able to attain a higher average rice yield and to improve remarkably their rice production over what it was 20 to 30 years ago. Some have made rapid progress just during the past decade and are continuing to do so, although their yields do not yet approach those of Japan or the United States. As can be seen in Table 2 and 3, since 1960, harvest areas have increased by 20 percent and yields have risen by 65 percent However, the rice production has gained only slightly compared to population growth since 1950. Thus the output per capita has remained rather constant. In simple terms, the future per capita production of rice will depend on the land area devoted to the crop, the intensity of multiple cropping, the average yields obtained and the rates of population growth. Per capita demand will also affect the outcome.

Asia has the largest harvested acreage of rice; over 90 percent of the world rice supply is grown there. China, the largest rice producer, is responsible for about 40 percent of this production. In the future, production increases in Asia will come largely from improving yields on land already growing rice and from expansion of double cropping of the grain[6]. Thailand and Indonesia are the only Asian nations which have brought large new areas into rice production recently. According to the Food and Agricultural Organization (FAO), during 1974-76 Thailand added over one

TABLE 2.   PRODUCTION OF PADDY (ROUGH RICE), BY REGION
            (in thousand metric tons)

	WORLD	ASIA	S. AMERICA	AFRICA	USA
1965	256479	136386	7853	5647	3460
1966	265125	242821	9079	5856	3856
1967	186528	262789	9038	6668	4054
1968	288958	264516	8752	6943	4723
1969	301247	276276	9292	6935	4168
1970	311830	287917	8084	7157	3801
1971	317749	292471	8884	7473	3890
1972	308157	282813	9414	7012	3875
1973	330883	304489	9546	6883	4208
1974	338502	309413	10660	7311	5098
1975	360576	327722	12525	7963	5826
1976	349029	318026	11876	7742	5246
1977	366071	336230	11411	7959	4499
1978	385737	353066	12212	7848	6087
1979	377394	343590	12414	8279	5985
1980	397597	360876	14449	8400	6629
1981	413785	376232	13258	8562	8408
1982	423552	384954	8880	15233	6969
1983	450049	417469	8912	12423	4523
1984	470284	432559	14570	9107	6296
1985	474728	436366	9417	14447	6120
1986	475533	436562	15323	9847	6097

Source: <u>World Rice Statistics</u>, 1980 and <u>FAO Production
        Yearbook</u>, 1986

TABLE 3.   AREA HARVESTED OF RICE AND RICE YIELD

	AREA HARVEST (1000 HA)			YIELD (KG/HA)		
	1961-65	1979-81	1986	1961-65	1979-81	1986
World	124126	14367	145358	2040	2756	3271
Africa	3202	4958	5325	1719	1752	1849
Egypt	348	416	412	5307	5707	5947
Ivory Coast	249	461	n.a.	887	1152	n.a.
Nigeria	180	517	700	1178	1975	2023
Zaire	72	236	335	858	806	896
South America	4649	7254	6905	1729	1837	2219
Brazil	3809	5932	5590	1607	1436	1860
Columbia	293	424	333	1965	4350	4905
Asia	114488	128351	130337	2040	2805	3349
Bangladesh	8955	10310	10320	1680	1952	2350
Burma	4741	4684	4800	1642	2689	3125
China	30953	34323	32948	2780	4244	5372
India	35626	40091	41000	1480	1858	2195
Indonesia	7036	9063	9871	1762	3257	3979
Japan	3281	2384	2303	5012	5581	6322
Philippines	3147	3513	3471	1257	2249	2694
Thailand	6944	8953	9970	1623	1894	1916
Viet nam	4813	5558	5668	2001	2097	2857
Others						
U.S.A.	705	1345	963	4374	5167	6330
W. Europe	278	309	335	5031	5538	5785

Source: FAO Production Yearbook, various issues.

million hectares of land to its rice-growing areas, most of which was rain-fed paddy. Indonesia is developing rice lands on its less populated islands, since Java, Madura, and Bali are greatly overcrowded and essentially all of the suitable rice land on those islands is already planted with this crop. Even Thailand is unlikely to bring much new rice land into cultivation in the years ahead. Instead it will continue to develop its irrigation systems and to depend upon double cropping and the use of modern technology to increase its rice production. The need for further developments of its irrigation system, of course, will be true for all Asian rice-growing nations except the few that already irrigate all of their rice crop. Since only one-half the Asian crop land is irrigated, most of the rice harvest depends on the critical timing of the Asian monsoon. As a result, the rice production in Asia fluctuates which causes a substantial instability in export availability and price and finally has a significant influence on world marketing and trade.

South America is the second largest rice producing region in the world, after Asia, with a total of 4.2 percent of the world production in 1986. In South America, the low and undependable yield is due to the fact that about 82 percent of the continent's land is planted with rain-fed upland rice. The data for Columbia, on the other hand, show the progress that can be made through the widespread introduction, on irrigated land, of the modern

rice varieties and new technology.

In Africa Egypt, Madagascar, Nigeria, Liberia, Tanzania, Sierra Leone, the Ivory Coast, Zaire and Senegal are the predominant rice producing countries. Zaire and Nigeria exhibited a sizable increase in area of harvested of rice[7]. In the long run, rice production undoubtedly will increase in Africa. With their abundant river water resources for irrigation, these countries have the potential to become major African rice producers.

In the United States, Europe and Australia, 100 percent of the rice crop is irrigated, adequate quantities of fertilizer are applied, and good farming practices prevail. The high yields reflect the response to good management. Consequently, any future increase in rice production in these areas undoubtedly will have to come largely from an expansion in land devoted to the rice crop.

The world rice production, though tending to increase steadily in the long run, has however, fluctuated in the short run. Decrease, when they do occur, are largely due to an unfavorable monsoon season which brought a long drought period, in addition to other factors such as floods, plant disease and the disrupting effect of military activities.

Recently, the rice importing countries attempted to increase their own rice production in order to decrease the amount of food imported and to attain self-sufficiency in rice. Exporter countries, especially the developing

ones, also attempted to increase production and to export in order to earn more foreign exchange. For example, Indonesia used the Bimas-Inmas programs to increase its production and the Philippines used the Masagana 99 program. India had experimented with a variety of programs designed to stimulate food grain production. In the late 1970s an exporting country, Burma, launched a similar program. Thailand, the main rice exporter, has always been eager about promoting rice production. Thus, these developments caused world rice production to increase rapidly, especially in 1982-86, when world rice production increased about 50 million tons.

1.3 Trends in International Trade

There have been some major changes in the trading patterns in rice since World War II. The three major rice exporters before World War II--Burma, Thailand, and Vietnam--no longer dominate the rice trade. Only Thailand has retained a significant share of the world market. Making up for the general decline of these traditional prewar exporters are some new entrants in the postwar period, most notably Pakistan, the People's Republic of China and The United States. There has been a steady and substantial decline in the role of Asian importers[8]. The Asian import share had dropped rapidly as shown in Table 4. However, Middle Eastern and Sub-Sahara African rice imports have grown more rapidly. As shown in Table 5, the fall in

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TABLE 4.   RICE MARKET SHARE OF RICE IMPORTING COUNTRIES

	Net Imports as a Share of Gross World Imports.			
Region	1961-63	1969-71	1976-78	1978-80
	(percent)			
Asian	60.63	64.2	42.2	33.1
Middle East	5.7	6.3	15.8	17.5
Sub-Sahara	8.1	8.7	16.5	18.3
U.S.S.R and Eastern Europe	7.0	8.0	7.3	8.4

Source: <u>The World Rice Market: Structure, Conduct, and Performance</u>. Siamwalla, Ammar, 1983.

TABLE 5.   RICE MARKET SHARE OF RICE EXPORTING COUNTRIES

	Net Exports as a Share of Gross World Exports.			
Region	1961-63	1969-71	1976-78	1978-80
	(percent)			
Asian	64.0	61.6	47.9	57.3
Central and South America	3.5	4.9	7.7	1.2
European	3.2	6.4	3.2	3.7
United States	15.7	21.0	23.3	24.0

Source: <u>The World Rice Marketing: Structure, Conduct, and Performance</u>. Siamwalla, Ammar, 1983.

the Asian export share accompanying with the rise of the
United States net export share may also be noted.

TABLE 6.   THE RICE EXPORTERS BY MAJOR EXPORTING COUNTRIES
(in metric ton)

	WORLD	THAILAND	UNITED STATE	CHINA	PAKISTAN
1974	8783659	1046019	1725581	3015101	597204
1975	8610335	951061	2138747	2740010	477650
1976	9570957	1869453	2106805	2190000	782166
1977	10849525	2931562	2287544	1173165	960164
1978	9685852	1606745	2278778	1677715	776600
1979	11855805	2796868	2300623	1459202	1015012
1980	12712791	2745061	3054237	1310616	1086641
1981	13097312	3027342	3132535	684702	1243665
1982	12188203	3782775	2540345	775863	951028
1983	11487061	3534208	2384789	1087000	904801
1984	12675930	4615730	2141320	1369750	4209120
1985	11124760	4061710	1939970	1045850	2204230
1986	12156440	4523590	2392010	990000	3426890

Source: <u>FAO Trade Yearbook</u>, 1976-1986.

1. Exports Dominated by Few

The export side of the international rice market
is highly concentrated in four countries: Thailand, United
States, Pakistan and China. They have a current export
potential of more than a million tons of rice milled and
these presently account for three-fourths of the rice
entering the world market. Table 6 shows that by 1974,
these four countries were supplying 72 percent of the 8.78
million tons traded in the world rice market: Thailand
(1.04 million tons), the United States (1.72 million tons),
China (3.01 million tons) and Pakistan (0.59 million tons).

By 1981, total rice exports grew to a record 13.1 million tons. The leading exporter was the United States at 3.13 million tons, followed by Thailand with 3.02 million tons and Pakistan with 1.2 million tons. In 1984, Thailand reached the record with sales of 4.61 million tons of the 12.6 million tons of total world rice trade. Thailand is still the largest exporter with 24.5 percent of the world market share.

2. Rice Importers

Rice is not a highly traded commodity and widely dispersed throughout the world; therefore, the import side of the market is less concentrated, with many countries importing relatively small quantities. However, the major rice importing regions are concentrated in Asia, Africa and the Middle East. These regions account for about 75 percent of the world rice trade. Asia is the biggest importing region and claims about 50 percent of the world rice imports. Since the early 1960s, Africa and the Middle East have increased their share of world imports while the shares of Asian nations have fallen. Several factors are responsible for these changes. First, the development of rice production in many Asian countries such as the Philippines, Malaysia, Indonesia and Sri Lanka, has decreased the quantity of food imported and led to self-sufficiency in rice production or even exporting of a small amount of rice. Second, rapid rates of income growth

and expanding urban populations in the 1970s pushed up the demand for rice in many African and Middle Eastern nations. Third, increased urbanization shifted consumption patterns from a staple diet of cassava to rice and wheat in African and Middle Eastern nations.

1.4 Characteristics of Rice Trade

An characteristic of the rice trade is the extreme volatility in the volume traded by each individual country. The unpredictability of weather causes the supply, and consequently the price to vary greatly from year-to-year even when the demand is steadily increasing in line with population growth. Also, the rice market can be characterized as "thin" in terms of the small volume of trade relative to the variability in supply[9]. Only about 4 percent of the world's rice crop enters into international trade as a result of the overlapping of production and consumption areas[10]. That so little of the rice produced enters the world market implies that the fluctuation in production has magnified effects on the volumes traded in the world market, making it highly unstable. This instability is offset to some degree by the fact that the primary fluctuation in production does not lead to an equal fluctuation in the volume of rice marketed. Rice producers do absorb some of these fluctuations by adjusting to farm consumption. About one-third or less of the production variation is absorbed by the changes in the farmers' own

consumption[11].

1.5 Price Structure of Rice

As shown in Table 7 rice is consistently higher priced than other cereals such as barley, oats, rye, sorghum, millet and wheat. In general, the international rice price per metric ton is quoted as two to three times higher than the international price of wheat per metric ton. The price of wheat is 10 to 45 percent higher than the prices of all other cereals.

The year-to-year fluctuation in the price of rice is followed by similar trends for the price of wheat and all other cereals; however, the magnitude of price increases or decreases may differ. Generally, rice prices are more variable than wheat prices because soil and climate conditions are not suitable to grow other crops in the areas usually associated with rice cultivation. This leaves farmers with no other choice, especially in the monsoon regions.

While the world price has been relatively stable in the long run, it has been very volatile in the short run. Fluctuations in the international rice price take place because of the fluctuation in international demand and supply conditions. The fluctuations in international demand and supply are due to fluctuations primarily in world production, since world consumption has a stable trend.

TABLE 7. WORLD EXPORT UNIT VALUE OF RICE WHEAT BARLEY AND
MAIZE (US$ per metric ton)

	RICE	WHEAT	BARLEY	MAIZE
1974	399	171	135	128
1975	374	169	140	136
1976	277	153	138	123
1977	263	125	132	111
1978	346	131	137	117
1979	324	163	145	128
1980	383	186	175	128
1981	444	188	175	154
1982	334	173	161	128
1983	302	162	143	143
1984	290	157	147	149
1985	271	145	121	125

Source: The State of Food and Agriculture, 1986.

The major source of supply variability for
agricultural commodities is the variability in rainfall
and other production conditions. Weather is a major cause
of fluctuations in supply and weather-related production
fluctuation is one of the reasons for a fluctuating price.
Generally, poor weather conditions have been used to
explain major production shortfalls and crop failures.
Since currently most of the world's paddy is rain-fed in
monsoon Asia, the volume of rice traded is particularly
vulnerable to weather variations such as droughts and
floods. The cobweb model shows also a reason for price
variability. For example the high price of rice this
year leads to a larger production of rice in the next
year and hence to a low price, but this in turn leads to a
low supply in the following year, resulting in a high

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price.

Another factor that enters into the current
situation is that virtually all countries have some type of
government interference with the domestic grain market. In
many LDCs, government policies are used to manipulate
prices, with various tax, subsidies, and supports in order
to raising farm income, lower consumer price and achieve
government revenue. Farmers and consumers adjust their
production and consumption in varying degrees to price and
thus, in the short run, government policies have adversely
affected market performance and substantially contribute to
the instability of the rice market.

CHAPTER 2

THE THAI RICE SITUATION

2.1 Rice Consumption and Rice Production

Rice is the only staple food in Thailand for the entire population, regardless of income level, and it accounts for 70 to 90 percent of the daily calorie intake. As habitual rice consumers, the domestic demand for rice is about thirteen to fourteen million tons of paddy or about 67 percent of the total production as shown in Table 8.

TABLE 8. RICE PRODUCTION AND RICE CONSUMPTION
(in thousand metric tons)

	RICE PRODUCTION	RICE CONSUMPTION
1974	9833	6076
1975	8835	6239
1976	10098	6401
1977	9945	6563
1978	9788	6666
1979	11530	6805
1980	10400	6939
1981	11463	7067
1982	11731	7109
1983	11140	7334
1984	12902	7430
1985	13137	7458
1986	13374	7639
1987	12453	7721

Source: Thailand, Ministry of Agriculture, 1987

TABLE 9.   RICE PRODUCTION, PLANTED AREA AND AVERAGE YIELD.

	RICE PRODUCTION (1000 MT)	PLANTED AREA (1000 rais)	AVERAGE YIELD (kg/rai)
1960	6770	37909	206
1961	7835	37008	222
1962	8177	38619	231
1963	9279	41618	240
1964	10029	41256	253
1965	9558	40872	256
1966	9078	40961	249
1967	11846	45664	276
1968	9595	40065	274
1969	10772	44681	275
1970	13346	47732	295
1971	13401	48764	300
1972	14201	50020	302
1973	12413	51070	293
1974	14899	52270	285
1975	13386	49899	268
1976	15300	55602	275
1977	15068	53595	281
1978	13921	56444	255
1979	17470	62667	313
1980	15758	58971	291
1981	17368	60110	302
1982	17774	59970	312
1983	16879	60134	302
1984	19549	62596	326
1985	19905	62329	331
1986	20264	63422	330
1987	18868	61571	328

Source: Agricultural Statistics of Thailand, various
        issues.

Rice is grown on nearly 50 percent of the total
cultivated area which accounts for about 61 million rais[12].
Thai rice production increased by an average of about 2.5
percent per year. As shown in Table 9, the area planted to
paddies increased from 37 million rais in 1960 to 61
million rais in 1987, while the overall yield barely showed
an upward trend. Therefore, the main source of output
growth in these years was achieved almost entirely by
expanding the area of rice planted. However, this situation
has changed since 1975 because cultivatable land resources
have become scarce. Recently, farmers have begun to adopt
more intensive production techniques[13] on their farms along
with the government production policy. However, the rate of
intensification is considerably slower than in many other
Asian countries as shown in Table 10. The reason is that
the High-Yielding Variety seeds need to have plenty of
water but most of the cultivated areas in Thailand are non-
irrigated fields. Moreover, the unfavorable
fertilizer/paddy price ratio leads to the lower fertilizer
use.

TABLE 10. INTENSIFICATION INDICATORS, ASIAN RICE-PRODUCING
          NATIONS

Country	Average yield 1979-81	Fertilizer use(kg/area) 1980	price ratio 1977/78	%area planted to modern rice 1979/80	Rice irrigation rate 1975
Bangladesh	1.95	13	1.58	21	13
Burma	2.61	18	1.80	29	17
China	4.25	n.a.	n.a.	n.a.	46
India	1.88	58	3.65	47	43
Indonesia	3.26	102	2.04	60	76
Japan	5.58	330	0.46	n.a.	n.a.
Korea(So.)	5.55	228	0.74	56	n.a.
Pakistan	2.43	62	3.00	50	75
Philippines	2.20	42	3.25	78	54
Sri Lanka	2.48	112	1.20	71	92
Taiwan	4.62	304	1.34	n.a.	n.a.
Thailand	1.85	18	3.35	9	n.a.

Source: Thailand: Pricing and Marketing Policy for The
        Intensification of Rice Agriculture. World Bank,
        1986.

TABLE 11.   THAILAND RICE EXPORT BY COUNTRIES OF DESTINATION

	1978	1979	1980	1981	1982	1983	1984	1985	1986
ASIA	642381	1382238	1259393	1228980	1300753	1657003	1071109	1071109	1026710
Hong Kong	94231	103599	127013	115613	115164	147244	156882	172995	179614
Singapore	140007	193528	180320	157467	174182	185914	212627	194973	248377
Malaysia	156713	102100	153859	237236	387999	307415	344694	326488	210349
Indonesia	163439	615520	644664	119580	181212	334621	20422	50474	21537
MIDDLE EAST	267801	281289	456263	589221	635964	713470	814173	791060	664895
Saudi Arabia	42020	42166	42773	89975	98938	69616	33650	149040	183957
Syria	-----	25108	10800	51200	70263	45624	131016	94105	63610
Iraq	74459	97423	53156	-----	-----	-----	-----	-----	700
Iran	38500	-----	164930	348590	319002	389100	415666	299813	174424
AFRICA	630079	629957	580558	771345	1481298	1278955	1478205	1212494	1630472
Nigeria	482885	202190	196473	198157	185835	486835	170552	297623	40360
Senegal	61170	229049	328214	226494	309404	271465	326017	65490	218303
Madagascar	-----	-----	-----	20769	268819	124260	2333674	98639	162990
EUROPE	21422	116994	332111	410376	172153	199982	314084	556558	509571
TOTAL	1573438	2722622	2716703	3066709	3623857	3704932	4545089	4005069	4322864

Source: Thailand, Ministry of Agriculture, 1987

2.2 Thai Rice Exports

As rice provides roughly one-fifth of the value of Thailand's total exports, rice is considered to be the major export product. Both the volume and the value of rice exports are expected to increase in the long run. However, in some years the volume of rice exports will slightly decline as a result of the unfavorable weather-related production decrease of paddy.

Thailand exports rice to almost everywhere in the world, but the dominant destination is Asia whose major importing nations are Hong Kong, Singapore, Malaysia and Indonesia (See Table 11). African is also considered to be a main market, particularly for low quality rice. Nigeria and Senegal represent major importing countries for this region. In recent years, the Middle East has emerged as an important market for Thai rice. Europe used to be an important Thai rice market, but recently the United States has taken away some of the market share.

As shown in Table 12, the world share of Thailand's exported rice has fluctuated from 22 percent in the early 1960's to 16 percent in the early 1970's market share rebounded about 30 percent in the last few years. The significant obstruction in Thailand's rice export is the competition among the other exporting nations. The degree of competitiveness depends upon the demand for and supply of rice in the world market. To stimulate its foreign sales, Thailand recently eliminated certain taxes on most

rice exports. The government also has begun making long-
term credit sales of rice to foreign countries and is
considering barter arrangements to exchange rice for
fertilizer, pesticide, and other agricultural inputs.

TABLE 12.   MARKET SHARE OF THAI RICE EXPORT
                 (in percent)

YEAR	PERCENT
1960-65	21.8
1965-70	16.3
1970-75	16.2
1975-80	22.4
1980-85	29.3

Source: Foreign Agriculture Circular Grain

2.3 Export Rice Price and Domestic Price of Rice and Paddy

Rice prices in each level--local, Bangkok
wholesale and export--are all related to each other as
illustrated in Table 13. The most important domestic rice
price is the Bangkok wholesale because all other domestic
rice and paddy prices are based on it. However, the Bangkok
wholesale rice price depends on the export rice price as
well as government policies. The export rice prices are
determined by the demand for and supply of Thai rice
exports. The world demand for Thai rice is obviously beyond
control as the world rice market is competitive and

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Thailand is not a strong market power in the world rice market, due to its small share of world production[14]. Hence, the export rice trade of Thailand principally concentrate on supply side rather than on demand side. The supply of Thai rice exports depends upon the behavior of Thai rice exporters, government policies and Thai rice production. However, as a rice export leader, export prices for Thailand are considered to be indicative of the world level[15].

The Bangkok wholesale price is related to the export price roughly as a result of subtracting the export tax from the export price. Once the wholesale price is determined, all transaction costs and the profit margin are added to the wholesale figure to determine retail price. At the same time, paddy wholesalers subtract their cost and profit margins from the Bangkok wholesale price in order to determine the paddy price. The efficiency price transmission process may not always be available to the farmer. Too often the farmer has to accept the buyer's offer for immediate income to support his family. In addition, the farmer is likely to be in debt, perhaps to the same person (the money lender) who offered to buy the rice. However, the data shown in Table 13 indicate that the export market and the domestic market are fairly well integrated[16].

TABLE 13.   THE RELATIONSHIPS BETWEEN THE EXPORT RICE PRICE
            AND THE DOMESTIC PRICE OF RICE AND PADDY
                 (in baht per metric ton)

YEAR	NET EXPORT PRICE[*]	WHOLESALE PRICE	PADDY PRICE
1974	7902	3757	1936
1975	6497	3782	2104
1976	4963	4064	1950
1977	5234	4048	1849
1978	6787	4463	2302
1979	6315	4572	2184
1980	8333	5743	2605
1981	10017	6706	3082
1982	6582	5372	2838
1983	6184	5180	2810
1984	5850	4890	2832
1985	5806	4610	2893
1986	5525	4290	2301
1987	5956	5070	2413

Source: <u>Agricultural Statistics of Thailand</u>, various
         issues.
         * Calculated by subtracting the export price from
         the export tax.

2.4 Rice Export Policies

        Rice-growing households account for 55 percent of
the national population and 66 percent of the labor force.
Moreover, rice accounts for 40 percent of the agricultural
GDP and about 30 percent of agricultural exports.
Therefore, the price of rice is an important determinant of
the rate of agricultural development, the urban real wage,
the level of rural welfare, intersectoral labor migration
and foreign exchange earnings. Therefore, the change of the
rice price has various effects, not only on the rice
sector, but also on the other markets. As rice plays an
important role, the excessive price fluctuations are

definitely harmful. As a result, the government always tries to intervene in the Thai rice trade, especially when the world rice price is highly fluctuating.

There are four different forms of rice export policy as follows:

1. Rice export premium[17].

2. Rice export duties[18].

3. Rice export quota[19].

4. Rice reserve requirement[20].

The rice quota and the rice reserve requirement have the same effects on rice as taxes on rice. The reserve requirement was abolished in 1976. Only three of the policies had been used until recently. Until 1986, the world rice situation was more competitive and the rice price tended to drop. To stimulate rice exports and keep Thai rice competitive in the world market, the government had eliminated almost all kinds of rice export taxes[21]. In 1987, Thai rice exporters experienced free trade.

It may be assumed that elimination of the rice premium will result in a benefit to the Thai economy. Since foreign demand for Thai rice is elastic to very elastic, when the premium is levied, the burden will fall to the Thai farmer more than the foreign consumers. As a result the domestic rice and paddy prices are forced down. Since farmers are responsive to price changes, rice production will fall as a result of such a low price, and the farmer's income is reduced. On the other hand, the city consumer

whose income is considered to be higher than that of the
farmer, can purchase cheaper rice. Consequently, the rice
premium is a policy of heavy taxation because its burden is
carried by the farmer and results in an unfair transfer of
income from the majority of the poor farmers to the
minority of relatively wealthy consumers. In terms of rice
exports, the low price will suppress rice production, which
in turn will decrease the amount of rice available for
export. Since the world rice market is competitive, a
decrease in the quantity of rice exported leads to a fall
in foreign exchange earnings. However, the supporters of
the rice premium policy argue that the international and
domestic rice market is not competitive. Regarding the
domestic market if the rice premium is abolished, profit
will be absorbed by middlemen, and the farmer's price will
remain low. This assertion rests on their belief that the
domestic market is not competitive because rice merchants
take collusive actions. On the international level, they
view the world market for Thai rice as one of imperfect
competition and believe that the rice premium caused export
prices to rise more than when there was no premium.
Therefore the importing countries paid part of the rice
premium. These supporters do not deny that the rice premium
has increased government revenue and has forced down the
farmers' income by lowering the rice price at the farm
level. But they assert that farmers are ultimately
compensated for the loss of income by government-financed

development projects, the diffusion of new farming techniques, and the investment in irrigation and road construction.

CHAPTER 3

LITERATURE REVIEW

This chapter concentrates on literature concerning the analysis of the Thai rice export sector with reference to the government intervention on rice trade. This chapter involves many previous works which concern the Thai rice trade in general, the international rice trade and the elasticities of demand and supply of Thai rice in the world market, the impact of the rice export tax on export and domestic price level and the welfare effect of the export tax.

Many aspects of the Thai rice trade have been studied extensively. Usher (in Silcock, 1971) gave a general view of the rice trade in Thailand, explaining that the function of the rice trade is to collect the surplus of rice over the farmers' needs, mill and distribute it where and when it is needed. He also discussed the channels of the rice trade in the topics of rice millings, storage and interest charges, transportation costs, ownership, retailing and the export trade. As he examined the cost of the rice trade as a whole, he found that Thai farmers received about 79 percent of the price of rice at Bangkok. Pinthong (1978) also examined the internal market structure from farm level to Bangkok wholesale level, price formation, marketing cost and marketing margin. He observed close relationships among the paddy price at the farm

level, the rural wholesale price of paddy, and the Bangkok
wholesale price of rice, which revealed the high efficiency
of the price transmission mechanism. An increase in the
Bangkok wholesale price will be fully transmitted to the
farm, as a result government interference with the domestic
price will directly make an impact on the farmer's income.
He also noted the importance of transportation costs,
margins and other sources of price differences on each
stage of the paddy and rice trade.

For the international rice trade, Meenaphant
(1981) provided a description of the structure of
Thailand's rice sector with an emphasis on the export
market. He discussed and analyzed the Thai rice export
sector in relation to the government rice trade policies,
particularly the rice premium policy, in order to measure
the policy's effect on exports and domestic rice prices.
His study indicated that the government trade control
policy reduces rice export volumes and lowers domestic rice
prices from the no-intervention equilibrium levels. He
pointed out that the effectiveness of the policy in
stabilizing domestic price levels lies in the magnitude of
export demand elasticities with respect to the export
price. Thus, the policy is relatively effective only if the
export demand for Thai rice is highly elastic with respect
to the export price. On the other hand, the policy is less
effective when the export price elasticity of demand for
Thai rice is low. His empirical study revealed the

estimated price elasticity of demand for Thai rice at about
1.07. He concluded that with this low price elasticity, the
premium policy is likely to be ineffective in insulating
the domestic rice market from external price fluctuations.
His work also included the effect on the welfare of the
rice premium. As a result of the export demand for Thai
rice being fairly inelastic, the larger share of the
premium is expected to be paid by foreign consumers.
Therefore, the rice premium brings a net gain to the Thai
economy as a whole.

Kruavan (1986) studies the welfare effects of the
free rice trade policy in Thailand. The results from his
study show that the free rice trade policy led to a larger
quantity of Thai rice exports, but at lower prices than
those under government intervention. His study revealed an
unexpected fall in the domestic price of rice and paddy
even below the price level under the intervention.
Therefore, rice consumers benefit the most from the free
rice trade policy, while Thai farmers are clearly worse off
Since his study showed a net positive balance in the
welfare indices, it might be concluded that the Thai
economy as a whole is better off from the free trade
policy. However, Kruavan pointed out that this policy
discourages an expansion of the rice production; thus, it
would be contrary to the interest of economic development,
despite the benefits accruing to the consumer sectors of
the economy.

Nakajima (1977) examined the Thai rice export system consisting of four stages as follows:

1. Rice export system with export tax.

2. Rice export system with export tax and 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.

His study showed that when the government introduces an export tax, export prices will rise and the domestic price will decline; consequently, the quantity of exports decreases. However, if the overseas demand for Thai rice has a price elasticity of unitary, the value amount of rice exports will remain unchanged. In the case that the overseas demand for Thai rice increases rapidly, the export quota does not allow for an increase in export volume and domestic price, but the export price will rise. Nakajima notes that the domestic rice price can be kept at a certain level by increasing the rate of the export tax. However, the government must know in advance where the exact point of export price level would be; therefore, it would be virtually impossible technically, as well as institutionally, to adjust the rate of the export tax. In order to stabilize the domestic rice price, the export quota would be necessary as an effective tool against any sudden increase in the overseas demand for Thai rice. He viewed that under normal conditions, the export quota is

regarded as negligible so that the export tax system, which consists of export tax and low-price forced selling, is a good institutional tool to benefit the whole economy because it generates larger total gains than those in a free export system and in an export system with only an export tax. The economy benefits because this policy allows the export tax and domestic price to be flexible. In a system that has only the export tax, an increase in its rate will result in a reduction of the domestic price; concurrently, the supply of rice will decrease. Thus, when the government wants a sizable increase in the revenue from the rice export tax, but doesn't want to raise the domestic market price of rice, the export tax only system is powerless. On the other hand, the export system which includes the export tax and low-price forced selling could maintain the domestic price at the same level as in the free export system, or even lower, or raise the domestic market price. At the same time it also brings an increase in tax revenue.

In order to determine the proportion of the tax burden and who would bear it, the elasticity of foreign demand for Thai rice must be estimated. Therefore, one of the important aspects of the Thai rice trade is the elasticities of Thai rice demand and supply in the world market. Chunantathum (1977) constructed a world demand and world supply equations for different grades--high, medium, and low quality--of Thai rice and estimated the demand for

and supply of Thai rice elasticities in each of the
different grades separately by using data from the period
of 1955 to 1972. He found that the supply of Thai white
rice exports is generally unresponsive to price change.
This inelastic supply response seems to be an important
factor underlying the wide price fluctuations in rice
prices for Thai white rice exports, particularly during a
short run period of one year. For the own-price
elasticities demand, he observed that high-quality and
medium-quality rice have higher elasticities than does
total white rice. Also, the estimates of the elasticities
of adjustment indicate that the demand for Thai white rice
exports is quite elastic in the long run. Thus its long run
monopoly seems small. He suggests that the policy-maker
should adjust the premium rate on various grades of rice
export speedily, in accordance with change in world demand
and supply conditions.

Wong (1978) developed a model to estimate the
effects of the rice export tax on trade and welfare of
Thailand. His analysis shows that the level of
international price is determined mainly by changes in
foreign demand, while the volume of rice exports has been
determined by the size of its exportable surplus at
prevailing prices. The estimation shows the close
relationship between the domestic price and the export
price net of the export premium. This implies that the
domestic market and the export market are well integrated.

Therefore, it is possible that the export premium may
serve as a tool in insulating the economy from fluctuation
in the world price. However, the use of the export premium
as a means to regulate the volume of rice export is
ineffective, since the export premium could affect
the volume of exports only by changing domestic
consumption. The production is given and consumption has
been shown to be highly price inelastic, so that very
little change in the exportable surplus could be brought
about by changing the domestic price. Moreover, when world
prices are exceptionally low, the export premium becomes a
heavy tax on the farmer.

The estimated welfare cost of the government's
taxation of the rice-producing sector is quite high. Wong's
estimation shows that the premium results in a substantial
transfer of income from the rice producing sector.
Therefore, it places a rather unjust burden on the farmer
and creates a disincentive to increase rice production. The
probable effects of an elimination of the export premium is
that the exportable surplus of rice can be significantly
increased.

The dispute of the rice premium policy has been
discussed and evaluated by Tsujii (1977). He analyzes the
influence of the rice export policy on domestic and world
rice markets theoretically, through the use of a simple
diagram. He shows the relationship between the quota system
and the rice premium. When the export quota policy is

effective and the rice premium is ineffective, the rice premium doesn't influence the export price, the amount exported, or the domestic wholesale prices. In this case, the excess profits resulting from the quota policy are shared by the governments and the exporters. However, if only the rice premium is effective, the Thai government will receive all the premium revenues and no excess profit comes to the exporters.

Tsujii suggested that in the situation of an extremely changeable world demand for Thai rice, both the rice premium and quota policies should be performed together to stabilize the domestic price and assure public revenue. He explains that the rice premium alone is not sufficient to accomplish policy aims on price and export quantities. In order to maintain the domestic price when world demand for Thai rice increases rapidly, the rice premium alone would require numerous adjustments over the short run. Moreover, the exporters are opposed to frequent changes of the rice premium because they may have difficulty in estimating profits. Also to determine the rice premium, the position of the world demand curve for Thai rice must be calculated, for which accurate estimations are extremely difficult to make. The export quota system alone is also not sufficient because all of the excess profit that is generated by the quota would unfairly come to the exporters. He concludes that the simultaneous use of the rice premium and quota with the

proper management allows a sharing of excess profit between the government and the exporters.

Tsujii argued that the world market for Thai rice was imperfectly competitive; therefore, the opponent's argument of the rice premium policy needs to be reviewed. Also he cited that the rice premium is borne by both the rice-importing countries and the rice-producing farmers; as a result, the long-run world demand curve for Thai rice is sloped downward to the right. Both supporters and opponents agree that the domestic rice price will be forced down by the rice premium in the long run. However, he argued against the assertion of the supporters that the rice producing farmers are not responsive to the price of rice. In conclusion, his analysis of the rice premium policy disputes the widely approved opinion of the rice premium policy's supporters.

CHAPTER 4

THEORETICAL FRAMEWORK

The purpose of this chapter is to theoretically
analyze Thailand's rice export system through the use of a
simple diagram, using the following assumptions to
facilitate an analysis[22]:

1. The domestic marketing cost of rice is zero;
therefore, the producers' price is equal to the consumers'
price.

2. Rice exporters are perfectly competitive with
each other. Other costs such as storage and shipping are
assumed to be zero.

3. The export demand for Thai rice is assumed to
be less than perfectly elastic.

4. The total domestic rice supply is assumed to be
the surplus of rice over the farmers' need. That is, supply
is obtained from subtracting the producers' self-consumption
from total production.

Figure 1a represents the domestic Thai rice
market. The domestic supply and domestic demand for rice is
represented by curve Q and curve C respectively. The
equilibrium for the domestic market is at point F where the
domestic supply is equal to the domestic demand and the
equilibrium rice price is Pd. At that price the country will
not trade, and therefore zero quantity is shown for the
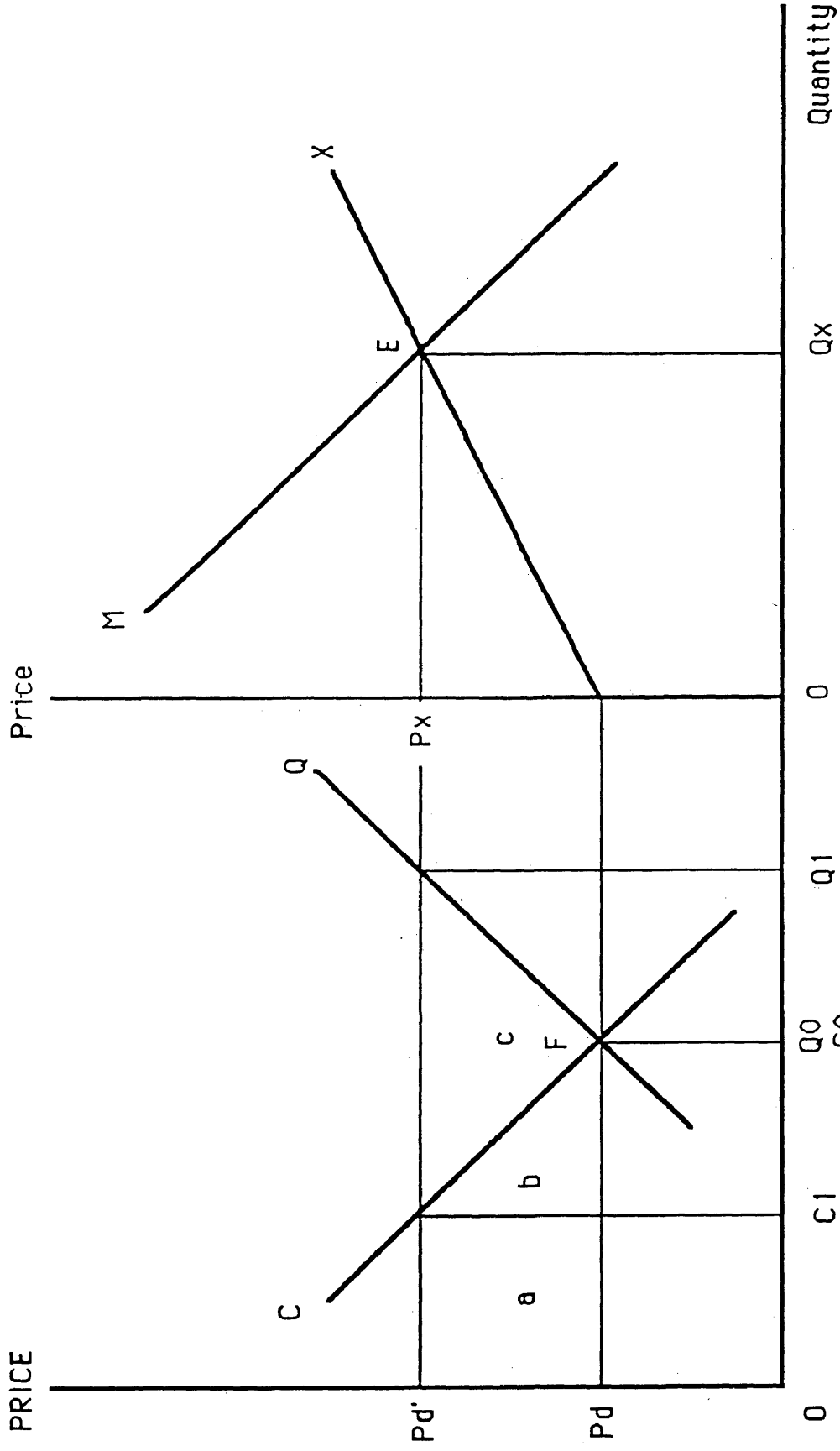export supply in Figure 1b. When the rice price rises, the

Figure 1

PRICE

Pd'

Pd

C

a

C1

b

c

F

Q0
C0

Q

Px

Q1

0

Figure 1a Domestic Market

Price

M

E

X

0

Qx

Quantity

Figure 1b International Market

Figure 2

Price

Figure 2b International Market
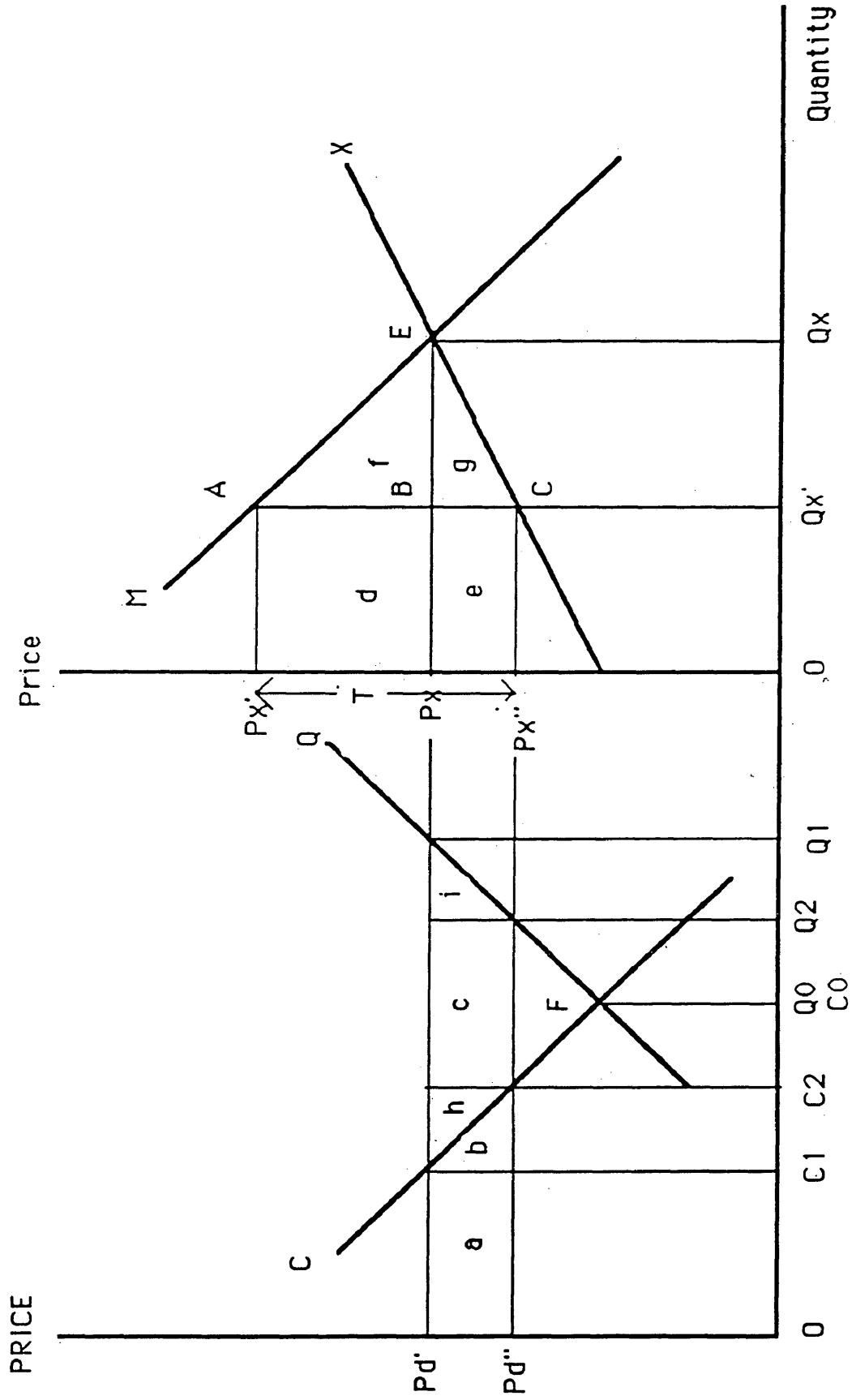
Figure 2a Domestic Market

PRICE

quantity supplied domestically increases as moving up along
the positively sloped supply curve, while the quantity
demanded internally declines as moving along the negatively
sloped demand curve. The horizontal distance between the
domestic supply and the demand for rice at each price is a
quantity of rice export rice at that price. Thus one can
draw the export supply curve, curve X, as shown in Figure
1b. By assumption, the foreign demand curve for Thai rice,
curve M, is sloped downward. If operating under the free
trade system, the export market equilibrium will be reached
at point E, where the quantity to export is OQx at the
export price Px. Since there is no barrier, Px will be the
level at which the producer price, consumer price and export
price of rice coincide. Under an autarky system, the
equilibrium for the domestic market will be at point F and
the equilibrium rice price is Pd which is lower than the
price at the free trade level (Px = Pd'). Therefore, the
rice consumer will gain under the autarky system due to the
price decline from Pd' to Pd. This gain is represented by
the sum of areas a and b, which is the increase in consumer
surplus. However, the producer will lose by the sum of areas
a, b and c, which is the decrease of the producer's surplus.
Hence, under an autarky system, the Thai economy will have
the net welfare loss measured by area c which is referred
to as the "dead-weight loss".

Suppose that trade opens up and the government
imposes an export tax. For simplicity we deal with a

specific duty, say T per unit. Since the vertical axis
denotes price, the duty can be measured as a T segment on
that scale. Starting from the intersection of the
export-supply and import demand curves, we proceed leftward
to where the vertical divergence between the curves equals T
in Figure 2b. As a result of the tariff, the export price
rises to Px' and the domestic price declines to Pd''. The
difference between the two prices is the tax per unit levied
by the government; consequently, the quantity of rice
exports drops from OQx to OQx'. The government revenue from
the duty equals the volume of export times the tax per unit.
The tariff is a definite gain to the government, since it is
collected as revenue by the government. It represents
revenue that accrues to someone within the country, and this
gain must be weighed against the consumer gains and producer
losses from the tariff.

By combining the effects of the tariff on
consumers, producers, and the government, we can determine
the net effect of the tariff on the nation as a whole. The
welfare implication of the rice export tax to each economic
unit is shown as follows:

The consumption effect of the tariff shows the
gain to the consumers in the nation that corresponds to the
increase in their consumption due to the decline of price.
From Figure 2a, the consumption effect of the tariff is
equal to the sum of areas a and b.

The production effect of the tariff shows the

decrease in producer surplus resulting from the tariff. From Figure 2a, the production effect is equal to the sum of areas a, b, c, h, and i.

The revenue effect shows the gain for the nation. Referring to Figure 2b, by imposing the rice export tax, the Thai government will gain by the sum of areas d and e.

In short, there is a reduction of a producer surplus from the rice farmers by areas a, b, c, h and i, only partially offset by a gain in consumer surplus of areas a and b and a gain in government revenue collected from the domestic citizens of area c and the revenue collected from foreigner of area d (shown in Figure 2). This leaves areas i and h (whose sum is equal to g) as a deadweight loss; the former is the production component of the protection cost or production loss which arises because, with the tariff, some domestic resources are transferred from the production of rice to the other commodities. The latter is the consumption component of the protection cost or consumption cost which arises because the tariff distorts the pattern of consumption.

Therefore, the net welfare for the Thai economy as a whole will be the sum of government gain, consumer gain, and producer loss. Algebraically, the net welfare gain can be written as:

Net gain = Government gain + Consumer gain + Producer loss

$$= (d+e) + (a+b) + (-a-b-c-h-i)$$

$$= d+e+a+b-a-b-c-h-i$$

$$= d+e-c-h-i$$

because e = c ; h+i = g

therefore;

Net gain = d-g

If d>g, Thailand benefits from an imposition such as an export tax, in so far as the definition of total gain, due to producer surplus and government revenue holds.

If the price elasticity of foreign demand for Thai rice is unitary, which means that the percentage change in the export price of rice is equal to the percentage change in the quantity of rice exported, the total gain to the economy resulting from imposing an export tax will be the area QxQx'CE since it holds that:

$$d-g = PxPx'AB - BCE = QxQx'BE - BCE = QxQx'CE.$$

One very important determinant of the size of the net gain or loss is the extent to which the tax is passed on to foreign buyers, which in turn depends on how responsive foreign demand is to change in the price charged by the exporting country. It is clear that as long as Thailand has some influence on the international rice price, which implies that the foreign demand for Thai rice is not perfectly elastic, there is an optimum export tax which would maximize the welfare of Thailand, or the gain in government tax revenue at the expense of the importing nations minus welfare loss (d-g). This is far from saying that any export tax rate would generate a net gain. This net gain is necessarily positive at a low rate of export tax,

but may turn negative at high rates. It can be shown that if the tax is imposed at a rate much higher than is optimal (if exports are restricted too much), it may generate a net loss to the export country. The size of the net welfare gain or loss depends on the elasticities of export demand for Thai rice and the domestic supply and demand of rice.

If the welfare of Thailand's rice-importing countries is also considered, an imposition of the rice export tax in Thailand will induce the welfare loss to those nations by the sum of areas d and f which is a reduction of consumer surplus in the rice importing countries out of which d is collected by the Thai government at the expense of the foreign buyer. By adding the gain to Thailand (d-g) and the loss to rice importing countries (d+f), the net welfare effect on the global economy is therefore the areas f and g, which is the deadweight loss to the global economy.

CHAPTER 5

THE ECONOMETRIC MODEL AND THE RESULTS FROM ITS ESTIMATIONS

5.1 The Econometric Model of the Thai Rice Sector

Thailand's rice sector econometric model to be estimated consists of seven equations, including one identity and six behavioral. The model is constructed in order to provide a means to analyze quantitatively the policy implications of government taxation on rice exports.

The model to be estimated is as follows:

1. Domestic Supply Equation

$$PRO_t = a_1 + a_2 APP_t + a_3 APC_t + a_4 YLD_t + u_1$$

2. Domestic Consumption Equation

$$CON_t = b_1 + b_2 PD_t + b_3 PC_t + b_4 INC_t + b_5 POP_t + u_2$$

3. Rice Export Demand Equation

$$XTH_t = c_1 + c_2 PX_t + c_3 UPX_t + c_4 WX_t + u_3$$

4. Rice Export Supply Equation

$$XTH_t = d_1 + d_2 PX_t + d_3 TX_t + d_4 ER_t + u_4$$

5. Price Transmission

    5.1 Domestic Wholesale Rice Price Equation

$$PD_t = e_1 + e_2 PNT_t + u_5$$

    5.2 Paddy Price Equation

$$PP_t = f_1 + f_2 PP_{t-1} + f_3 PD_t + u_6$$

6. Net Return to Exporter

$$PNT = PXX - TX$$

The model developed for this study includes two groups of variables: first, endogenous variables which are generated by the system that the model characterizes;

second, predetermined variables help to cause the movement of the endogenous with inn the system which are the exogenous variable plus the lagged endogenous variables. The variables used in the model are defined as follows:

The Endogenous Variables

PRO = Domestic rice production, thousand tons.

CON = Domestic rice consumption, thousand tons.

PP = Domestic paddy price at farm, baht per ton.

PD = Domestic wholesale price of rice, bath per ton.

XTH = Quantity of Thai rice export, thousand tons.

PX = Export price of Thai rice, U.S. Dollar per ton.

PXX = Export price of Thai rice, baht per ton.

PNT = Net return to Thai rice exporters, baht per ton.

The Lagged Variables

PP_{t-1} = Domestic paddy price at farm in the previous crop year.

The Exogenous Variables

PC = Price index of food crops except rice, 1980 = 100.

APC = Weighted average price index of food price except rice over three years (see appendix A).

APP = Weighted average price of paddy over three years (see appendix A).

YLD = Actual yield, kilograms per rai.

INC = Per capita income, baht.

POP = Population in Thailand midyear average, million persons.

UPX = Export price of U.S. rice, U.S. dollar per ton.

WX = Total volume of world rice export, thousand tons.

TX = Rice export tax, baht per ton.

ER = Exchange rate, baht per U.S. dollar.

All the equations were estimated using the annual data over the period 1974 to 1987. The further definition and data source for the variables are given in appendix A.

Equation (1) : Domestic Rice Production Equation

The formulation of the supply equation is based on the assumption of maximum profit of the rice producers. To maximize their profits, farmers have to make decisions on the amount of rice acreage to plant. Since crop production takes time, farmers do not always know for certain the level of output, nor the prices they will receive for their crop at planting time. As a result, the decision on the acreage of rice planted is dependent on the expectation of the price of the paddy and of other substitute crops. This model assumes that the farmers make their decision dependent on the weighted average price of the current year, the previous year and that of two years ago[23].

The supply of rice in Thailand is mostly accounted for by production and the nature of rice supply in Thailand

still depends very much on rainfall; the rice yield has, therefore, often been varied according to local weather conditions. Hence, the yield is included in the model as an exogenous control variable.

Equation (2) : The Domestic Rice Consumption Equation

Following the theory of consumer demand, the domestic demand for rice is assumed to be a function of its own price. However, other factors other such as income, prices of the substitute food products and population are also considered to affect domestic rice consumption. Given short-run effects of habit and tradition, income is an important factor governing a level and pattern of consumption of food as a whole. However, because rice is the main part of the Thai diet, the changes in the rice price and income may not be able to capture all of the changes in the quantity of rice consumed; therefore, a population variable is included and is considered to be a dominating long-run factor affecting rice consumption.

Equation (3): The Rice Export Demand Equation

The export demand of the Thai rice function is treated in a manner similar to the domestic demand such that the export demand for Thai rice is constructed as a function of the export price of its own price, PX; the export price of U.S. rice, UPX; and other explanatory variables such as domestic rice production, income level, balance of payment

situation, and rice import duties of every rice importing country. There is no satisfactory way to aggregate these different determinants; therefore, the volume of the world rice export, WX, is chosen as a proxy for these variables because this variable is the result of the interaction among these other important determinants of the import demand for rice that ultimately affect the demand for Thai rice exports.

The demand curve for Thai rice usually slopes downward; therefore, the coefficient of PX is expected to be negative. The export price of U.S. rice represents the price of competing goods, since U.S. rice is considered to be a substitute for Thai rice; thus, the coefficient of UPX is expected to be positive. The volume of world exports has a positive relationship to the quantity of Thai rice exports.

Equation (4): The Rice Export Supply Equation

In order to maximize profits, the export volumes are altered positively to a change in export price and negatively to a change in costs of exporting rice, of which the major cost is the export tax. Exporters receiving a lesser price per unit due to the export tax will export less than those without the export tax. Thai rice exports are subject to heavy export taxes which should have a depressing effect on the rice exported. Moreover, exporters receive more domestic currency for their exporting product after the devaluation of Thai currency. For this reason the exchange

rate variable is included in the equation and should have a positive relationship to the quantity of the rice export supply.

Equation (5): The Price Transmission Equation

There is a difference between the domestic market and the world market; the former is subject to government regulation and the latter is relatively competitive. Thus, it is necessary to link the two market prices in which the export tax plays a major role. By historical movement, the wholesale rice price often moves in a similar pattern to that of the export price. Hence, the domestic wholesale price of rice is a function of the difference between the export price of rice and the rice export tax, PXX - TX, which is the net return to the exporters, PNT.

Since the export premium is aimed at stabilizing the domestic rice price from the fluctuating export price, the rice premium would be raised when international prices are high and when domestic production is low. As a result, an increase in the export price of rice has no effect on the domestic rice price if the export premium is raised just enough to compensate for such a change in the export price and vice versa. In general, however, the attempt to stabilize the domestic price of rice seems not so successful. While international prices have shown wide fluctuation, changes in the export premium have been rather infrequent and not enough to offset these fluctuations.

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Similarly, to link the paddy price received by the farmer and the wholesale price, we have the domestic paddy price as a function of the lag paddy price and the domestic wholesale price of rice.

5.2 Estimation Procedures and Prediction

The econometric model as constructed belongs to the system of simultaneous equations since endogenous variables are interdependent. It is impossible to solve for any single endogenous variable without simultaneously solving all equations. As a rule, Ordinary Least Squares estimation of this model will yield biased, inefficient, and inconsistent estimates of the structural coefficients. The simultaneity bias arises because of the correlation between the error terms and some of the independent variables which is caused by the simultaneous interaction of all equations of the model. The method of Two Stage Least Squares (2SLS) seems to be favorable because it permits simple interpretations, incurs a lower estimation cost and produces a good performance. Also the method of Two Stage Least Squares provides a mean to purge these independent variables of the error components of the structural equations.

In this econometric model, there are seven equations and seven endogenous variables; therefore, the system is complete and it would be possible to solve the model to determine values of these endogenous variables.

Before estimating a system of equations,

identification of the equations to be estimated should be ascertained. Identification is the problem of finding a unique solution for the structural parameters from the reduced form coefficient. If we cannot identify the structural parameters, then the estimation effort will be in vain. Therefore, it is obvious that identification is a necessary step before estimating the model. In order to use Two Stage Least Squares to generate a consistent estimator of the parameters in a regression equation, the number of endogenous variables that appears as regressors in the equation to be estimated can not exceed the number of predetermined variables that both appear in the model as a whole and are excluded from that equation. The necessary condition for identification of a given structural equation says that the number of predetermined variables excluded from the given equation is equal to or greater than the number of endogenous variables included in the equation minus one. Considering the identification problem, each equation is overidentified.

5.3 Statistical Results

The parameters of the equations of the model are estimated by using the Two Stage Least Squares method and the statistical results are presented below. The estimated standard errors are shown in parenthesis and t-statistics are shown immediately below.

The estimated regressions are :

Domestic Rice Production Equation

$$PRO = -3182.25 + 6.309APP - 86.488APC + 42.266YLD + u_1$$

$$(1265.293) \quad (2.529) \quad (37.580) \quad (6.259)$$

$$-2.515 \quad 2.494 \quad -2.301 \quad 6.752$$

R-square = 0.9692

Domestic Rice Consumption Equation

$$CON = +2339.064 - 0.0616PD + 1.854PC + 0.175INC$$

$$(687.705) \quad (0.048) \quad (1.800) \quad (0.082)$$

$$3.401 \quad -1.266 \quad 1.030 \quad 2.138$$

$$+50.482POP + u_2$$

$$(34.906)$$

$$1.446$$

R-square = 0.9945

Rice Export Demand Equation

$$XTH = -1741.6 - 13.169PX + 5.582UPX + 0.592WX + u_3$$

$$(548.158) \quad (1.659) \quad (2.228) \quad (0.062)$$

$$-3.177 \quad -7.937 \quad 2.505 \quad 9.403$$

R-square = 0.9727

Rice Export Supply Equation

$$XTH = -1519.32 + 4.285PX + 195.403ER - 3.143TX + u_4$$

$$(2561.899) \quad (3.091) \quad (99.905) \quad (1.493)$$

$$-0.593 \quad 1.387 \quad 1.956 \quad -2.104$$

R-square = 0.8125

Domestic Paddy Price Equation

$$PP = -277.791 + 0.495PP_{t-1} + 0.316PD + u_5$$

$$(420.805) \quad (0.138) \quad (0.074)$$

$$-0.660 \quad 3.585 \quad 4.243$$

R-square = 0.8315

Domestic Wholesale Price of Rice Equation

$$PD = +1733.796 + 0.492PNT + u_6$$

$$(471.882) \quad (0.071)$$

$$3.674 \quad 6.893$$

R-square = 0.8261

Domestic Rice Production Equation

For the domestic rice production equation the estimated coefficients are statistically significant at the usually accepted level of 5 percent and all of the coefficients have the expected signs, a positive for average paddy price and yield, and negative for average price index of food crops except rice. The short run elasticity evaluated at the means is about 0.454754. The estimation of the cross-price elasticity of supply is -0.29864. The estimate for the cross-price elasticity is low because the other crops may not compete significantly with rice.

Domestic Consumption Equation

The domestic rice consumption equation has a high R-square. All coefficients have correct signs, but only the

income variable is statistically significant at 5 percent accepted levels. The relationship between the domestic consumption and its prices is obviously negative. The per capita income, the price index of food crops except rice, and the population variable all have positive coefficient estimates.

The price elasticity of rice consumption at the means of the period is calculated at -0.042711, and the income elasticity is at 0.338579. It is therefore suggested that the domestic demand for rice is price and income inelastic. The fairly low price elasticity and income elasticity of less than unitary imply that rice is an important food item in the Thai diet. The cross-price elasticity of the demand for rice calculated at the mean is about 0.0103296. In a habitual rice-eating country such as Thailand, rice is usually the most important item of the diet, so it will remain as the basic staple around which meals are planned. It seems less probable that, in the habitual rice-eating countries, rice will become merely supplementary in the way bread or potatoes are in the high income countries.

Rice Export Demand Equation

All estimated coefficients have correct signs and are statistically significant at the 5 percent level. The demand for Thai rice shows a negative relationship to the export price of Thai rice and positive to the export price

of U.S. rice. A movement in the world rice export tends to alter the quantity of the Thai rice export in the same direction.

The price elasticity of the export demand for Thai rice calculated at the mean value is slightly above unitary, at -1.1772 and being far from infinitely elastic. Therefore, it support the basic claim that a part of the rice export tax is shifted to foreign consumers and that the cross-price elasticity of demand for Thai rice is about 0.627131, implying that U.S. rice, which is considered to be a substitute good of Thai rice, is not a significant substitute for Thai rice.

Rice Export Supply Equation

All estimated coefficients have correct signs, but the export price of rice is found to be insignificant. The reason may be that the supply of rice is generally inelastic to the price change, particularly in the short run. The change in premiums is specifically designed to adjust the quantity exported to domestic prices. When the export price is very high, the government attempts to maintain an adequate domestic supply by imposing an export tax. The rice export tax, by affecting the cost of exporting, discourages the exportation of rice. Therefore, the export supply is very much subject to government policy. Moreover, inadequate storage facilities restrict the exporters's capacity to hold on to the rice in anticipation of better prices.

The Price Transmission Equations

The domestic wholesale price of rice equation and the paddy price equation have a good fit with estimated coefficients being significant even at the 1 percent level The relationship between the domestic wholesale rice price, Pd, and the export rice price net of the export tax, (PX-TX), is positive, with elasticity measured at their mean equal to 0.647411. The relationship between the domestic wholesale rice price, PD, and domestic paddy price, PP, is also positive. The estimated elasticity with respect to the wholesale rice price at the means is 1.88429. The statistical result confirms our expectation that the export and domestic rice markets of Thailand are fairly well integrated.

Overall considering that this study analyzes a very limited data and information available, the fit of the equations must be regarded as fairly good. All the estimated coefficients have the expected signs and only a few are not significant at the usually accepted levels.

The questions to be considered further are (a) who pays the export tax--the rice importing country or the exporting country, and (b) what proportion of the tariff is to be paid by each nation? These can be best analyzed by using the concept of elasticity.

As seen in Table 14, the estimation results show that the Thai rice supply is inelastic and imply that rice output can not readily be changed when the price is changed,

TABLE 14. ESTIMATES OF ELASTICITIES AT MEAN

Elasticities	
Price Elasticity of Supply	0.45475
Cross Price Elasticity of Supply	-0.29864
Price Elasticity of Demand	-0.04271
Cross Price Elasticity of Demand	0.01032
Income Elasticity of Demand	0.33857
Price Elasticity of Foreign Demand	-1.19080
Cross Price Elasticity of Foreign Demand	0.64830
Elasticity of Price Transmission	
- Domestic Wholesale Price	0.64741
- Paddy Price	1.88429

so a lower price might be accepted to avoid a change in
quantity. Since the rice premium forces down the domestic
rice price, the domestic rice producer will bear part of the
rice export premium. As a result, the more inelastic the
Thai rice supply, the more of the export tax the Thai rice
producer will pay. The elasticity of price transmission
shows that the price information in the market seems to
transmit very well. A change of one percent in the net
return to export will cause the domestic rice price to
change by 0.64711 percent. In the same way, a change in the
domestic rice price is transferred to the paddy price at the
farm. A one percent change of the domestic wholesale rice

price will cause the paddy price to change by 1.88429 percent. This price efficiency indicates that the market is working well by itself. Therefore, the rice export tax which depresses the domestic wholesale rice price, has also depressed the paddy price at the farm level. Any tax burden which can not be shifted to the foreign buyers will be fully passed on to the farmer. Furthermore, Thailand's domestic demand is also inelastic, and even though the price of rice changes a great deal, rice demand will remain relatively constant. The larger quantities will not easily be taken up by the local market, so that a small fall in the rice price will not induce the domestic market to absorb the quantities of the rice surplus. As a result, the price will fall greatly to allow the continued export. If the Thai elasticity of the domestic supply and demand is small, Thailand will be forced to absorb a larger proportion of tax. The elimination of the export tax will raise the domestic price. If the domestic rice trade is highly competitive, an increase in the domestic rice price will be reflected in a higher paddy price; therefore, the farmer will benefit from the elimination of the export tax, assuming other things are unchanged. It seems reasonable to conclude that the domestic paddy market is competitive because of the following factors:

1. There are several outlets open to the farmers, such as local mills, local middlemen and government cooperatives.

2. There are a large number of each type of buyers (except the government cooperative), which means that there is horizontal as well as vertical competition in paddy trading.

3. There are no legal barriers to new entries into the paddy trade. Technical barriers are insignificant, since paddy trading is a relatively simple business. Economic or financial barriers are not formidable, because both paddy trading and paddy milling can be operated on a large or a small scale.

4. Expansion of transport and communication facilities in recent years has greatly improved the access between the farmers and the markets and has helped diffuse price information to the farmers.

Considering the world market for Thai rice, if it is perfectly competitive, the foreign demand for Thai rice will be infinitely elastic. It means that foreign consumers are sensitive to price and will avoid paying a higher price. The quantity forced back onto Thailand would serve to reduce the Thai rice price; hence, an infinite elasticity of foreign demand will serve to shift the total export tax burden backward to Thailand. Under this assumption, a rice premium is actually a policy of heavy taxation of the farmers. Nevertheless, the world market for Thai rice is imperfectly competitive for the following reasons[24]:

1. The export price elasticity of the world demand for Thai rice, calculated from the econometric model, is

slightly greater than one and the demand curve must have a
negative slope.

2. Thailand is one of the world's largest rice
exporters, with its share of the world export market at
approximately 25 percent. Thus, Thailand does have some
influence on the international rice price.

3. Habitual rice consumers usually have a strong
preference for a particular type and variety. Thai rice
attracts a marked preference in some world markets because
of its high quality, so that an increase in price of Thai
rice would lead to a slow and gradual substitution toward
other suppliers rather than being immediately priced out in
the international market.

Because of the above reasons, the total export tax
can be split into two portions. One is born by foreign
buyers in the form of a higher price of rice imported from
Thailand. The other portion falls into the Thailand's
economy as a reduction in the domestic price of rice. As a
result, the export premium generates a burden to the farmer,
but benefits the domestic rice consumers and generates
revenue for the government. As the export tax distorts the
relative prices of commodities and causes allocation
inefficiencies in production and consumption, there is a
welfare loss generated in the Thai economy as a whole.
However, another part of the export tax which is borne by
foreign buyers represents a gain to the Thai economy.
Therefore, whether the export tax generates an overall

benefit to Thailand or not depends on whether the gain at the expense of the foreigner is greater or less than the losses from resource allocation inefficiencies in Thailand's economy.

The welfare effects, as mentioned earlier, can be quantified by using the estimate of the parameters of the model. The evaluation is done in a roundabout manner following these assumptions:

1. The premium rate is divided into two parts: a rise in the export price, k, borne by the foreigner, and a fall in the net export price, (1-k), borne by the Thai farmer[25].

2. The rise in the export price, k, would rise by 5 percent of the export premium. (If Thailand is a small producer not expecting to have a strong influence on the world price, it is reasonable to assume that the export price would rise by no more than 5 percent of the export premium.)

3. It is expected that the price to the domestic consumer and to the farmer would eventually rise or fall by the same amount as the net change in export price. From Figure 3, dPP = dPD = (Ta - R) = Ta(1-k).

4. The change in the quantities produced and consumed are predicted by using the estimation of the slope coefficient of the domestic rice production and the domestic rice consumption curve[26].

5. The welfare effects are then computed by using

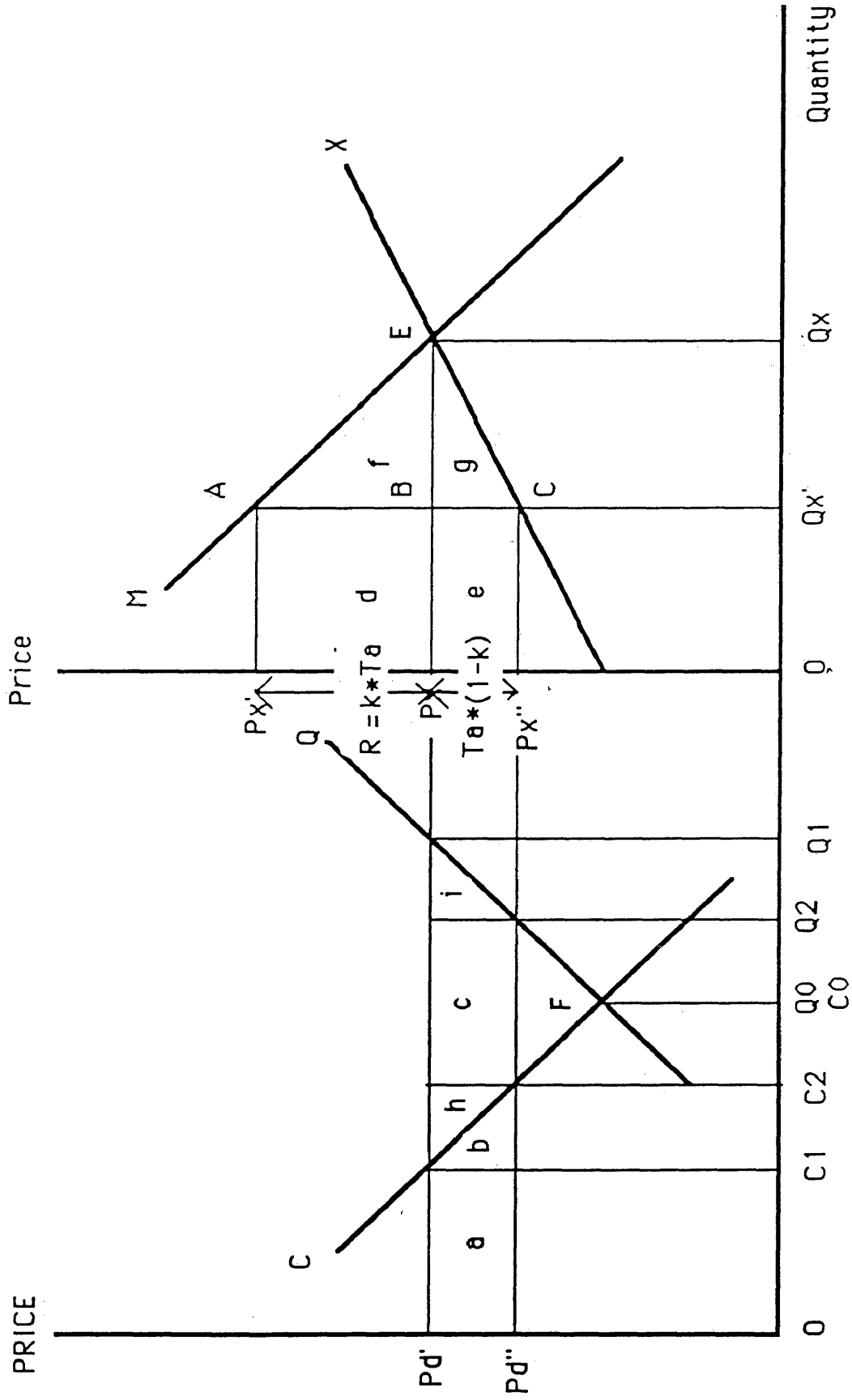Figure 3

PRICE

Price

Quantity

Pd'

Pd''

0   C1 C2 Q0 Q2 Q1
        CO

a   b   h   c   i

F

Q

C

Figure 3a Domestic Market

Px'

R = k*Ta

Px

Ta*(1-k)

Px'''

M   A

d

B   f

e   g

C

E

X

0' Qx' Qx

Figure 3b International Market

the following formulas:

> Producer loss = (Qa - 1/2dQa)*Ta(1-k)
>
> Consumer gain = (Ca + 1/2dCa)*Ta(1-k)
>
> Government tax revenue = (Xa - dQa - dCa)*Ta

assuming

Qa	= The average rice production during 1974 to 1987.
dQa	= The change in quantity of rice production.
Ca	= The average amount of rice consumed during 1974 to 1987.
dCa	= The change in quantity of rice consumption.
Ta	= The average of the rice export premium during 1974 to 1987.
R	= The increase in export price due to the export premium, thus R = k*Ta where k = the rise in export price as a percentage of export premium which in this study is assumed to be 5 percent.
Ta(1-k)	= The change in the net export price which is assumed to equal the change in the domestic price of the consumer and producer.
Xa	= The average quantity of rice export during 1974 to 1987.

TABLE 15

WELFARE EFFECTS OF THE EXPORT PREMIUM, 1974-1987 AVERAGE

ESTIMATES FROM A 5 PERCENT EXPORT PRICE INCREASE[27]

(MILLION BAHT)

PRODUCERS LOSS	- 2061.797
CONSUMERS GAIN	1376.522
GOVERNMENT TAX REVENUE	338.549
NET WELFARE FOR THAILAND	- 346.726

The results indicate that when the export price
rises by 5 percent of the export premium, the net welfare
effect to the Thai economy as a whole is negative. That mean
that the export premium would generally result in a net loss
for the Thai economy. Even if Thailand were able to exploit
considerable monopoly power on the world rice market, the
net gain from doing so would be modest, relative to the
income transfers imposed on farmers by the price-depressing
effects of the export premium. This suggests that, although
foreign demand for Thai rice is not perfectly price elastic,
the export premium rate has been set higher than it could be
justified by the optimum rate. The removal of the export
premium would be a benefit to Thailand.

When the rice premium is levied, it forces about
an equivalent decrease in both the domestic wholesale rice
price and the farmers' price. The low rice price would

benefit rice consumers as well as the industrial sector, since it would tend to lower wages. On the other hand, the lower rice price causes a lower income for farmers and discourages rice production because farmers are responsive to price changes. Consequently, the rice premium is actually a policy of heavy taxation of the farmers and results in the unfair transfer of income from the poor farmers to those consumers and industrial users who are relatively better off. Moreover, since the Thai economy relies heavily on rice production, its decrease can impede economic development. Thus, an export premium policy which discourages an expansion of rice production would be inconsistent with the economic development policy.

CONCLUSION

Rice plays a very significant role in the Thai
economy because rice constitutes a high percentage of the
national income of Thailand and it is the main diet for her
people. The highly volatile and widely fluctuating
international rice price causes a high degree of instability
in rice exports and domestic rice prices; therefore, the
government imposes export policies to regulate the volume of
exports and insulate the domestic price. The effects of
government intervention in the rice exporting country are
enormous, involving not only the effect on those in the rice
export sector but also the farmers, as well as the domestic
rice consumers. Although such an intervention generated a
benefit to the domestic rice consumers and the government
sector, at the same time it results in a substantial
transfer of income from the poor farmers to other sector.
Due to the controversy over government intervention, the
purpose of this study is to analyze Thailand's rice export
sectors, emphasizing the government trade control policy,
particularly the rice premium policy. An analysis of the
government intervention was undertaken in order to measure
and evaluate the policy's effects on exports and domestic
rice prices. In Chapter three it was found by using a
theoretical model that the government policy reduces rice
export volumes and lowers domestic rice prices from the no
intervention equilibrium level. The magnitude of these

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effects depends upon the price elasticities of production, consumption and export demand for Thai rice. The theoretical result suggests that the export tax policy is relatively effective in reducing the rice export volume and lowering the domestic rice price only if the export demand for Thai rice is highly elastic with respect to the export price. Nevertheless, if the export demand for Thai rice is highly elastic, the tax burden shared by foreign consumers would be small and the larger share would fall to domestic rice producer. This then, in turn, points to the welfare effect of an export premium. Whether the export premium increases or decreases national welfare depends on how much of it is passed on to foreign buyers and how much of it is borne by domestic producers in excess of consumer's and government revenue's gain. The theoretical analysis concludes that as long as the foreign demand for Thai rice is not perfectly elastic, there is an optimum export tax that maximizes the welfare of Thailand.

The model presented in his study is capable of explaining the interrelationships in he Thai rice economy and generating estimated values of the elasticities. The price elasticity of foreign demand for Thai rice was estimated at about -1.1908. Considering this low price elasticity, the premium policy is likely to be ineffective in insulating the domestic rice market from the fluctuations of the international rice price as claimed by the premium policy supporters. To quantify and evaluate the effects of

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government policy on rice exports and price levels, a
dynamic simultaneous model of Thailand's rice sector was
formulated and estimated by using the Two Stage Least
Squares regression method over the period of 1974 to 1987.
Our estimations have shown that there exists a close
relationship between the domestic price and the export price
net of the export premium, implying that the export and
domestic markets are fairly well integrated. The effects of
the export premium on national welfare were estimated in
terms of consumers' and producers' surpluses. The signs and
magnitudes of these surpluses provide a clear indication of
who benefits and who suffers from the export premium policy.
In addition, government tax revenues have also been computed
to determine the net effects of the trade policy. According
to the results in this study, the effect on the consumer's
surplus is shown to be positive and that on the producer's
surplus is negative, clearly indicating that the export
premium policy brings benefit to the domestic rice consumers
while the farmers become worse off than before. Although the
government gains from the export tax revenue, the net
welfare to the Thai economy as a whole turns out to be
negative. Therefore, it is concluded that the Thai economy
would benefit by eliminating the export tax.

1. This grouping follows the pattern given in <u>The Southern Rice Industry</u> by Marshall R. Godwin and Linneil L. Jones, 1970. However, <u>The Rice Economy of Asia</u> by Randolph Barker and Robert W. Hredt, divided the rice consumption pattern as: rice and wheat production, rice-dependent economies, rice producer and rice-wheat importers.

2. In many rice habitual consuming countries, a cost increase may be met by shifts toward purchasing the same type of rice but of an inferior and cheaper grade, containing a higher percentage of broken grains.

3. See <u>Agricultural Price Policies and The Developing Countries</u>, World Bank Publication.

4. See <u>Agricultural Price Policies and The Developing Countries</u>, World Bank Publication.

5. From 1962 to 1971, rice imported by the Middle East was 352,000 tons annually. But in the next decade, total rice imports tripled, to an annual average of 1.2 million tons. African rice imports followed a similar pattern, averaging about 700,000 tons from 1963 to 1971, then doubling to nearly 1.5 million tons annually in the following decade.

6. The current yields in many Asian nations are so low that there is considerable room for improvement.

7. Nigeria increased its rice-harvested area dramatically from 180 thousand hectares in the early 1960s

to 700 thousands hectares in 1986. Zaire increased its rice-harvested area from 72 thousand hectares in the early 1960s to 335 thousand hectares in 1986.

8. This change is a result of a complex set of interactions among technological demographic and economic factors and the policies of trading nations. In addition to attempt to increase rice production, many countries, such as the Philippines, Malaysia and Sri Lanka have either switched to exporting small quantities of rice or have reduced their imports substantially.

9. Siamwalla characterizes a thin market as one with relatively high transaction costs because there is no central market price for rice and there is difficulty in access to the world market for the sale of a temporary surplus.

10. The frequency distribution of the ratio of consumption to production for rice is concentrated around one which implies that rice is consumed in the country in which it is produced.

11. See The World Rice Market: Structure, Conduct, and Performance. Research Report 39, International Food Policy Research Institute, June 1983.

12. One rai = 0.16 hectare.

13. The adoption of the High-Yielding Variety (HYV) of rice has been a relatively recent phenomenon in Thailand.

14. See Thailand: Pricing and Marketing Policy for

the Intensification of Rice Agriculture. A World Bank
Country Study, 1986.

15. See Rice Outlook and Situation Report,
October, 1979.

16. Siamwalla argued that the degree of
competitiveness in the marketing of a crop in Thailand is
related to the cost of shifting from one buyer to another.
This cost is related to the nature of the commodity itself
and to the technology employed in both production and
marketing. The rice milling industry in Thailand consists of
a number of small-scale firms that are well dispersed. The
farmers and various intervening middlemen thus face a
relatively low shifting cost and do sell to many different
buyers over the years. Therefore, the Thai farm price is
closely linked to the Bangkok wholesale price which, in
turn, is affected by export demand. Thus, in Thailand, the
price-making forces flow from urban to rural areas rather
than rural to urban.

17. The rice export premium is a specific tax
levied on each ton of rice to be exported.

18. The rice export duty is an ad valorem tax on
the f.o.b price.

19. The rice export quota is the government
restrictions on the quantity of rice export. Export quotas
have been occasionally used along with the rice premium
since 1957, especially during the period of the rice crisis,
and was abolished in 1981. However, in 1985, a new export

quota scheme was introduced which differed from the previous
quota system. Under this scheme, a private exporter is
allocated monthly quota, based on the level of his stocks,
despite of the quantity which was exported by him in the
past, as in the previous quota system.

20. The reserve requirement ratio is a mandatory
sale by exporters to the government in the lower price of a
fixed proportion of particular rice grades for every ton
exported.

21. Export premiums had already been significantly
reduce between March 1974 and October 1981 when the fee for
100 percent white rice was lowered from US$ 250 per ton to
US$ 17.47 per ton. In October 1983 the premium for all
grades of rice was reduced by a further 50 percent and
remained at that rate until 1984. Also, the export duties
which were fixed at 5 percent were reduced to 2.5 percent in
October 1983.

22. See An Economic Analysis of Thai Rice Trade.
Sorrayuth Meenaphat, 1981.

23. The weights used are 0.5 for the current
year, 0.3 for the previous year, and 0.2 for the two years
ago.

24. See "An Economic and Institutional Analysis of
The Rice Export Policy of Thailand: With Special Reference
to the Rice Premium Policy". Hiroshi Tsujii, The Developing
Economic. Vol 15, pp. 202-220, June 1977.

25. As the world rice market is imperfect

competition, the foreign demand for Thai rice has less than an infinite elasticity; thus, the total export tax can be divided into two portions. The larger the price elasticity of foreign demand, the less the foreign buyer bear the tax burden and the smaller will be the benefit return to the Thai economy.

26. See Appendix B.

27. See Appendix B.

APPENDIX A

DEFINITION OF VARIABLES AND SOURCES OF DATA

All The equations were estimated using annual data over the period 1974 to 1987.

APP = Weighted average of paddy price at the farm. The weights are 0.5 for the current price, 0.3 for the last year's price, and 0.2 for the price of two years ago. The paddy price at farm was obtained from Agricultural Statistics of Thailand (Ministry of Agriculture), 1975-1987.

APC = Weight average price index of the food crop except rice. The weights are 0.5 for the current year, 0.3 for the previous year, and 0.2 for the two years ago. The price index of the food crop, except for rice, was obtained from Agricultural Statistics of Thailand (Ministry of Agriculture), 1975-1987.

CON = Domestic rice consumption, in thousand metric tons. Data was obtained from the unpublished report from The Ministry of Commerce (Bangkok), 1987.

ER = The exchange rate, in baht per U.S. dollar. The data was obtained from International Financial Statistics (International Monetary Fund), 1987.

INC = Per capita income, deflated by the GDP deflator, in baht. Data was obtain from International Financial Statistics (International Monetary Fund), 1987.

PD = The domestic wholesale rice price, in bath Data was obtained from Journal of Business Economics

(Division of Business Economics, Ministry of Commerce, Bangkok), 1983.

POP = Population in Thailand, midyear average, million persons. Data was obtained from _International Financial Statistics_ (International Monetary Fund), 1987.

PP = The paddy price at farm, in baht. Data was obtained from _Agricultural Statistics of Thailand_ (Ministry of Agriculture), 1975-1987.

PRO = The quantity of paddy production, in milled equivalent, in thousand metric tons. Data was obtained by multiplying the quantity of paddy production by a constant conversion factor of 0.66. Data on paddy production was obtained from _Agricultural Statistics of Thailand_, 1975-1987.

PX = Export price of Thai rice, in U.S. dollar. Data was obtained from _International Financial Statistics_ (International Monetary Fund), 1987.

PNT = Net return to Thai rice exporters, in baht. Data was calculated by converting the export price of Thai rice from U.S. dollars into bahts and then subtracting the average rice export taxes.

TX = The average rice export taxes, in baths. Data was calculated by dividing the total rice export tax revenue collected each year with the quantity of rice exported in that year. The tax revenue data was obtained from _Journal of Business Economics_ (Division of Business Economics, Ministry of Commerce, Bangkok), 1983 and from the unpublished report

from The Ministry of Commerce for 1984-1987.

XTH = The quantity of Thai rice exports, in thousand metric tons. Data was obtained from FAO Trade Yearbook (The United Nation), 1970-1987.

UPX = Export price of U.S. rice, in U.S. dollars. Data was obtained from International Financial Statistics (International Monetary Fund), 1987.

WX = Total world export, thousand tons. Data was obtained from FAO Trade Yearbook (The United Nation), 1970-1987.

YLD = Yield per rai, in kilograms. Data was obtained from Agricultural Statistics of Thailand (Ministry of Agriculture), 1975-1987.

TABLE 16: DATA USED IN FITTING MODEL

YEAR	PRO	CON	PP	APP	P1	PC	APC	PD	YLD
1974	9832.6	6076	1936	--.---	---	71	--.----	3756.9	285
1975	8834.7	6239	2104	--.---	1936	94	--.----	3781.6	268
1976	10098.0	6401	1949	674.200	2104	99	29.3667	4063.8	275
1977	9944.8	6563	1849	658.500	1849	94	32.5667	4048.4	281
1978	9187.9	6666	2302	656.533	1849	94	32.8333	4462.5	255
1979	11530.2	6805	2184	714.167	2302	116	33.4000	4572.8	313
1980	10400.3	6939	2605	767.867	2184	138	37.9333	5742.9	291
1981	11462.9	7067	3082	858.033	2605	161	45.3333	6705.5	302
1982	11730.8	7109	2839	963.433	3082	139	49.9000	5372.0	312
1983	11140.1	7334	2810	968.700	2839	128	47.8000	5180.0	302
1984	12902.3	7430	2832	941.033	2810	135	44.2333	4890.0	326
1985	13137	7458	2893	945.867	2832	109	42.5667	4610.0	331
1986	13374.2	7639	2301	918.767	2893	116	39.4000	4290.0	330
1987	12452.9	7721	2413	833.677	2301	131	38.9667	5070.0	328

TABLE 16. DATA USED IN FITTING MODEL (CONT.)

YEAR	INC	POP	XTH	PX	UPX	WX	TX	ER	PNT
1974	10209.3	40.78	1046	541.50	555.56	8784	3130.69	20.375	7902.4
1975	10557.0	41.87	951	363.17	418.87	8610	904.00	20.379	6497.0
1976	11133.6	42.96	1925	254.08	308.64	8987	219.79	20.400	4963.4
1977	11606.6	44.04	2932	272.42	332.89	10870	322.82	20.400	5234.6
1978	12385.8	45.10	1607	368.50	399.03	9837	706.35	20.336	6787.5
1979	12730.4	46.14	2797	334.33	381.40	11856	551.58	20.419	6315.1
1980	13372.0	46.50	2797	433.67	496.04	13084	546.87	20.476	8333.0
1981	13747.9	47.49	3027	482.83	565.48	13101	474.50	21.731	10017.9
1982	13935.2	48.49	3783	293.38	366.70	12188	169.34	23.014	6582.5
1983	14512.1	49.46	3476	276.83	378.46	11591	180.26	22.991	6184.3
1984	14882.1	50.40	4616	252.25	379.74	12680	97.64	23.582	5850.9
1985	14903.5	51.30	4062	217.42	382.50	11125	105.54	27.193	5806.8
1986	15172.5	52.09	4524	210.19	342.83	12156	5.53	26.314	5525.4
1987	15811.6	53.60	4556	230.26	323.53	12233	0.00	25.870	5956.8

APPENDIX B

THE WELFARE EFFECT OF THE EXPORT PREMIUM

Since the premium rate, prices and quantities have shown considerable variations during the period of study, the welfare effects are then evaluated by using the average value of these variables for the period of 1974 to 1987. The figure of the average value of each variable is shown as follows:

Average value of production (Qa)   = 9811.55   thousand tons

Average value of consumption (Ca)   = 6080.86   thousand tons

Average value of rice export (Xa)   = 2864.43   thousand tons

Average value of rice export tax (Ta) = 238.59 baht per ton

The change in quantity produced and consumed is predicted by using the estimates of the slope coefficients of the domestic supply and demand. Therefore, the change in the quantity of rice produced can be computed as follow:

dPP/dQa = slope of production curve.

dQa   = coefficient estimate of price in
            production equation*dPP

assuming that

dQa   = the change in quantity produced.

dPP   = the change in paddy price.

since,   dPP   = Ta(1-k) ; as it is expected that the price to the domestic consumer and to the farmer would rise or fall by the same amount of the change in the net export price, assuming that k is the rise in export price as a

percentage of the export premium. For this study, assume k = 5 percent. Therefore, (1-k) is the fall in the net export price as a percentage of the export premium.

thus

$$dQa = coefficient*Ta(1-k)$$

$$= 6.30918*238.59(1-0.05)$$

$$= 1430.02$$

In a similar way, the change in quantity consumed will be:

$$dCa = coefficient\ of\ consumption\ curve*dPD$$

since, $dPD = dPP = Ta(1-k)$

thus: $dCa = slope\ coefficient*Ta(1-k)$

$$= 0.06161*238.59(1-0.05)$$

$$= -13.967$$

Now, the welfare effects can be computed. The result of the welfare indicators are shown as follow:

Producer Loss(PL) $= (Qa - 1/2dQa)*Ta(1-k)$

$$= -2061.797$$

Consumer Gain(CG) $= (Ca + 1/2dCa)*Ta(1-k)$

$$= +1376.552$$

Government Tax Revenue(GTR) $= (Xa - dQa - dCa)*Ta$

$$= +338.549$$

Net Welfare for Thailand $= PL + CG + GTR$

$$= -2061.797 + 1376.552 + 338.549$$

$$= -346.726$$

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