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The World Rice Market

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THE WORLD RICE MARKET

PREFACE

This report provides information on the California, U.S., and world rice situation—production including varieties grown, consumption including types preferred by various consumers, and world trade. The focus is on international markets, and the considerable background material contributes to understanding their behavior. For example, most statistics are not disaggregated by type of rice, yet many consumers prefer one type over another and are willing to pay a premium for the preferred type. Another extremely important aspect only touched on here is the preponderance of government intervention in rice markets. Rice policy and price are important political matters in countries where rice is literally the staff of life. Drawing from many sources, the report offers information useful for understanding the complex world rice market.

INTRODUCTION

The report provides considerable background information that contributes toward an understanding of the world rice situation; in particular, it offers reasons for the thinness, volatility , and riskiness of world rice trade. Various types of rice are produced in the world. Differences in cooking quality limit the substitutability from one type of rice to another. This may cause world prices for the various types of rice to move somewhat independently of one another. Thus, to understand the operation of the world rice market, it is essential to differentiate between various types of rice. In this report rice varieties, trade by type of rice, and price differences between various types of rice are discussed.

There are significant differences between rice yields in developing countries and those in the United States, but also between various production regions in the United States. These differences are due mainly to differences in production methods and in varieties grown. New high yielding varieties, grown both in the United States and in many traditional Asian importing countries, may eventually lead to surpluses on the world market, but, in any case, to changes in basic trade patterns. The report discusses world rice production technology. An overview of the U.S. rice market, supply and disappearance, is also given.

Given that rice is a staple food for over half of the world's population and considering the instability of world rice markets, many governments control rice trade to secure domestic supplies. But government involvement in trade has exacerbated rice market instability. Domestic rice support policies distort trade patterns. The report gives information on government intervention and its impact on the world rice market.

Since 1980, the U.S share in world rice exports has been steadily decreasing, displaced by Thailand's increasing exports. Many traditional U.S. markets have turned to Thailand for supplies. Various factors contributing to the loss of U.S. market share to Thailand are explained herein.

The Structure of the International Rice Market

Although rice is a staple food for over half of the world's population, it is of secondary importance in international trade, ranking only 14th in value of agricultural commodities traded (Slayton, March 1984). Because most major rice producing countries consume most or all of the crop, only a small proportion of world rice production is traded each year. From 1960-61 to 1983-84, on average, only about 4 percent of world rice production was traded, compared with 19 percent for wheat (Appendix Tables 1 and 2). Still, rice trade is relatively more important among developing countries; in some cases it is a leading traded commodity.

Besides being a market with a very small volume of trade compared to production, traded volumes are unpredictable. Because about 90 percent of the world's rice crop is produced in Asia and 45 percent of the Asian crop is nonirrigated, the world rice supply—and demand (given that Asia is also the major rice consuming area)—depend importantly on the Asian monsoon and are therefore very unstable, given that the Asian monsoon is unstable.

Trends in World Production, Consumption, and Trade

World rice production increased from 160.0 million metric tons of milled rice in 1960-61 to 285.3 million metric tons in 1982-83, a 78 percent increase (U.S. Economic Research Service, October 1984). Most of this increase was due to higher productivity. Yields increased from 1.95 metric tons per hectare (M.T./ha) in 1960-61 to 2.98 M.T./ha in 1982-83, a 53 percent increase, while area harvested increased only 17 percent during this period (Ibid). World rice trade nearly doubled during the same period (Center for Trade and Agricultural Policy, 1985). Shares of the world's rice production, consumption, and trade by developing and developed countries and by centrally planned economies are presented in Table 1, with developing countries dominating all categories.

Between 1960 and 1982, because of increased yields, production in developed countries increased by 9 percent while area harvested and consumption remained essentially unchanged (Ibid). Their net exports nearly tripled over the same period, accounting for about 28 percent of total production. Meanwhile, developing countries' production increased by 64 percent from 1960 to 1982, with area harvested increasing by 22 percent and yields increasing by 34 percent. Consumption approximately matched production during this period. Developing countries were net importers of rice in most years; only about 4 percent of their production was exported (Ibid). In centrally planned economies, production more than doubled while area harvested increased only 7 percent. These countries were net exporters during the 1960s and most of the 1970s but became net importers in the 1980s.

This brief overview of worldwide trends in production, consumption, and trade has not distinguished among rice varieties. However, such trends and the supply-demand situation for rice in aggregate may misrepresent the market situation for any single variety (Stucker, 1984). Rice varieties will be discussed, therefore, in the next section along with production technology and breeding improvements.

Table 1. Shares of World Rice Production, Consumption, and Trade, Developing Countries, Developed Countries, and Centrally Planned Economies, 1982

	Developing Countries	Developed Countries	Centrally Planned Economies
	percent		
Percentage of world's rice production	53	6	42
Percentage of world's rice consumption	54	5	42
Percentage of world's rice imports	77	15	8
Percentage of world's rice exports	62	31	6

Source: Derived by author from Center for Trade and Agricultural Policy, *Rice Data Book,* Department of Economics, Iowa State University, CTAP Staff Report No. 2, January 1985.

RICE VARIETIES AND PRODUCTION TECHNOLOGY WORLDWIDE

There is archaeological evidence that rice was grown between 6,000 and 7,000 years ago in southeast Asia and southern China, later spreading to India, Indonesia, the Philippines, to the rest of China, Korea, and Japan. In the process, the Asian species Oryza Sativa was differentiated into three ecogeographic races: Japonica, a temperate zone variety; Indica, a tropical variety; and Javonica, native to Indonesia (Rutger, 1981).

There are two other types of rice: glutenous and aromatic. Glutenous rice (a short-grain variety), also known as waxy or sweet rice, has a very low amylose content and forms a gelatine-like mass without distinct grain separation when cooked. Glutenous rice is a staple food in northeast Thailand and Laos. Small amounts are also produced in most rice-consuming areas in Asia for use in desserts, ceremonial foods, and sweet dishes. Aromatic (scented) rice, also known as basmati rice, has a distinctive odor when cooked; its grains double in length, remaining completely separate. Aromatic rice grows mostly in the Punjab area of central Pakistan and northern India and is mainly bought by higher income Middle Eastern countries. Small quantities are also grown in Thailand to be sold to Hong Kong and Singapore.

Most rice is either Japonica or Indica. Javonica varieties (known as bulu rice) only grow in some parts of Indonesia and the Philippines.

In the United States, rice is classified by grain length: short-, medium-, and long-grain, based on an average length and average length/width ratio (Table 2). Short- and medium-grain varieties have low amylose (starch composition) content and, therefore, cook moist and chewy with grains tending to stick together. Typical long-grain varieties cook dry and flaky, with grains remaining separated. In world trade, Indica rice is referred to as long-grain rice, while Japonica refers to shorter grains.

Rice everywhere is planted in the spring. The growing season for U.S. rice ranges from 100 to 160 days; in Asia, from 90 to 250 days (Rutger, 1981). In most of Asia, peasants plant individual seedlings by hand on small plots; rice cultivation and harvest there require more than 300 labor hours. In the United States, where rice production is mechanized, only about seven labor hours are required. A combination of water management, fertilizer, chemical weed control, and high yielding varieties are responsible for U.S. yields more than double those of Thailand. (The 1980-81 average U.S. rice yield was 5.0 M.T./ha.; in Thailand it was 1.9 M.T./ha.)

Table 2. Size and Shape Classifications of Rice Based Upon Brown Rice Kernel Dimensions

Classification	Average Length	Average Length/Width Ratio
	- - - millimeters - - -	
Short	5.50 or less	2.1
Medium	5.51 to 6.60	2.1 - 3.0
Long	6.61 or greater	3.0

Source: University of California, Cooperative Extension Service, *California Rice Varieties, Description, Performance, and Management,* Special Publication 3271, August 1981.

U.S. PRODUCTION AND UTILIZATION

In the United States, California rice yields are substantially higher than those in the South. In 1983, southern states' yields ranged between 4.3 M.T./ha. in Louisiana to 4.9 M.T./ha. in Texas; California's average rice yield was 7.9 M.T./ha. Advanced rice cultivation methods are used in California where fields are flooded to a depth of 2 to 4 inches before seeding—a level maintained throughout the growing season. Rice seeds, treated with fungicide to control seedling disease, are then soaked in water for 24 hours to initiate germination, giving them an advantage over weeds and making them pest resistant and heavy enough to sink to the soil under the flooded field (Rutger and Brandon, 1981).

Because infestations of aquatic weeds can drastically reduce yields, chemical control is essential for successful rice production. In California, these chemicals are applied by air. Thus, compared to most of the world's rice, the California crop is relatively free of major diseases and pests. California rice fields are drained about 20 to 30 days before harvest; harvest begins when the grain's moisture content drops below 24 percent (Rutger and Brandon, 1981).

In the United States, the use of semi-dwarf, short-stemmed varieties has increased since the late 1960s with the introduction of Bluebelle in 1965 and Starbonnet in 1967 (Stucker, 1984). Because these semi-dwarfs are resistant to lodging,[1] they are more efficiently harvested and produce higher yields.

Lemont is a new short-stemmed long-grain rice variety producing record yields. On test plots this variety yielded 20 to 35 percent more than the 1983 long-grain yield of 4.7 M.T./ha. Thus, this new variety has potential to bring long-grain yields more in line with medium-grain yields which average 6.0 M.T./ha. Although Lemont production is more costly because it requires more fertilizer, herbicides, and fungicides than other long-grain varieties and also more labor for water control and chemicals, studies show that Lemont may still be more profitable because of increased yield and milling outturn (Stucker, 1984).

The Lemont long-grain variety could double the average southern yields. According to Stucker (p. 9):

> In 1983, had Arkansas planted its entire 1.5 million acre base in Lemont, 90 percent of the 1983 rice crop would have been harvested by one state. Stated another way, the U.S. rice crop would have been nearly twice as large as the actual harvest.

Harvested rice grain (paddy or rough rice) is taken to local central dryers or to bins on the farm, where the moisture is reduced for storage and milling. In California, moisture is taken down to about 14 percent; in the South, because of greater humidity, to 12 percent (Rutger and Brandon, 1981). After drying, hulls are removed, producing brown rice. While some rice is consumed as brown rice, most is milled to remove the bran layers and embryo. Milled or white rice is the most common form for human consumption (Rutger, 1981).

In the United States, 100 kilograms of rough rice, when milled, will yield on average (1) 55 kilograms of whole kernel (head) rice used mainly for table rice; (2) 15 kilograms of broken kernels used for infant cereals and brewing; (3) 20 kilograms of hulls, used for soil conditioning and animal litter; and (4) 10 kilograms of bran and polish used in animal feeds (Rutger, 1981). Farmers are paid on the basis of the amount and quality of milled head rice. Thus, milled rice prices, reflecting the cost of obtaining whole kernels, are approximately double farm level rough rice prices (Stucker, 1984).

Considerable rice is now being marketed as par-boiled brown or parboiled milled. Parboiling is a steaming process before the hull is removed which forces the hull and bran nutrients into the inner kernel of rice.

U.S. Rice Production by Type of Grain

The major rice growing areas in the United States are in the South (Arkansas, Louisiana, Mississippi, Texas) and in California (the Sacramento Valley). [2] Rice grown in the southern United States is intermediate between Japonica and Indica, whereas the California rice varieties are basically cold-tolerant Japonicas developed from genetic stocks originating in Japan and China.

The share of long-grain rice in total U.S. rice production has increased, while medium- and short-grain shares have decreased since 1960. In 1982, about 61 percent of U.S. rice production was long-grain, 33 percent medium-grain and 6 percent short-grain. By 1984, long-grain rice had increased its share to 70 percent, replacing medium-grain which declined to

[1]Lodging refers to the tendency of plants to fall over or bend, reducing yields by impeding efficient harvesting (Stucker, 1984).

[2]Rice grown in the San Joaquin Valley amounts to less than 10 percent of the California total.

about one-fourth of the total. With increased plantings of the Lemont variety, the long-grain share will likely continue to increase.

Most southern rice is long-grain, accounting for 79 percent of the total there in 1982; 88 percent in 1984. Arkansas is the only state in the South that grows over 1,000 acres of short-grain rice. The medium-grain share of the total declined from 20 percent of the southern total in 1982 to 12 percent in 1984.

While most California rice grown is medium-grain, long-grain production has recently been increasing rapidly in California. In 1982, only 2 percent of California's total was long-grain; by 1984, the long-grain share had increased to 12 percent. Over the same period, medium-grain declined from 76 to 63 percent, while short-grain increased slightly from 22 to 25 percent.

Traditionally, it was difficult to develop long-grain varieties adapted to California's climate (University of California, Cooperative Extension Service, 1981). However, since 1982, California rice growers have been encouraged to seed a promising new long-grain variety, Cal Belle.[3] The objective was to produce more of the rice preferred by U.S. consumers. But some argue that California long-grain rice cooks somewhat softer and whiter than southern long-grain varieties due to differences in growing conditions. Cal Belle yields are still low compared to other California-grown rices, and this variety tends to crack during harvesting and milling (Shallit, 1984).

Some world buyers prefer California medium-grain (Calrose) while others prefer the southern medium-grain (Blue rose). Calrose is somewhat sweeter and more glutenous and, therefore, stickier when cooked than is Blue rose. For example, South Koreans definitely prefer California's medium-grain. Most other markets, e.g., Peru, Spain, and Portugal, exhibit a preference for one or the other but are not willing to pay a premium for the type they prefer.

Table 3 gives the proportional distribution of rice produced in the United States, since 1960 by type of grain. California grows the bulk of both medium- and short-grain varieties—53 and 88 percent, respectively, in 1982; 61 and 93 percent in 1984. Arkansas grows over one-half of the nation's long-grain rice.

U.S. Rice Disappearance

Though figures vary somewhat from year to year, a little less than one-third of the U.S. milled rice supply is used directly for food or is processed. About one-tenth of the supply goes to breweries and the rest (about 60 percent) to exported. Table 4 summarizes the supply and disappearance of U.S. milled rice for the past six years. Most rice used directly for food (about 80 percent) is regular milled white rice. The rest consists of specialty products—parboiled, precooked, or brown rice.[4] Processed food use of rice includes breakfast cereals, soups, babyfood, and package mixes.[5]

Of all rice used in processed foods in 1980-81, 30 percent was long-grain, 46 percent medium-grain, 7.2 percent short-grain, and 16 percent brokens. Soups and package mixes used both long- and medium-grain, cereals used mainly medium-grain, while baby foods used all brokens. Brewers use mostly brokens, though they also take some whole grain rice, depending on the supply and price situation of the various types in a particular year.

[3]Another long-grain successfully grown in California is L-201.

[4]In 1980-81, 58 percent of specialty rice products was parboiled, 30 percent was precooked, and 11 percent was brown rice.

[5]In 1980-81, cereals accounted for 58 percent of processed rice food use, soups for 3 percent, baby foods for 3 percent, and package mixes for 30 percent.

Table 3. Proportional Distribution of Rice Production, by Type of Grain, United States, 1960-1984, Five-Year Averages

Crop Year	Long-Grain	Medium-Grain	Short-Grain	Production
	Percent			(1,000 cwt)
1960-64	42.3	42.9	14.8	63,654
1965-69	45.8	43.4	10.9	89,119
1970-74	49.6	40.2	10.1	92,024
1975-79	60.2	30.9	8.8	121,685
1980-84	63.1	30.7	6.2	144,072

Source: Holder and Grant, 1979, U.S. Economic Research Service and U.S. Statistical Reporting Service, 1984.

Table 4. Milled Rice: U.S. Supply and Disappearance, 1978-1983

Item	Year Beginning August 1					
	1978	1979	1980	1981	1982	1983[a]
	1,000 hundredweight					
Beginning Stocks	4,347	4,583	4,035	4,855	5,477	5,896
Production	83,427	89,820	103,037	95,074	84,475	79,012
Imports	49	45	160	278	469	540
Supply	87,823	94,448	107,232	100,207	90,421	85,448
Direct Food Use[b] (Food as percentage of total disappearance)	23,763 (29)	23,868 (26)	27,957 (27)	30,702 (32)	26,413 (31)	23,753 (30)
Brewers' Use (Brewer's use as a percentage of total disappearance)	7,872 (10)	8,093 (9)	8,001 (8)	9,123 (10)	9,613 (11)	8,825 (11)
Exports (Exports as a percentage of total disappearance)	51,605 (62)	58,452 (65)	66,419 (65)	54,905 (58)	48,499 (57)	47,749 (59)
Disappearance	83,240	90,413	102,377	94,730	84,525	80,327
Ending Stocks, July 31	4,583	4,035	4,855	5,477	5,896	5,121

[a]Preliminary.
[b]Included shipments to U.S. territories.

Source: U.S. Department of Agriculture, Economic Research Service, *Rice Outlook and Situation Report,* various issues.

THE WORLD RICE MARKET

The World's Major Rice Traders

World rice trade almost doubled—from 6.5 million to 12 million metric tons—between 1962 and 1984. While the export side of the rice market is dominated by a few Asian countries and the United States, the import side is more dispersed geograhically, as illustrated in Figures 1 and 2, and shown in Appendix Tables 3 and 4.

The United States and Thailand are the two largest rice exporters, accounting for 49 percent of trade over the last five years. These two countries, plus mainland China, Pakistan, and Burma normally account for about 70 percent of world exports (Table 5). Argentina, Australia, Eqypt, Guyana, North Korea, Nepal, Taiwan, and Uruguay also export rice, together accounting for about 13 percent of world rice trade over the last decade. European Economic Community (EEC) exports accounted for about 6 percent of world exports between 1978 and 1982 with Italy as the major exporter, representing 69 percent of the EEC total.

Rice trade patterns have changed over time for many reasons, including increased petroleum revenues in oil exporting countries to pay for imports, changing African diets, and the Green Revolution. Table 6 shows some of these changes. India was a rice importer, but became a net exporter from 1978 through 1982. Japan, too, was once a rice importer, but in the late 1960s started to export rice. But Brazil, once a rice exporter, has recently become an importer. The Philippines exports rice in some years and imports in others.

Developing countries account for 70-75 percent of the world import demand with Indonesia, Malaysia, Nigeria, and the Middle East (Iran, Iraq, Saudi Arabia, and Kuwait) as major rice importers. The Soviet Union, South Korea, and the EEC also import considerable quantities of rice—the EEC countries accounted for 9 percent of world imports during the last decade.

Trade By Type of Rice

Because of strong tastes and preferences, there is limited substitution in consumption or in production between the various types of rice. For example, South Koreans prefer California's rice and are willing to pay a premium for it. Japan's consumers also prefer short-grain sticky rice. Meanwhile, Middle Eastern and African people prefer long-grain rice. On the other hand, there are some countries who prefer a particualr type of rice, but either cannot afford to pay a premium for it or their preference is not strong enough to warrant a premium. An example is Indonesia, which purchases both medium- and long-grain. But because of definite preferences by some consumers, it is quite possible that a surplus exists in the market for one type of rice and a shortage for another. Prices for various types of rice, therefore, may move somewhat independently of one another. Aggregate data cannot possibly capture these market conditions by type of rice, but still it is important to differentiate markets where possible.

Most rice trade is in milled rice of the Indica type. Because of the relatively low value of hulls, making shipments over long distances uneconomical, very little rough rice is traded internationally. Trade in glutenous and aromatic rice is not significant. Trade in brown rice is also very limited, with only about 1 to 1.5 million tons (precise data are not available) traded annually.

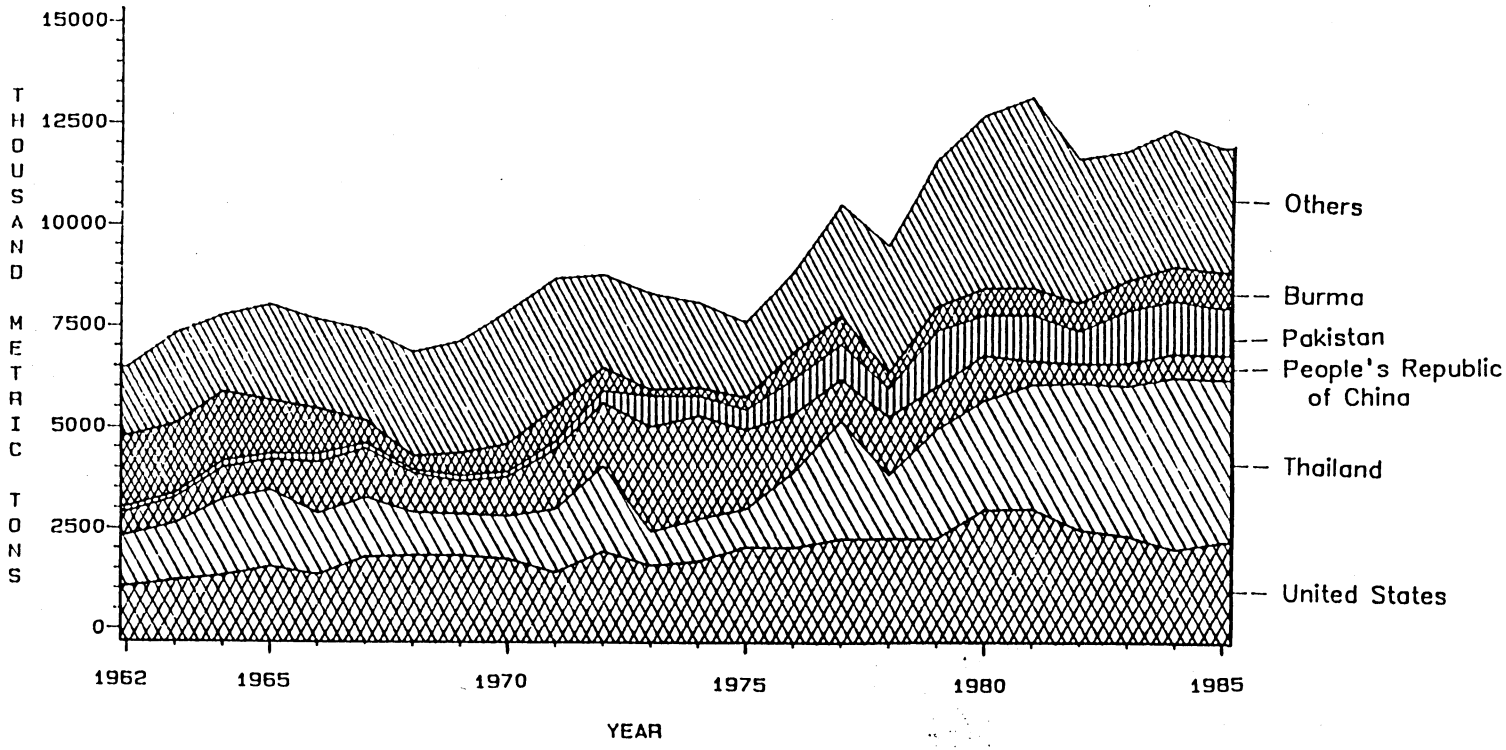
Trade in Japonica rice amounts to only about 1.5 million tons, or about 12.5 percent of the total volume of world rice trade. When Japonica rice must be exported to Indica rice markets, it usually sells at a discount. (In the United States, however, because of a high quality product, export demand for sticky rice, and proximity to port, California short- and medium-grain Japonica-type rice is priced higher than the southern Indica-type long-grain.)

Thus, the bulk of world rice trade is in Indica. Demand for Indica rice is split into that for well-milled and parboiled rice. Both milled and parboiled markets are also divided by quality differences. Low quality parboiled which includes a larger percentage of brokens, has a dark color and a strong odor, and sells at a relatively low price—about the same price as for brokens. High-quality parboiled has a yellowish tint, no odor, and little foreign matter.

High-quality well-milled long-grain rice has less than 10 percent brokens. The two most frequently cited benchmarks for high quality well-milled rice are the U.S. #2, brokens not to exceed 4 percent, long-grain, and Thai 100 percent, Grade B. Medium-quality, well-milled long-grain rice includes 10-20 percent brokens, while low-quality milled long-grain has more than 20 percent brokens. Major exporters and importers by type of rice are shown in Appendix Table 5.

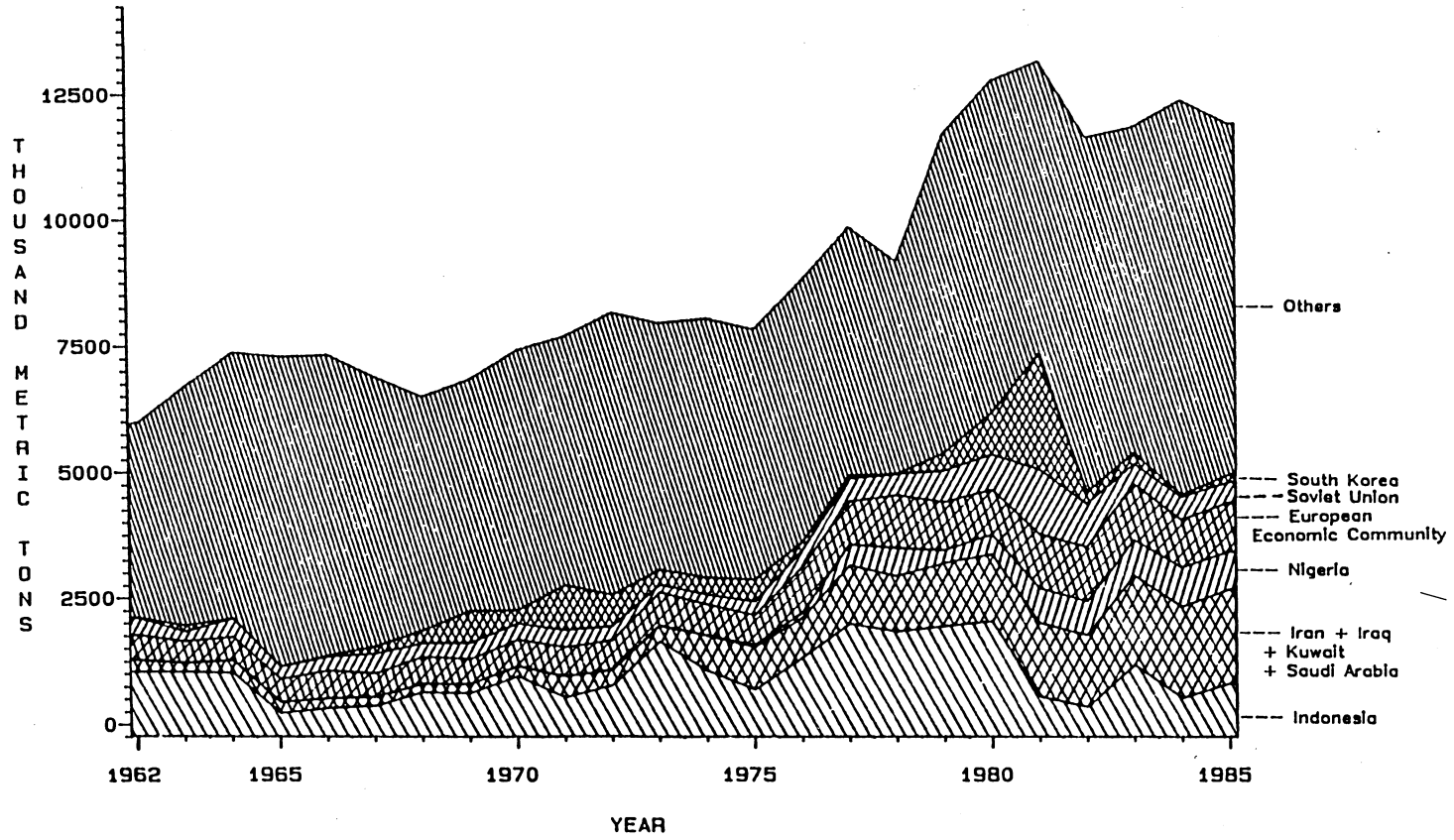
In Thailand, high-quality parboiled rice sells at a discount to high-quality well-milled rice, while in the United States, the reverse is true: High-quality par-boiled sells at a premium to high-quality well-milled.

Figure 1. Rice Exports of Major Exporting Countries and Total Exports, 1962–1985.



Source: Appendix Table 3

Figure 2. Rice Imports of Major Importing Countries and Total Imports, 1962–1985.



Source: Appendix Table 4

Table 5. Percentage Export Shares in World Trade

Calendar Year	United States	Thailand	Mainland China Pakistan Burma	Argentina, Australia, Egypt, Guyana, North Korea, Nepal, Taiwan, Uruguay
			percent	
1962	16	20	38	8
1963	16	20	34	12
1964	17	25	30	14
1965	19	24	28	14
1966	17	20	34	15
1967	24	20	26	16
1968	27	16	20	18
1969	26	14	21	21
1970	22	14	22	17
1971	16	18	30	15
1972	22	24	28	13
1973	19	10	43	13
1974	21	13	40	9
1975	27	13	36	13
1976	23	21	34	11
1977	21	28	25	13
1978	24	17	26	16
1979	20	23	26	13
1980	24	21	22	11
1981	23	23	18	9
1982	21	31	17	13
1983	20	31	22	12
1984	16	34	22	12
1985[a]	18	34	22	13

[a]As of Septermber 14, 1984.

Source: Calculated from Appendix Table 3.

Table 6. World Rice Trade, Milled Basis, Selected Countries

Calendar Year	Brazil		India		Japan		Philippines		The European Economic Community[a]	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
	1000 metric tons									
1962	44	–	–	391	–	178	–	31	288	480
1963	–	–	3	481	–	222	–	256	222	418
1964	12	–	3	633	–	415	–	300	126	456
1965	237	–	3	726	–	967	–	570	181	460
1966	289	–	2	785	–	812	–	108	176	545
1967	32	–	4	455	–	509	107	290	313	449
1968	158	–	3	446	–	271	37	–	411	536
1969	70	–	15	487	361	56	1	–	356	490
1970	95	–	25	335	597	19	1	–	682	520
1971	149	1	16	275	909	13	–	369	545	580
1972	2	9	15	166	200	3	–	458	467	578
1973	33	11	18	38	517	24	–	306	352	654
1974	57	–	40	55	284	63	–	168	568	613
1975	3	63	18	181	10	36	–	152	570	583
1976	76	17	38	237	–	20	–	55	641	906
1977	410	–	18	34	17	21	15	30	553	848
1978	180	29	145	6	75	64	49	–	676	1,049
1979	–	711	340	3	564	20	127	–	744	959
1980	1	239	423	10	653	20	231	–	804	889
1981	46	142	1,143	70	795	80	83	–	812	1,079
1982	–	124	633	10	318	50	0	–	625	1,080
1983	–	400	165	310	321	–	40	–	800	1,114
1984	–	150	150	800	100	–	0	–	769	945
1985[b]	–	50	100	–	0	–	0	–	742	980

[a]The trade data are for the ten countries of the European Economic Community: France, West Germany, Italy, Belgium, Luxembourg, the Netherlands, Denmark, Ireland, the United Kingdom, and Greece.
[b]As of September 14, 1984.

Source: U.S. Department of Agriculture, Foreign Agricultural Service, *Foreign Agriculture Circular,* FG-22-82, September 30, 1982; and Economic Research Service, *Rice Outlook and Situation Report,* various issues.

Rice Price Differences in Domestic and International Markets

In the United States, f.o.b. mill prices are available for southern No. 2, long-grain milled rice (Texas, Arkansas, Louisiana); southern No. 2, medium-grain milled rice; and California No. 1, medium-grain milled rice. For California No. 1, short-grain milled rice, free-alongside-ship (f.a.s.) prices are available.

There is very little difference between U.S. No. 2, long-grain milled, f.o.b., mill, at Texas, Arkansas, and Louisiana (Appendix Table 6). Nor is there much difference between U.S. No. 2, medium-grain milled, f.o.b. mill, at Texas, Arkansas, and Louisiana (Appendix Table 6). But there is a considerable difference between southern medium-grain and long-grain free-on-board (f.o.b.) milled rice prices (Figure 3, Appendix Table 6) and between California medium-grain and southern medium-grain f.o.b. milled rice prices (Figure 4, Appendix Table 6). In fact, California prices have been higher than those at southern mills most years—the difference sometimes amounting to 33 percent of the southern price.

There are two main reasons for the higher prices for California's rice. First, California rice is U.S. No. 1, which is of a higher quality that the No. 2 medium-grain grown in the South. Second, there is a freight differential. California f.o.b. mill prices are closer to f.a.s. than are the southern f.o.b. mill prices; that is, the transportation cost to move the grain from the mill to the ship is less in California than it is in the South. California mill, short-grain prices are also for U.S. No. 1 rice but have been below California medium-grain prices most years, until recently (Appendix Table 6).

On an international basis, however, price data are not available by type of grain. The most commonly used world price is the Thailand export price for milled rice, 100 percent second grade (grade B) f.o.b. mill, Bangkok. The Bangkok f.o.b. price, however, is not truly representative of the actual trading price; it is sometimes as much as 10 percent above the transaction price (Slayton, 1984). The Bangkok f.o.b. price posted weekly by the Thai Board of Trade is meant to be, by Thai regulations, the minimum price that private exporters must demand of their buyers. But when markets are soft, the selling price may be 5 to 10 percent below this posted price; i.e., illicit discounts are given (Siamwalla and Haykin, 1983). In Figure 5 and Appendix Table 7, this Bangkok price is compared with U.S. No. 2 long-grain milled rice, f.o.b. mill, Texas.

Governmental Involvement in International Rice Trade and Rice Market Instability

In many developing countries where rice is a staple, it is politically important for the governments to assure sufficient rice supplies, particularly in urban areas (Slayton, 1984). Because of the unpredictability of international markets and occasional shortages, some governments have pursued self-sufficiency production policies and/or have either tightly controlled or directly conducted rice trade. But these policies worsen market instability by reducing trade volume and isolating domestic markets from world market adjustments.

Governmental involvement in international rice trade has been extensive. In 1983, governments were active in 60 percent of total imports and 46 percent of total exports (Slayton, 1984). (Only in the United States, Australia, Italy, Argentina, Uruguay, and Spain are exports left to private trade.) Both rice exports and imports are subject to government controls such as licensing, quotas, or taxes. In Thailand, 37 percent of 1983 rice exports was government arranged; Hong Kong, which is otherwise a laissez-faire economy, imposes quotas on rice imports. In the United States, exports under governmental program (P.L. 480) accounted for 21 percent of total U.S. exports in 1983.

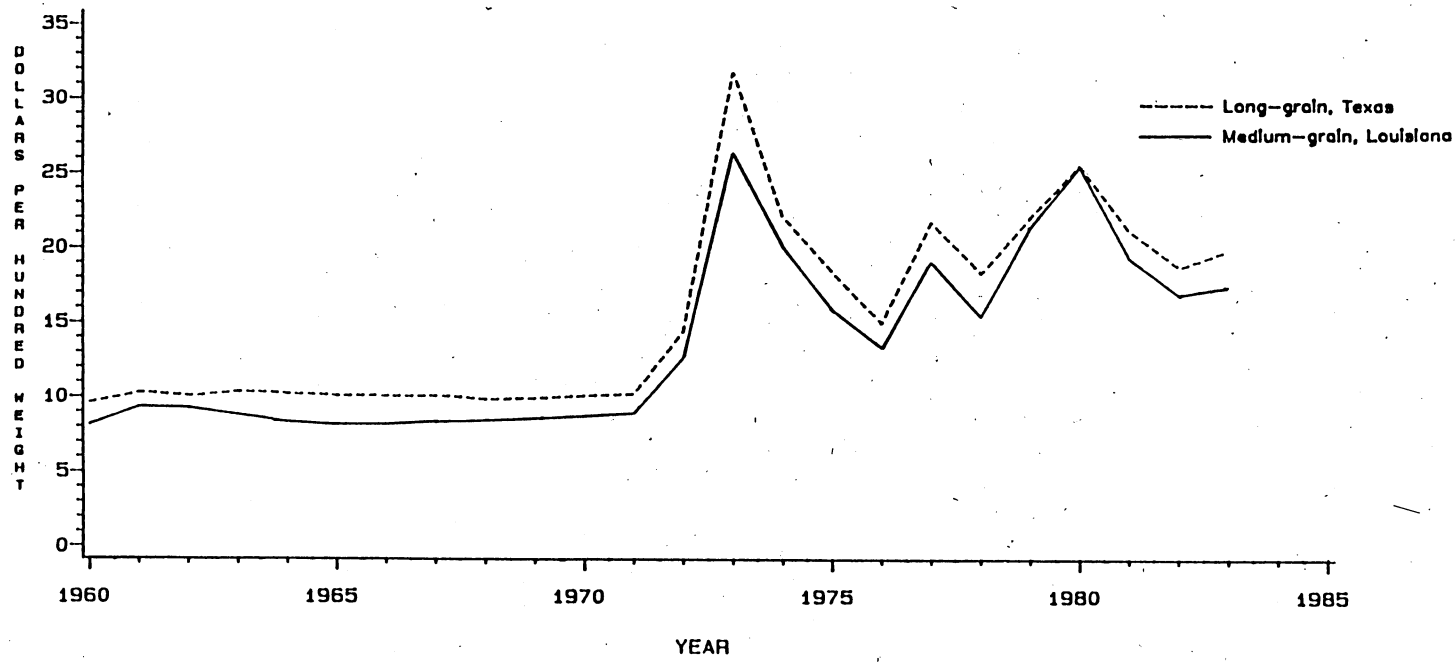
Government-to-government contracts are used extensively as trade instruments. Over 43 percent of rice exports by Thailand, Pakistan, and Burma in 1983 were via these agreements. Increased government-to-government contracts by the Ivory Coast and Indonesia meant that the 1983 total for amount contracted is about 20 percent higher than the 1982 figure.

Governmental involvement in rice trade increases world market instability. Governments sometimes (or even frequently) improperly estimate the supply situation for their domestic markets. For example, surpluses may occur as an overcompensation when governments underestimate supply and anticipate shortages in their countries; these surpluses can only be exported at a discount. Buyers are unsure of the quality of these discounted exports,[6] and many countries who traditionally import their rice do not have port facilities adequate for exports.

Foreign exchange fluctuations also contribute to the instability of the international rice market. When an importing country is faced with foreign exchange problems, it may drop out of the market entirely or shift to a supplier whose currency is devaluating or who

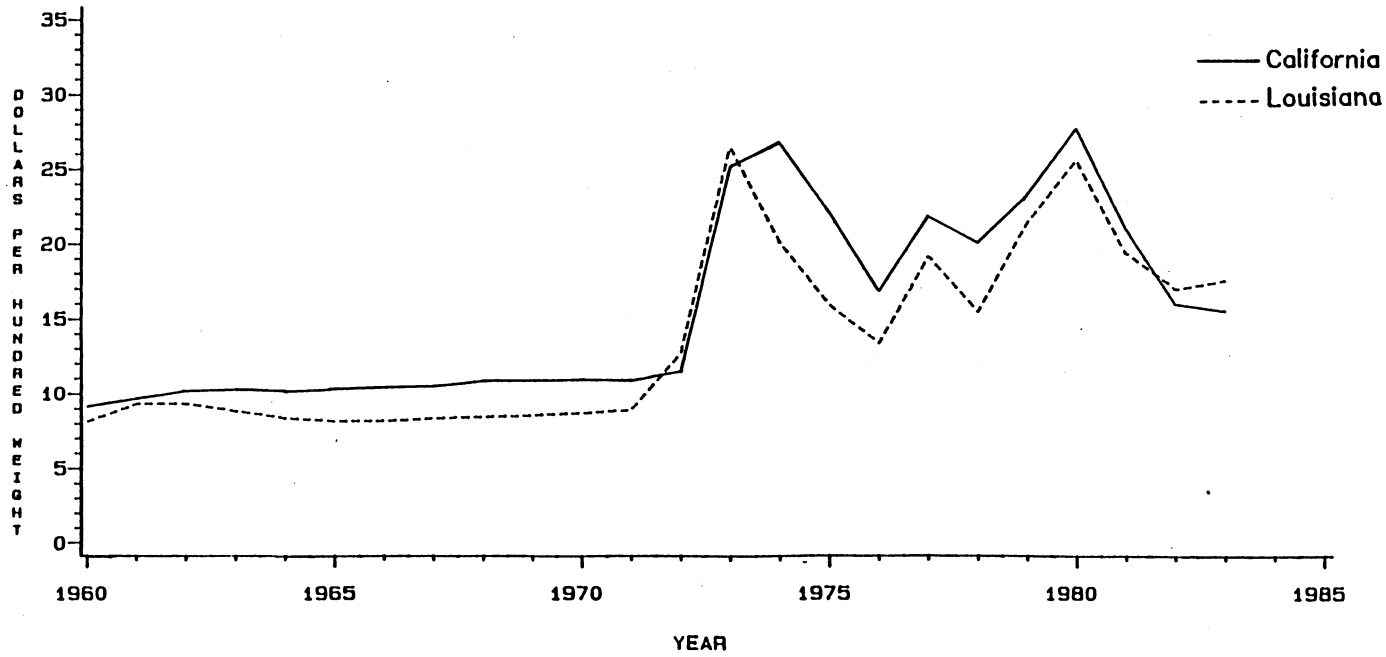
[6]However, what facilitates trade is not high or low quality, but whether the rice is sufficiently standardized. Many temporary exporters have neither the milling facilities to ensure standardization nor sufficient exposure to the market to have acquired a reputation (Siamwalla and Haykin, 1983).

Figure 3. Average f.o.b. Prices for Long-Grain (Texas) and Medium-Grain (Louisiana) Milled Rice, 1960-1983.



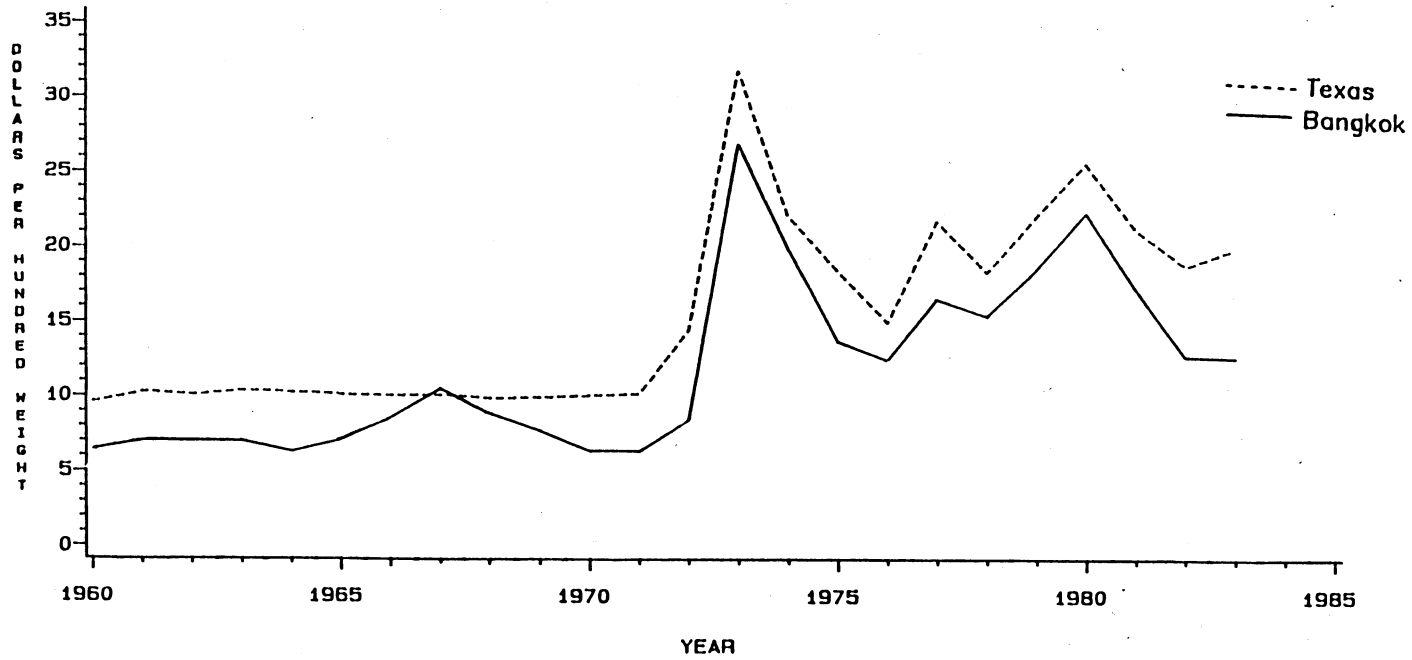
Source: Appendix Table 6

Figure 4. Average f.o.b. Prices for Medium-Grain Milled Rice, California and Louisiana, 1960-1983.



Source: Appendix Table 6

Figure 5. Average f.o.b. Prices for U.S. No. 2 Long-Grain Milled Rice, Texas and White Milled Rice, 100 percent Second Grade, Bangkok, Thailand, 1960-1983.



Source: Appendix Table 7

provides financial assistance. This situation could cause sudden price changes. Also, because of the small number of exporting countries, when one exporting country has a sudden increase in its exportable surplus or another faces a shortage on its domestic market, the international price may be affected significantly.

In summary, the following factors characterize the rice market as thin, volatile, and risky: the large role played by the weather (the Asian monsoon in particular) in rice production, governmental involvement in rice trade, the effect of foreign exchange fluctuations on international trade, and the concentration of exports among a few key countries. The lack of widely quoted actual trading price data, further increases trading risk. Because of limited substitution in consumption among various types and qualities of rice, prices for each type and quality may move somewhat independently of one another. Yet, there is not a price quoted for each type or quality of rice in the international market; neither is there a commonly used grade or standard. While prices posted weekly by the Thai Board of Trade are referred to as the world price, the actual Thai trading price may vary as much as 10 percent from this quote. Also, there is no world-recognized central spot or futures market for rice.[7] Without the existence of an effective futures market, trading risk is increased, as traders are exposed to large profits or losses when there is no hedging (Stucker, 1984).

In addition, the rice market may be characterized as a market where transaction costs are frequently high because of the need to search for supply sources (Siamwalla and Haykin, 1983). This search may entail costs to private buyers, e.g., brokerage fees, or time-loss costs to governments. In spite of the significance of state trading (or perhaps because of it), the international rice market supports a number of brokerage houses in the United States, Singapore, Hong Kong, and Europe (Ibid.). Brokerage fees of 5 to 10 percent are not uncommon. Exact fee data are not available, but rates are significantly higher for rice than wheat, presumably because of the higher search costs associated with the rice market.

As long as participants float in or out of the market, trade channels cannot be established, so search costs are high (Siamwalla and Haykin, 1983). Wherever production and consumption patterns reduce trade, high search costs prevail. In traditional importing countries, the adoption of new high-yielding varieties of rice, government self-sufficiency policies, and the maintenance of large rice stocks have all discouraged international trade, reducing the quantity of trade relative to production.

Domestic Rice Support Programs and Their Effect on International Rice Trade

Domestic rice support programs in Thailand, the United States, and the EEC have significantly affected world rice trade. In Thailand, where the policy has been to keep domestic consumer prices low and stable; farm prices are at the subsistence level. Because the posted Bangkok f.o.b. export price has been higher than the Thai domestic wholesale price, an export tax has been used by the government to close the gap. But the export tax has made Thai rice less competitive in international markets (Ross, 1984). Recently the government cut export taxes in hopes of increasing domestic farm prices, but, because Thai exporters reduced prices in response, this goal was not accomplished. (It could also be that the Thai government varies its export tax in response to U.S. support prices.)

Although U.S. government programs have heavily influenced rice prices since 1950, there has not been direct control over foreign trade of commercial rice. (Recall that about 60 percent of the U.S. crop is exported.) Major policy instruments have been acreage and production controls and price-support programs. To be eligible for support prices, farmers had to restrict area planted. Between 1955 and 1972, U.S. support prices were set above the world price, isolating domestic prices from factors affecting the world rice price; an export subsidy was granted to close the gap between U.S. domestic and export prices. From 1973 until recently, the support price was below the world price, making the allotment and export subsidy systems inoperative. But once again U.S. support prices are above the world price, making U.S. rice less competitive in international markets and reducing exports.

In the EEC, the common agricultural policy for wheat and coarse grains also applies to rice. There is a system of target, intervention, and threshold prices to protect and stabilize domestic EEC markets: The target price is the desired wholesale price for round grain brown rice; the intervention price is the guaranteed minimum price for producers in the EEC, set annually for paddy rice; the threshold price for brown and milled rice is the minimum price at which rice imports enter EEC ports—it serves to insulate domestic EEC markets from world price fluctuations. Import levies are calculated as the difference between the threshold price and the lowest cost-insurance-freight offer price. To protect the EEC milling industry, import levies are

[7]The New Orleans commodity exchange closed in 1983. A rice futures contract has recently been offered on the Mid-American exchange, but has not been very active.

highest on fully milled rice, lower on brown rice, and lowest on rough rice (McNitt, 1983). This system of support prices has protected EEC domestic markets from low-priced foreign supplies and has led to an increase in domestic rice production.

Recent Developments in World Rice Markets

Partly because Thai exporters have been selling rice at $170 to $200 per metric ton below the U.S. price (about 30-40 percent of the U.S. price), U.S. world market share has dropped from about one-fourth of the total in 1980 to 16 percent in 1984 and 18 percent in 1985, while that of Thailand has risen from 21 percent in 1980 to 34 percent in 1985. (Recall Table 5 and Figure 1.) A strong dollar and high loan rate (which form a price floor for U.S. rice) have reduced the competitiveness of U.S. exports on international markets. Meanwhile, devaluation of Thai currency and a reduction of controls over exports (especially export taxes) have made Thai exports more attractive in foreign markets. Besides these reasons for the increase in Thailand's share of trade are its reputation as reliable source of both low and high quality rice and its flexible marketing arrangements. The Thai government has sponsored trade missions to promote its reliability as a supplier and has facilitated marketing arrangements including the extension of credit, the ability to market small shipments, and options for government-to-government sales (Ross, 1984). Thailand's exports have not only increased in Asia where they have a transportation advantage over U.S. rice, but they have also increased in other markets such as Africa, the Middle East, and the EEC.

In the United States, rice exports under government programs (P.L. 480) have played a significant role in promoting U.S. rice exports (Stucker, 1984). But P.L. 480 exports as a percentage of total U.S. exports declined between 1976 and 1982 from over 44 percent to less than 12 percent. Although the P.L. 480 share recovered to over 20 percent in 1983 and 23 percent in 1984, it is thought that the period of decline may have played an important role in the U.S. loss of export market share. The bulk of U.S. P.L. 480 exports is medium-grain rice of lower quality (Stucker, 1984). Very little long-grain and no short-grain rice are exported under Title I (sales programs) or Title III (mutual security aid) of P.L. 480 (Hesse, personal communication).

There have also been major shifts in importers' sources of supply, especially in developing countries which constitute about 70-75 percent of world rice imports. African and Middle Eastern countries have increased their import shares as a percentage of world trade, while Asian countries (South Korea and Indonesia, in particular) have decreased theirs since the 1970s. (Recall Figure 2.)

Nigeria, one of the world's major rice importers, although maintaining its share in world markets, has decreased its imports from United States as a percentage of its total imports. In 1981, U.S. imports accounted for 59 percent of Nigeria's total imports, but by 1983 they decreased to 17 percent, and the estimate for 1984 is that U.S. imports accounted for only 13 percent of Nigeria's total imports (Ross, 1984). Nigeria, a net exporter of oil, has faced foreign exchange shortages as oil prices have declined, making it more responsive to rice prices. A Nigerian governmental goal has been to keep rice prices low for consumers so lower-priced Thai rice has displaced U.S. rice and government-to-government sales arrangements provided improved marketing arrangements, further increasing imports from Thailand (Ross, 1984).

In the Middle East markets, U.S. exports to Iran and Syria have also decreased as Thai exports increased. In these markets, not only economic but also political forces played a role in the decline of U.S. market share. (The United States has maintained its market share in Iraq.)

Other Asian nations have reduced their import shares in world trade. Government policies in Asian countries (except for Thailand) have attempted to protect domestic rice producers. These policies, along with increased yields from high-yielding varieties, have expanded domestic production and therefore reduced their shares in world trade (Stucker, 1984)

In spite of the EEC's protective trade policy, the United States has maintained its role as the prime rice supplier. United States exports to the EEC grew from 189,000 tons in 1970 to 387,000 in 1983. Most of EEC's rough and semi-milled imports from the United States have been brown long-grain rice, but some long-grain rough, short-grain rough, and fully milled (regular or parboiled) rice is also imported from the United States. The success of U.S. rice in the EEC can be attributed to its reputation for high quality and EEC consumer preferences for long-grain varieties (McNitt, 1983).[8] Effective U.S. export promotion activities and the fact that many rice milling facilities in Europe are owned by U.S. rice companies have also contributed to an increase in U.S. exports to the EEC. But the EEC has also been a growing market for Thailand, increasing its imports from 16,300 tons in 1970 to 129,700 tons in 1983 (Ross, 1984).

[8]Italy is the EEC's most important rice producer; however, Italy does not grow the long-grain variety popular in northern Europe (McNitt, 1983).

CONCLUDING REMARKS

Thus, the world rice market is complex. It is fragmented by type of rice demanded and supplied. But international price data by rice type are not available, precluding study of these separate markets, their interrelationships, and substitutability. Tastes and preferences, politics, governmental intervention, and state trading all play crucial roles in the ever-changing patterns of trade. Because most rice trade is in long-grain Indica type, the use of aggregate data may explain a large part of this market without revealing anything about the many submarkets and their cross effects.

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Appendix Table 1. World Rice Production and Trade, 1960/61-1984/85

Year	Production	Exports[a]	Percentage of Production Exported
	million metric tons milled		percent
1960-61	160.0	6.5	4.1
1961-62	147.3	6.3	4.3
1962-63	155.2	7.3	4.7
1963-64	169.1	7.7	4.6
1964-65	180.8	8.2	4.5
1965-66	173.3	7.9	4.6
1966-67	179.3	7.8	4.4
1967-68	189.4	7.2	3.8
1968-69	195.6	7.5	3.8
1969-70	201.6	8.2	4.1
1970-71	213.6	8.6	4.0
1971-72	216.4	8.7	4.0
1972-73	209.6	8.4	4.0
1973-74	228.0	7.7	3.4
1974-75	226.3	7.3	3.2
1975-76	243.8	8.4	3.4
1976-77	236.8	10.6	4.5
1977-78	251.4	9.6	3.8
1978-79	263.7	12.0	4.6
1979-80	257.4	12.7	4.9
1980-81	271.6	13.1	4.8
1981-82	280.6	11.6	4.1
1982-83	285.3	11.8	4.1
1983-84[b]	305.4	12.1	4.0
1984-85[c]	307.5	11.7	3.8

[a]Exports are quoted on calendar year basis.
[b]Preliminary
[c]Projected

Source: U.S. Department of Agriculture, Economic Research Service, *Rice Outlook and Situation Report,* RS-43, October 1984.

Appendix Table 2. World Wheat Production and Trade, 1960/61-1984/85

Year (July-June)	Production	Exports[a]	Percentage of Production Exported
	------ million metric tons milled ------		------ percent ------
1960-61	238.4	41.9	17.6
1961-62	224.8	46.8	20.8
1962-63	251.8	44.3	17.6
1963-64	233.9	56.0	23.9
1964-65	270.4	52.0	19.2
1965-66	263.3	61.0	23.2
1966-67	306.8	56.0	18.3
1967-68	297.6	51.0	17.1
1968-69	330.9	45.0	13.6
1969-70	310.0	50.0	16.1
1970-71	313.8	55.0	17.5
1971-72	350.9	52.0	14.8
1972-73	343.5	67.0	19.5
1973-74	373.0	63.0	16.9
1974-75	360.2	64.3	17.9
1975-76	356.5	66.7	18.7
1976-77	421.3	63.3	15.0
1977-78	384.1	72.8	19.0
1978-79	446.8	72.0	16.1
1979-80	424.4	86.0	20.3
1980-81	442.7	94.1	21.3
1981-82	448.6	101.3	22.6
1982-83	478.6	98.6	20.6
1983-84[a]	489.5	103.2	21.2
1984-85[b]	513.5	107.0	20.8

[a]Preliminary
[b]Projected

Source: U.S. Department of Agriculture, Foreign Agricultural Service, *World Grain Situation and Outlook,* Foreign Agriculture Circular, Grains, February 12, 1985.

Appendix Table 3. World Rice Trade, Milled Basis, Selected Exporters, 1962-1985

Calendar Year	Argentina		Australia		Burma		People's Republic of China		Egypt	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
	1000 metric tons									
1962	37	–	38	1	1,744	–	578	–	144	–
1963	14	–	58	1	1,712	–	640	–	380	–
1964	7	–	57	1	1,413	–	784	–	527	–
1965	43	–	65	1	1,335	–	753	–	330	–
1966	47	–	64	2	1,128	–	1,264	–	347	–
1967	34	–	99	2	546	–	1,198	–	435	–
1968	41	–	97	2	331	–	967	–	570	–
1969	74	–	124	2	562	–	811	–	772	–
1970	96	–	111	1	677	–	981	5	654	–
1971	87	–	165	–	844	–	1,473	8	515	–
1972	23	–	143	–	570	–	1,556	19	456	–
1973	38	–	158	–	157	–	2,581	–	298	–
1974	35	–	145	1	214	–	2,548	102	136	–
1975	70	–	185	–	307	–	1,935	30	104	1
1976	91	–	218	1	657	–	1,427	114	211	–
1977	185	–	260	1	690	–	1,033	–	223	7
1978	118	–	337	1	375	–	1,435	–	150	7
1979	95	–	400	1	590	–	1,053	71	95	–
1980	107	–	321	1	675	–	1,116	18	178	–
1981	110	9	335	1	674	–	583	110	134	–
1982	92	–	530	1	701	–	460	250	22	5
1983	70	–	251	–	750	–	550	75	21	–
1984	185	–	400	–	850	–	600	100	50	–
1985[a]	140	–	500	–	900	–	600	100	70	–

Appendix Table 3. Continued

Calendar Year	Guyana		Italy		North Korea People's Republic		Nepal		Pakistan	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
	1000 metric tons									
1962	80	–	209	–	–	–	179	–	128	–
1963	85	–	176	4	–	–	182	–	102	–
1964	82	–	80	4	–	–	273	–	164	–
1965	101	–	119	1	44	–	234	–	135	–
1966	102	–	108	13	72	–	266	–	213	–
1967	96	–	222	7	125	–	247	–	140	–
1968	95	–	279	14	60	–	292	–	81	–
1969	63	–	280	2	96	–	260	–	135	–
1970	60	–	594	6	89	–	247	–	130	–
1971	69	–	473	8	103	–	228	–	196	–
1972	71	–	372	17	88	–	325	–	300	109
1973	49	–	247	18	96	–	300	–	771	–
1974	52	–	461	5	286	–	21	–	478	–
1975	83	–	451	7	328	–	115	–	498	–
1976	72	–	396	49	89	–	181	–	861	–
1977	67	–	275	15	269	–	105	–	860	–
1978	106	–	409	263	412	–	85	–	703	–
1979	86	–	475	175	234	–	100	–	1,366	–
1980	81	–	553	96	284	–	10	–	971	–
1981	78	–	551	179	200	–	43	9	1,127	–
1982	35	–	550	275	250	–	50	–	794	–
1983	45	–	N/A	N/A	250	–	0	–	1,299	–
1984	40	–	N/A	N/A	250	–	0	–	1,300	–
1985[a]	35	–	N/A	N/A	250	–	50	–	1,150	–

Appendix Table 3. Continued

Calendar Year	Taiwan		Thailand		Uruguay		United States		World Exports
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	
	1000 metric tons								
1962	42	13	1,271	–	25	–	1,050	10	6,467
1963	119	2	1,418	–	17	–	1,197	–	7,296
1964	128	28	1,896	–	22	–	1,317	1	7,751
1965	257	10	1,895	–	19	–	1,549	30	8,011
1966	178	2	1,508	–	45	–	1,347	6	7,642
1967	116	6	1,483	–	38	–	1,795	–	7,394
1968	68	–	1,068	–	21	–	1,834	–	6,832
1969	34	2	1,023	–	73	–	1,834	1	7,122
1970	5	–	1,064	–	45	–	1,738	20	7,851
1971	34	–	1,576	–	74	–	1,409	62	8,663
1972	16	3	2,112	–	45	–	1,949	15	8,767
1973	49	–	849	–	65	–	1,581	15	8,298
1974	5	127	1,046	–	73	–	1,697	3	8,063
1975	–	4	933	–	91	–	2,057	1	7,573
1976	–	8	1,870	–	115	–	2,032	–	8,819
1977	150	9	2,915	–	120	–	2,264	3	10,501
1978	238	–	1,573	–	100	–	2,264	3	9,465
1979	409	–	2,696	–	115	–	2,267	3	11,565
1980	261	1	2,700	–	165	–	2,977	3	12,679
1981	92	13	3,049	–	215	–	3,008	8	13,128
1982	307	5	3,620	–	227	–	2,487	13	11,611
1983	531	–	3,700	–	189	–	2,330	–	11,830
1984	275	–	4,250	–	225	–	2,000	–	11,359
1985[a]	300	–	4,000	–	180	–	2,200	–	11,894

[a]As of September 14, 1984.
N/A = not available

Source: U.S. Department of Agriculture, Foreign Agricultural Service, Foreign Agriculture Circular, FG-22-82, September 30, 1982; and Economic Research Service, *Rice Outlook and Situation Report,* various issues.

Appendix Table 4. World Rice Trade, Milled Basis, Selected Importers, 1962-1985

Calendar Year	Bangladesh		Canada		Cuba		France		West Germany	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
	1000 metric tons									
1962	–	229	–	39	–	195	24	70	8	158
1963	–	419	–	47	–	190	6	54	11	144
1964	–	283	–	46	–	286	4	58	15	159
1965	–	82	–	54	–	282	10	87	22	168
1966	–	330	–	39	–	146	7	117	16	188
1967	–	372	–	41	–	157	39	105	21	125
1968	–	283	–	42	–	177	68	136	23	146
1969	–	240	–	42	–	186	17	115	18	139
1970	–	510	–	48	–	199	19	92	25	170
1971	–	348	–	71	–	280	10	103	18	181
1972	–	658	–	66	–	256	5	132	34	157
1973	–	171	–	66	–	201	3	160	35	144
1974	–	58	–	56	–	276	3	150	29	139
1975	–	440	–	60	–	200	3	147	28	130
1976	–	280	–	66	–	179	4	187	44	158
1977	–	404	–	89	10	144	52	244	52	144
1978	–	18	–	89	–	171	30	182	69	169
1979	–	652	–	90	–	161	9	167	39	143
1980	–	168	–	95	–	224	7	183	29	146
1981	–	34	–	99	–	199	7	190	30	160
1982	–	296	–	108	–	200	7	191	30	165
1983	–	82	–	115	–	200	–	N/A	–	N/A
1984	–	650	–	120	–	150	–	N/A	–	N/A
1985[a]	–	400	–	125	–	200	–	N/A	–	N/A

Appendix Table 4. Continued

Calendar Year	Hong Kong		Indonesia		Iran		Iraq		Ivory Coast	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
	1000 metric tons									
1962	67	427	–	1,025	–	7	–	69	–	43
1963	23	412	–	1,043	–	3	–	14	–	26
1964	54	410	–	1,010	–	41	–	95	–	51
1965	29	370	–	203	–	29	–	1	–	78
1966	29	367	–	308	–	10	–	–	–	83
1967	7	421	–	354	–	24	–	11	–	24
1968	11	314	–	628	–	2	1	–	–	47
1969	17	347	–	604	–	1	2	–	–	56
1970	12	307	–	956	–	1	–	2	–	79
1971	14	330	–	516	–	60	–	97	–	97
1972	87	409	–	762	–	92	–	33	–	88
1973	50	380	–	1,638	–	145	–	16	–	148
1974	18	281	–	1,056	–	268	–	210	5	73
1975	4	307	–	671	–	367	–	218	5	2
1976	2	323	–	1,309	–	276	–	198	30	5
1977	3	304	–	1,989	–	578	–	237	–	148
1978	3	343	–	1,824	–	320	–	290	–	142
1979	3	361	–	1,934	–	371	–	300	–	218
1980	46	359	14	2,040	–	507	–	379	–	257
1981	–	362	64	543	–	583	–	350	–	335
1982	–	365	–	332	–	475	–	369	–	363
1983	–	365	–	1,175	–	680	–	474	–	434
1984	–	365	–	500	–	680	–	500	–	350
1985[a]	–	N/A	–	800	–	700	–	500	–	350

Appendix Table 4. Continued

Calendar Year	South Korea		Kuwait		Laos		Malaysia		Malagasy	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
	1000 metric tons									
1962	62	–	–	18	–	112	22	374	–	N/A
1963	5	117	–	20	–	126	10	493	–	N/A
1964	13	–	–	25	–	83	–	499	–	N/A
1965	16	–	–	50	–	39	25	387	–	N/A
1966	33	18	–	47	–	31	15	329	–	N/A
1967	–	139	–	19	–	38	3	321	–	N/A
1968	–	247	–	42	–	33	2	311	–	N/A
1969	–	631	–	27	–	47	1	289	–	N/A
1970	–	254	–	38	–	42	–	356	–	N/A
1971	–	890	–	55	–	62	–	235	–	N/A
1972	–	607	–	54	–	80	14	213	–	N/A
1973	–	300	–	16	–	64	10	298	–	N/A
1974	–	334	–	75	–	51	–	334	–	N/A
1975	–	426	–	41	–	21	–	145	–	N/A
1976	–	158	–	64	–	120	–	210	–	N/A
1977	–	58	–	84	–	100	–	283	–	100
1978	80	2	–	85	–	94	–	405	–	136
1979	–	355	–	90	–	70	–	239	–	175
1980	–	822	–	85	–	53	–	167	–	177
1981	–	2,292	–	95	–	50	–	267	–	191
1982	–	228	–	100	–	50	–	403	–	357
1983	–	216	–	110	–	N/A	–	352	–	250
1984	–	50	–	110	–	N/A	–	450	–	200
1985[a]	–	150	–	110	–	N/A	–	400	–	250

Appendix Table 4. Continued

Calendar Year	Mauritius		Mexico		Nigeria		Peru		Portugal	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
	1000 metric tons									
1962	–	68	63	–	–	1	–	1	–	2
1963	–	70	–	2	–	2	–	1	–	24
1964	–	68	–	–	–	1	–	48	–	5
1965	–	61	–	17	–	1	–	92	–	26
1966	–	67	–	12	–	1	–	79	–	35
1967	–	67	–	–	–	1	–	59	–	19
1968	–	62	46	–	–	1	–	48	–	35
1969	–	64	–	5	–	1	–	37	–	32
1970	–	59	–	16	–	2	–	–	–	12
1971	–	54	–	1	–	5	–	–	–	6
1972	–	72	–	1	–	6	–	–	–	26
1973	–	58	–	38	–	6	55	–	–	7
1974	–	88	–	71	–	8	–	–	–	32
1975	–	66	–	1	–	42	–	78	–	71
1976	–	79	–	1	–	103	–	71	–	120
1977	–	75	3	1	–	413	–	–	–	85
1978	–	86	60	1	–	564	–	–	–	45
1979	–	75	–	34	–	241	–	150	–	75
1980	–	68	–	128	–	394	–	250	–	20
1981	–	72	–	66	–	686	–	103	–	128
1982	–	72	–	16	–	666	–	58	–	110
1983	–	N/A	–	0	–	711	–	101	–	110
1984	–	N/A	–	155	–	775	–	35	–	70
1985[a]	–	N/A	–	70	–	750	–	0	–	70

Appendix Table 4. Continued

Calendar Year	Saudi Arabia		Singapore		South Africa		Sri Lanka		United Arab Emirates	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
	1000 metric tons									
1962	–	142	188	350	7	44	–	411	–	N/A
1963	–	120	223	440	9	60	–	403	–	N/A
1964	–	99	109	270	9	59	–	658	–	N/A
1965	–	141	99	291	10	67	–	642	–	N/A
1966	–	142	107	262	12	74	–	693	–	N/A
1967	–	125	79	256	13	78	–	355	–	N/A
1968	–	124	125	288	16	79	–	370	–	N/A
1969	–	151	80	237	15	81	–	309	–	N/A
1970	–	151	45	275	14	68	–	534	–	N/A
1971	–	203	46	272	16	82	–	339	–	N/A
1972	–	125	71	358	2	75	–	266	–	N/A
1973	–	131	44	234	–	92	–	343	–	N/A
1974	–	137	15	163	–	65	–	302	–	96
1975	–	220	19	147	–	79	–	434	–	102
1976	–	257	6	226	–	81	–	425	–	115
1977	–	255	14	225	–	99	–	542	–	126
1978	–	404	22	194	–	92	9	161	–	145
1979	–	496	16	214	–	121	–	211	–	175
1980	–	356	27	187	–	126	–	189	150	441
1981	–	427	20	178	–	134	–	168	–	285
1982	–	471	N/A	192	–	146	–	217	20	170
1983	–	500	N/A	180	–	158	–	157	–	175
1984	–	525	N/A	175	–	165	–	75	–	175
1985[a]	–	550	N/A	N/A	–	170	–	130	–	175

Appendix Table 4. Continued

Calendar Year	United Kingdom		The Soviet Union		Vietman Socialist Republic		World Imports
	Exports	Imports	Exports	Imports	Exports	Imports	
	1000 metric tons						
1962	1	114	12	338	90	52	5,961
1963	1	107	12	194	330	10	6,686
1964	1	105	4	363	60	20	7,361
1965	1	111	3	238	6	170	7,277
1966	1	107	4	275	13	449	7,321
1967	1	102	4	397	3	775	6,863
1968	1	116	4	260	2	703	6,475
1969	1	109	5	327	20	900	6,836
1970	–	126	8	323	18	1,075	7,404
1971	–	147	14	332	3	600	7,677
1972	2	128	87	280	3	910	8,157
1973	1	141	83	154	–	760	7,943
1974	1	126	147	194	–	865	8,043
1975	1	116	15	279	1	640	7,819
1976	4	145	11	324	2	805	8,791
1977	61	211	9	460	6	265	9,848
1978	52	203	13	414	5	150	9,166
1979	45	175	20	631	–	250	11,687
1980	2	141	16	694	80	135	12,731
1981	2	145	50	1,283	40	30	13,128
1982	2	145	50	859	–	150	11,611
1983	–	N/A	–	400	–	30	11,830
N/A	–	450	–	150	12,359		
1985[a]	–	N/A	–	400	–	100	11,894

[a]As of September 14, 1984.
N/A = Not available

Source: U.S. Department of Agriculture, Foreign Agricultural Service, Foreign Agriculture Circular, FG-22-82, September 30, 1982; and Economic Research Service, *Rice Outlook and Situation Report,* various issues.

Appendix Table 5. Major Traders by Type of Rice

	BROWN RICE	
	Regular	**Parboiled**
Major Importers:	South Korea, Portugal	the European Economic Community, Canada, South Africa

	JAPONICA RICE
Major Growers:	Japan, the Koreas, Taiwan, parts of China, Australia, the Mediterranean region, Brazil, and California
Major Importers:	Indonesia and South Korea

	INDICA RICE					
		Well Milled			Parboiled Milled	
	Brokens	Low Quality	Medium Quality	High Quality	Low Quality	High Quality
Major Exporters:	Thailand and Burma	Thailand, Pakistan, China, and Burma	the United States, Thailand and Pakistan	the United States and Thailand	Burma and Thailand	the United States and Thailand
Major Importers:	Senegal, Madagascar, Mauritania, Gambia, and South Vietnam	Indonesia and most of Western Africa	Brazil, Hong Kong, Malaysia, Indonesia, and the Soviet Union	the United States, Western Europe, Uruguay, Argentina, Iran, Iraq, Malaysia, Singapore, and Hong Kong[a]	Sri Lanka, Bangladesh, and Liberia	Saudi Arabia, Nigeria, the European Community, Canada, and South Africa[b]

[a]While most consumers in southern and southeastern Asia prefer high-quality long-grain rice, the only significant buyers there are Malaysia, Singapore, and Hong Kong.
[b]The European Community, Canada, and South Africa import significant quantities of parboiled rice, but it is usually brown parboiled rather than milled.

Source: Derived by author from Slayton, 1984.

Appendix Table 6. Average f.o.b. Prices for U.S. No. 2 Milled Rice, at Selected Milling Centers, 1960/61-1983/84

Year	Long[a]			Medium[a]			Medium[b]	Short[b]
Aug/July	Texas	Arkansas	Louisiana	Texas	Arkansas	Louisiana	California	California
	dollars per hundredweight, bagged							
1960-61	9.55	9.30	9.50	8.20	8.05	8.10	9.15	8.95
1961-62	10.25	9.90	10.15	9.40	9.20	9.30	9.70	9.60
1962-63	10.00	9.95	10.05	9.30	9.15	9.25	10.15	9.95
1963-64	10.30	10.05	10.25	8.80	8.55	8.75	10.25	10.00
1964-65	10.15	10.00	10.15	8.35	8.20	8.30	10.10	9.90
1965-66	10.05	9.90	10.15	8.15	8.10	8.10	10.30	10.10
1966-67	10.00	9.90	9.95	8.35	8.20	8.15	10.40	10.15
1967-68	10.05	10.05	9.90	8.65	8.65	8.35	10.50	10.40
1968-69	9.80	9.90	9.55	8.50	8.55	8.45	10.90	10.60
1969-70	9.90	10.00	9.60	8.65	8.55	8.55	10.90	10.60
1970-71	10.05	10.10	9.85	8.90	8.95	8.70	10.95	10.75
1971-72	10.20	10.25	9.95	9.15	9.25	8.90	10.80	11.05
1972-73	14.45	14.35	14.35	13.55	13.45	12.70	11.50	11.80
1973-74	31.75	30.80	30.40	27.40	26.70	26.40	25.15	24.20
1974-75	22.05	22.40	21.50	19.90	21.15	20.05	26.70	25.40
1975-76	18.35	18.10	17.20	17.35	17.10	15.85	22.05	20.65
1976-77	14.95	15.30	14.60	14.10	14.40	13.30	16.80	15.15
1977-78	21.70	21.80	21.30	20.75	20.55	19.10	21.80	20.35
1978-79	18.30	18.85	18.40	16.20	16.65	15.40	20.00	18.20
1979-80	22.05	22.30	22.15	21.35	22.05	21.40	23.30	21.95
1980-81	25.55	25.55	25.95	N/A	25.30	25.55	27.70	27.70
1981-82	21.15	20.20	20.20	N/A	19.40	20.95	20.95	22.05
1982-83	18.70	17.80	18.00	N/A	16.80	16.90	15.90	16.10
1983-84[c]	19.88	18.65	19.38	N/A	17.35	17.50	15.44	15.45

[a]U.S. No. 2, brokens not to exceed 4 percent.
[b]U.S. No. 1.
[c]Preliminary.
N/A = not available, i.e., no price quoted.

Source: Holder and Grant, *U.S. Rice Industry,* U.S. Economics, Statistics, and Cooperatives Service, Agricultural Economic Report No. 433; and U.S. Economic Research Service, *Rice Outlook and Situation Report,* various issues.

Appendix Table 7. Average f.o.b. Mill Prices for U.S. No. 2, Long Grain Milled Rice, Texas, and for Milled White Rice, Thailand, 100 percent Second Grade, Bangkok, 1960/61-1983/84.

	Texas	Bangkok
	dollars per hundredweight	
1960-61	9.55	6.43
1961-62	10.25	7.04
1962-63	10.00	6.93
1963-64	10.30	6.91
1964-65	10.15	6.23
1965-66	10.05	7.09
1966-67	10.00	8.61
1967-68	10.05	10.48
1968-69	9.80	8.81
1969-70	9.90	7.67
1970-71	10.05	6.33
1971-72	10.20	6.39
1972-73	14.45	8.49[a]
1973-74	31.75	26.92[b]
1974-75	22.05	19.92
1975-76	18.35	13.74
1976-77	14.95	12.46
1977-78	21.70	16.57
1978-79	18.30	15.40
1979-80	22.05	18.57
1980-81	25.55	22.33
1981-82	21.15	17.21
1982-83	18.70	12.68
1983-84	19.88	12.59

[a]August 1972-March 1973 average.
[b]January-July 1974 average.

Source: Holder and Grant, *U.S. Rice Industry,* U.S. Economics, Statistics, and Cooperatives Service, Agricultural Economic Report, No. 433, 1979; and U.S. Economic Research Service, *Rice Outlook and Situation Report,* various issues.