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United States
Department of
Agriculture

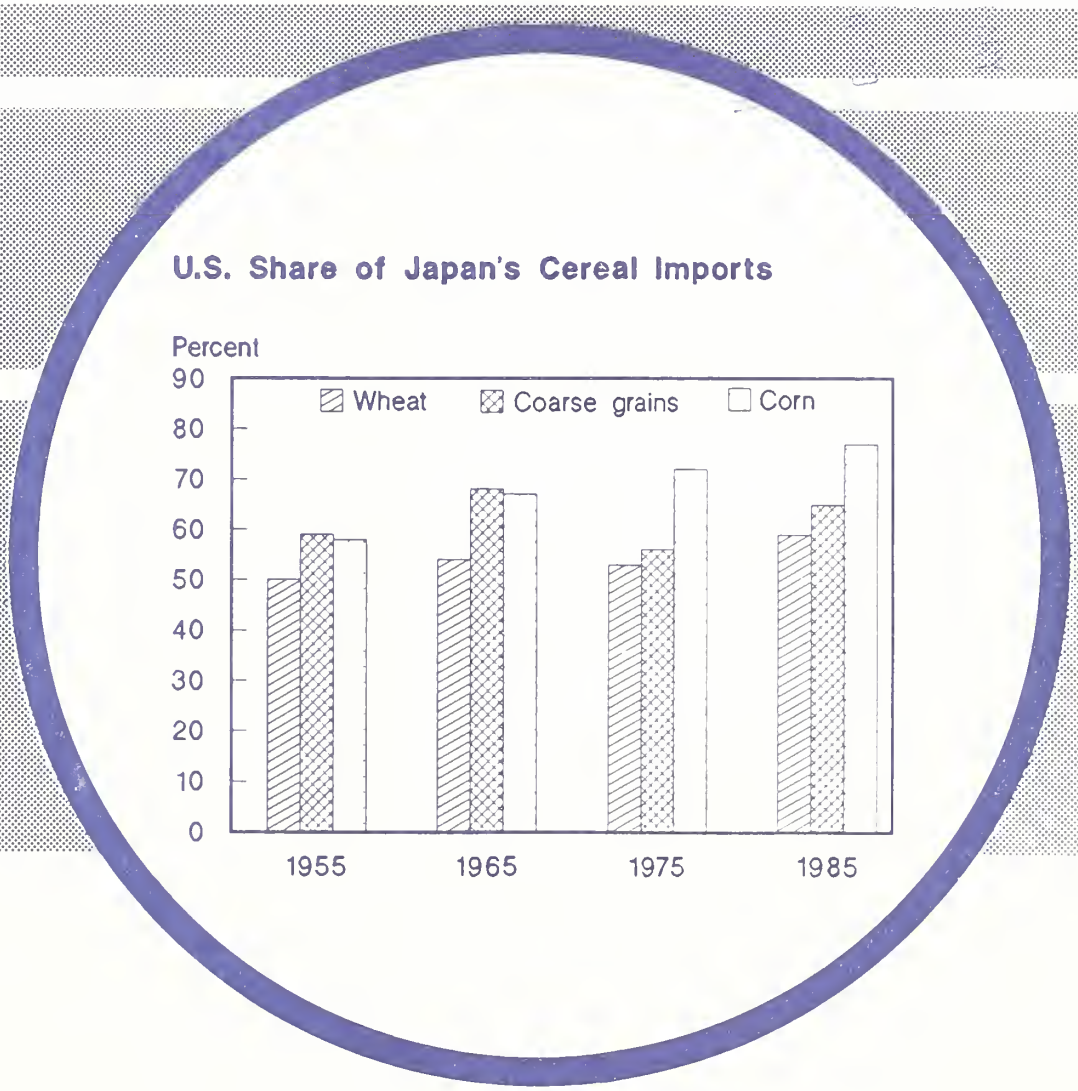
Economic
Research
Service

WAS-56
September 1989

World Agriculture

Situation and Outlook Report

World Grain Markets



World Agriculture Situation and Outlook Report. Agriculture and Trade Analysis Division, Economic Research Service, U.S. Department of Agriculture, September 1989. WAS-56.

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Approved by the World Agricultural Outlook Board. Summary released Sept. 25, 1989. The next summary of the *World Agriculture Situation and Outlook* Report is scheduled for release on Dec. 4, 1989. Summaries of situation and outlook reports, including tables, may be accessed electronically through the USDA EDI system. For details, call (202) 447-5505.

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Note: Tons are metric, dollars are U.S., and rice is on a milled basis unless otherwise specified.

Summary

In-depth discussions and negotiations have followed the Mid-Term Review of progress in the Uruguay Round of GATT trade negotiations that concluded in April 1989. The agreement on a common framework for further negotiations covered the four remaining areas of agriculture, safeguards, textiles and clothing, and intellectual property rights.

For agriculture, ministers agreed to long-term measures with "substantial progressive reductions" in agricultural support and protection, as well as several short-term measures aimed at freezing or reducing this support in the interim before the Uruguay Round concludes in December 1990.

The discussions have focused on country plans and various policy packages that will contain elements designed to progressively reduce agricultural support. These packages will focus on liberalizing both trade measures—such as import access and export subsidies—and on internal support measures—such as production subsidies and programs.

Three of the main elements under discussion include:

- "Tariffication," the conversion of nontariff to tariff barriers;
- "Aggregate measures," the measurement of the overall effect of domestic and trade policies that support producers; and
- "Decoupling" or "decoupled payments," income support payments to producers that end the distortional effect of government support policies on farmers' decisions about how much to produce.

In a report published on Sept. 7, the National Research Council examined the scientific and economic viability of alternative agriculture in the United States for helping producers and policymakers achieve three goals. The goals are (1) keeping U.S. farm exports competitive; (2) cutting production costs; and (3) reducing the environmental consequences of farming.

The report concludes that many Federal policies in agriculture have operated to encourage inefficient and unsustainable farming practices, while at the same time discouraging adoption of alternative agriculture methods such as crop rotations, soil conservation measures, and reduced use of off-farm inputs like fertilizer, herbicides, and pesticides.

In this issue of World Agriculture, the first of several articles focusing on world grain markets examines patterns in Japan's cereal production and trade. Over the past three decades, Japan became, with large government subsidies, self-sufficient in rice production. Production of wheat and coarse grains fell until 1977-78, when wheat and barley production began to rebound. Per capita consumption of rice has been decreasing, wheat consumption has been stable since the early 1970's, and per capita consumption of coarse grains has been increasing, but at a decreasing rate.

Faced with inflation, recent political turmoil, and a leveling off of grain production, China's agricultural policymakers have reinstituted certain centralized policies discarded since the reforms of 1979. These may reverse a 10-year trend of rising grain imports. On the other hand, if the reforms continue on track, or if pressures to provide cheap grain to urban areas is great enough, grain imports may rise.

The net effect of government intervention in Thai rice markets during 1982-87 has gradually shifted. Export taxes have been phased out, and input subsidies have dominated. Rising per capita income made the implicit subsidy to consumers less important, while the demands for foreign exchange for industrialization increased Thailand's need for export earnings from rice.

Unwillingness of importing countries to substitute one kind of wheat for another constitutes a serious nonprice constraint on wheat-exporting countries like the United States. Findings of a study of four classes of wheat exported to developing countries are reported.

U.S. exports may not always increase when the dollar falls on world currency markets. While a falling dollar makes U.S. products less expensive in relation to those of other countries, thereby stimulating U.S. exports, much also depends on what happens to the importing countries' purchasing power.

World Trade and Agricultural Policy

U.S. Agricultural Trade

U.S. agricultural exports are estimated to have reached $40 billion in fiscal 1989, up $4.7 billion from fiscal 1988 and the largest since 1981's record $44 billion, as higher prices offset a slight decline in volume. As prices retreat from drought-induced highs, exports are expected to slip in fiscal 1990. Lower prices and reduced grain exports are expected to result in lower export value and volume.

Grain Exports Lead 1989's Growth

Led by higher grain exports, U.S. bulk agricultural exports increased an estimated $2.8 billion in fiscal 1989, almost $1 billion more than the increase in high-value exports. Higher prices were recorded for grains and oilseeds in fiscal 1989. An estimated 9-million-ton increase in coarse grain exports virtually offset reduced wheat, soybean, and soybean meal shipments.

Coarse grain sales rose because of record sales to the Soviet Union which more than offset lower exports to Japan, North Africa, the Middle East, and Latin America. With coarse grain volume up, and prices averaging more than 20 percent higher, it is estimated that fiscal 1989 U.S. coarse grain exports increased in value by $1.3 billion. In fiscal 1990, Soviet imports could drop because of larger domestic feed grain supplies and better pasture conditions. Also, foreign competitors are expected to harvest larger crops.

U.S. wheat exports declined in fiscal 1989. As with coarse grains, the Soviet Union was the largest source of change. Fiscal 1988 wheat exports to the USSR were a record 9 million tons, but following a better Soviet crop, 1989 exports declined about 50 percent. Lower exports were recorded to Eastern Europe and Latin America, but larger shipments to Pakistan and China helped offset these losses. U.S. wheat exports finished fiscal 1989 about 3 million tons below fiscal 1988's 40 million tons, but prices drove export value $1.5 billion higher.

In fiscal 1990, world wheat prices are likely to remain much closer to 1989 levels than corn or soybean prices. However, likely changes in U.S. export volume are less clear since Northern Hemisphere crops will first be harvested mid-way through the fiscal year. Declining U.S. wheat exports and continued record European Community exports are forecast on a crop year basis, but the fiscal year total could vary from this.

Table 1--U.S. agricultural exports

Item	1986	1987	1988	1989 1/
		Billion dollars		
Grains and feeds	9.7	9.3	12.7	17.0
Oilseeds and products	6.5	6.5	7.8	6.7
Animal products	4.4	5.0	6.1	6.6
Horticultural products	2.7	3.2	3.8	4.3
Other	3.1	3.9	4.8	5.4
Total	26.3	27.9	35.3	40.0

Note: Years are fiscal years. 1/ Forecast.

Table 2--International commodity prices

	Wheat				Corn		Soybeans	Soyoil	Soymeal 44%	
Year	U.S. 1/	Arg. 2/	Can. 3/	Aust. 4/	U.S. 5/	Arg. 2/	U.S. 5/	U.S. 6/	U.S. 6/	Ham.7/
					$/metric ton					
1980	176	203	192	175	129	159	272	522	217	271
1981	176	190	194	175	135	139	272	464	223	269
1982	161	166	165	160	110	109	233	404	197	233
1983	158	138	167	161	137	133	269	518	222	255
1984	153	135	166	153	138	132	271	678	184	210
1985	137	106	173	141	114	103	214	596	140	171
1986	117	88	161	120	89	83	200	361	174	197
1987	114	89	134	115	77	80	204	349	194	215
1988	146	125	178	150	107	105	287	519	259	285
1989										
Jan.	175	NQ	213	179	119	119	297	463	274	301
Feb.	173	NQ	212	178	118	118	290	463	258	287
Mar.	179	NQ	210	183	119	122	296	485	260	291
Apr.	176	NQ	207	179	116	118	280	482	244	285
May	177	NQ	209	182	119	115	280	490	237	256
June	170	156	204	178	114	114	275	458	251	254
July	168	155	204	175	108	108	267	438	254	255

NQ = No quote.
1/ No. 2 hard winter, ordinary protein, f.o.b. Gulf ports. 2/ F.o.b. Buenos Aires. 3/ No. 1 western red spring, 13.5% protein, in store Thunder Bay. 4/ July-June crop year, standard white, f.o.b. selling price. 5/ U.S. No. 3 yellow, f.o.b. Gulf ports. 6/ Decatur. 7/ Hamburg, f.o.b. ex-mill.

Fiscal 1989 soybean exports fell with reduced world trade and record competitor exports. Although U.S. exports are expected to rise in 1990, competitors are expected to capture most of the anticipated gain in world trade, and U.S. export volume is not expected to increase as much as prices fall. *[Stephen A. MacDonald (202) 786-1822]*

GATT Agricultural Issues Under Discussion

In-depth discussions and negotiations have followed the Mid-Term Review of progress in the Uruguay Round of GATT trade negotiations that concluded in April 1989. The agreement on a common framework for further negotiations covered the four remaining areas of agriculture, safeguards, textiles and clothing, and intellectual property rights.

For agriculture, ministers agreed to long-term measures with "substantial progressive reductions" in agricultural support and protection, as well as several short-term measures aimed at freezing or reducing this support in the interim before the Uruguay Round concludes in December 1990.

The discussions have focused on country plans and various policy packages that will contain elements designed to progressively reduce agricultural support. These packages and their elements will focus on liberalizing both trade measures—such as import access and export subsidies—and on internal support measures—such as production subsidies and programs.

Three of the main elements under discussion include:

- "Tariffication," the conversion of nontariff to tariff barriers;
- "Aggregate measures," the measurement of the overall effect of domestic and trade policies that support producers; and
- "Decoupling" or "decoupled payments," income support payments to producers that end the distortional effect of government support policies on farmers' decisions about how much to produce.

Tariffication

To liberalize world trade in agriculture through improved market access, the United States proposed in fall 1988 that all nontariff measures be converted to fixed tariff rates. Concerns that resulting tariff increases might prove prohibitive are answered by the U.S. "tariffication" proposition to first convert to tariffs and then to reduce them.

The tariffication proposal calls for an end to import barriers such as quotas, variable levies, and import restrictions or prohibitions administered in connection with marketing boards and state trading operations. It also calls for an end to voluntary restraint agreements, restrictive licensing practices, and other trade-distorting import restrictions and measures.

Conversion of all nontariff import barriers to fixed tariffs would have a number of advantages. First, tariffs distort trade less than other types of import barriers because they establish a direct link between domestic and world market prices, thus allowing the transmission of world market signals. Second, tariffs are "transparent" so that exporters can more easily gauge how to compete on the basis of quality, cost, and price. This is likely to make world market prices more predictable and hence more stable.

Third, tariffs are more easily administered than other import barriers. An added advantage is that tariffs produce government revenue. Fourth, tariffs are more easily negotiated than nontariff measures. The U.S. tariffication proposal is not intended as a mere conversion from nontariff barriers to tariff equivalents, but rather as a first step in liberalizing market access that will later include the reduction of these tariffs.

Aggregate Measures

From the outset, discussions aimed at reducing government intervention in agriculture have needed some means for comparing and measuring the domestic and trade policies that comprise support programs in different countries. As a consequence, economists—most notably at the Organization for Economic Cooperation and Development (OECD)—have applied methodologies to quantify the overall impact of agricultural support programs. These measures are designed as an aid in negotiations to reduce government support intervention.

Broadly, these aggregate measures of support (AMS) are expressed as a percent of the value [price x quantity] that would result in the absence of government programs, e.g. a representative world market price multiplied by corresponding quantity produced. Other formulations may express only a "price gap" in percentage terms between domestic and world market prices, but all attempt to measure the degree of support afforded by domestic and border policies that result in differences between domestic prices and a more open market represented by traded world prices.

While the producer and consumer subsidy equivalent (PSE/CSE) used by the OECD is perhaps the most widely known in the context of the Uruguay Round, it is by no means the only one. Others also discussed include nominal

or effective rates of protection, Canada's trade distortion equivalent (TDE), and the European Community's (EC) support measurement unit (SMU). Whereas the PSE adds up the estimated proportion of producer gross revenues that can be attributed to the "price gap" effects of government programs, which is then expressed as a percent of total producer revenues, the proposed SMU is more narrowly defined.

The SMU would:

- exclude from any policy coverage the direct producer payments for production controls;

- include the effects of supply control—such as the 1984 EC dairy quotas—as a "benefit" for "credit" of any reforms enacted since the Punta del Este declaration; and

- use a fixed external reference price to exclude the effects of exchange rate changes. The EC proposes to base support reductions on 3 years—1984 to 1986—so as to avoid the effects of price fluctuations. The EC suggested that support based on 1984-86 be measured over a 5-year period starting in 1986. The original EC proposal to use 1984 as the base year would be highly favorable to the EC because it would freeze EC support at high levels, thus making it easier to comply with negotiated reductions in support.

The EC considers it imperative to develop an AMS method—preferably along the lines of its SMU—and to use it for negotiations concerning major agricultural products. While the EC preference may allow it to reduce internal support prices, with little or no substantial change in its border policies of variable levies and export subsidies, the United States is hoping to address both internal and external aspects of agricultural trade policies by focusing on negotiated reductions in specific policy instruments (rather than an aggregate measure of support). An aggregate measure of support—preferably along the lines of the PSE—could then be used to evaluate compliance with policy-specific commitments to reduce support.

Decoupled Payments

Negotiations to liberalize trade in agriculture will consider measures that affect trade both directly and indirectly, according to the 1986 Punta del Este declaration that inaugurated the Uruguay Round. To achieve this aim, the United States proposed the elimination of all trade-distorting policies and subsidies. The U.S. proposal enumerates multiple domestic price, income, and other support policies to be included in an aggregate measure of support that helps negotiators gauge the extent of the trade-distorting policies in question and then reduce this support.

The domestic support policies often have important social goals, and consequently are difficult to reduce or eliminate. This can be partly due to general public support for such policies and the social groups they target, and partly because the support policies give certain interest groups the right to receive income support or subsidy which leads them to lobby governments to maintain their vested interest.

However, not all support policies distort trade. Trade distortion can occur either directly from trade measures, or indirectly from government support policies that alter the determination of prices through supply and demand factors. This government intervention in the marketplace leads to price distortion, typically providing farmers with incentives to produce above market demand. How much these programs distort depends a lot on program design, that is, how directly the support or subsidy payments affect production, as well as on how large the actual subsidy is. Nonetheless, if this link between production and income formed by support policies can be broken, government support programs can cease to be trade-distorting.

The U.S. proposal noted one such policy that would be permissible because of its neutral or inconsequential effect on production and trade:

> "*direct income or other payments decoupled from production and marketing*, including those that provide a safety net against natural disaster or other extraordinary circumstances."

Thus, "decoupled payments" are a solution to the problem of government programs distorting production, and thereby trade, by breaking the link between production and income. "Decoupling" farm programs indicates removing the policy impact on farmers' short and long run production, investment, and resource development decisions concerning their marginal revenue. Decoupling thus lessens or eliminates government policy influences on domestic commodity markets and, in turn, allows trade to be determined more or completely by market factors.

While decoupling in its narrow sense applies simply to breaking the link between government support policy and its influence of farmers' production decisions, individual countries may implement decoupled measures in a number of different ways. In one sense, decoupling can mean a reform of agricultural programs that cost billions of dollars both in direct government and consumer costs but also in indirect economic costs through inefficient resource use. These costs are a primary force motivating their discussion and negotiation in the GATT Uruguay Round.

In another sense, decoupled payments can mean the phase-out payments needed to help producers adjust in an orderly fashion to a more market-oriented agriculture. They repre-

sent in effect a type of declining payment in compensation for the loss of subsidies as farmers adjust to a more free market agriculture over, say, a 5- to 10-year period.

In yet another sense, decoupling can indicate agricultural program payments targeting certain groups "most in need," e.g. as transfer payments to the lowest income producers. While such direct income payments would mean a virtual about-face from present EC programs that support farm income through price supports, decoupled payments used in this sense could be a policy tool to maintain the EC's numerous small farms that probably could not compete with large commercial operations in a more market-oriented agricultural sector. *[Edward C. Wilson (202) 786-1689, Robert House, and Mary Anne Normile]*

National Research Council Publishes Report on Alternative Agriculture

In a report published on Sept. 7, the National Research Council examined the scientific and economic viability of alternative agriculture in the United States for helping producers and policymakers achieve three goals. The goals are (1) keeping U.S. farm exports competitive; (2) cutting production costs; and (3) reducing the environmental consequences of farming.

The NRC's Committee on the Role of Alternative Farming Methods in Modern Production Agriculture defined alternative agriculture as any system of food or fiber production that systematically pursues the following goals:

—More thorough incorporation of natural processes such as nutrient cycles, nitrogen fixation, and pest-predator relationships into the agricultural production process;

—Reduction in the use of off-farm inputs with the greatest potential to harm the environment or the health of farmers and consumers;

—Greater productive use of the biological and genetic potential of plant and animal species;

—Improvement of the match between cropping patterns and the productive potential and physical limitations of agricultural lands to ensure long-term sustainability of current production levels; and

—Profitable and efficient production with emphasis on improved farm management and conservation of soil, water, energy, and biological resources.

In a chapter, "Agriculture and the Economy," *Alternative Agriculture* takes a critical look at many of the Federal policies that, on the one hand, tolerate and sometimes encourage inefficient and unsustainable practices, but on the other hand discourage adoption of alternative farming practices by economically penalizing those who adopt rotations or certain other soil conservation measures, or attempt to reduce use of inputs like fertilizers, herbicides, and pesticides. The report is likely to stimulate public discussion of the benefits and drawbacks of alternative agriculture at a time when lawmakers are beginning to talk about a new farm bill for American agriculture.

"Government policy," the report states, "influences the direction of agriculture through a variety of agricultural, economic, and regulatory programs and policies. The most important of these are the commodity price and income support programs, tax policy, credit policy, research programs, trade and domestic economic policy, soil and water conservation programs, and the U.S. Environmental Protection Agency's (EPA) pesticide and water-quality regulations."

Describing Federal policy as "a patchwork of individual programs," the report states: "In more than half a century of operation, government policy has not only affected commodity prices and the level of output, but it has also shaped technological change, encouraged uneconomical capital investments in machinery and facilities, inflated the value of land, subsidized crop production practices that have led to resource degradation such as soil erosion and surface and groundwater pollution, expanded the interstate highway system, contributed to the demise of the railway systems, financed irrigation projects, and promoted farm commodity exports. Together with other economic forces, government policy has had a far-reaching structural influence on agriculture, much of it unintended and unanticipated."

The report singles out two central components of Federal commodity programs that impede movement toward alternative agriculture: base acre requirements and cross-compliance provisions. Farmers know that if they voluntarily reduce their planting (base acres) of a particular commodity program crop, they will not only forfeit benefits for that year, such as loan price and deficiency payments, but they will also lose future benefits by reducing their eligible acreage base (the subsequent 5-year average), the report says. The cross-compliance provisions of the Food Security Act of 1985 designed to control government outlays and limit production, the report says, serve as an effective financial barrier to diversification into other program crops, particularly if a farmer has no established base acres for those crops.

"Between the need to maintain base acres and the cross-compliance provision," the report says, "farmers often face economic penalties for adopting beneficial practices, such as corn and legume or small grain rotations or strip cropping. With few exceptions, only farmers outside the programs can currently adopt these cropping systems without financial penalties."

Farmers' attempts to establish high crop yields so as to maximize deficiency payments, the report says, have "encouraged heavier use of fertilizers, pesticides, and irrigation than can be justified by market forces in any given year. In effect, a high target price subsidizes the inefficient, potentially damaging use of inputs. It also encourages surplus production of the same crops that the commodity programs are in part designed to control, thus increasing government expenditures."

The report also addresses the bias in research programs that have responded to the needs of farmers operating under a set of economic and policy incentives that encourage high yields. "Until recently, research has generally not deliberately addressed the possibility of maintaining current levels of production with reduced levels of certain off-farm inputs, more intensive management, increased understanding of biological principles, or greater profitability per unit of production with reduced government support."

The report says "fundamental changes in the targets for agricultural research and education," based on identifying crops better suited to regional natural resources and on reducing costs of production, sometimes at lower per acre yields, are emerging from a realization of the high costs entailed by specialized, high-yield systems of production. The "economic safety net" of government commodity payments, disaster relief, and crop insurance benefits, have up to now made farmers willing to take the risks associated with such specialized systems, the report says.

The report *Alternative Agriculture* is further evidence of the increasing importance of what economists call the externalities of agricultural production. Research for the report was supported by the W. W. Kellogg Foundation, the Rockefeller Brothers Fund, the Cooperative State Research Service of USDA, and the Wallace Genetic Foundation, Inc. *[Arthur J. Dommen (202) 786-l884]*

World Grain Markets

World grain trade grew rapidly in the 1970's, but has not shown similar growth in the 1980's. Japan is a major market in terms of coarse grains and wheat, its principal grain imports. Japan has been experiencing a slowing growth rate in consumption of these grains, while maintaining virtual self-sufficiency in rice, as an analysis of more than 30 years of data by Fawzi A. Taha shows.

In China, grain production and trade have changed dramatically since the initiation of economic reforms in 1979. The uncertainty facing China's new economic policies because of problems of inflation, political turmoil, and changes in the agricultural sector, means difficulty for forecasters of China's future grain imports. Shwu-Eng Webb analyzes the factors behind this uncertainty.

Thailand's important rice sector has been undergoing a shift in terms of the net effect of government intervention in markets during 1982-87. By using producer subsidy equivalents (PSE's) and consumer subsidy equivalents (CSE's) Douglas H. Brooks shows that this shift may be more than just a response to world rice prices.

The world market for wheat is more diverse than a one-commodity market. As Kim Hjort points out, a study finds that the unwillingness of some importing countries to substitute different kinds of wheat constitutes a serious nonprice constraint on wheat exporters like the United States.

Finally, Mary E. Burfisher shows how fluctuations in the value of the U.S. dollar affect other countries' demand for U.S. corn and wheat. A weaker dollar does not always result in higher sales, because the income effect on the importing country must also be considered.

Patterns of Change in Japanese Cereal Production, Consumption, and Trade

by

Fawzi A. Taha*

Abstract: Over the past three decades, Japan became, with large government subsidies, self-sufficient in rice production. Japanese production of wheat and coarse grains fell until 1977-78, when wheat and barley production began to rebound. Per capita consumption of rice has been decreasing, wheat consumption has been stable since the early 1970's, and per capita consumption of coarse grains has been increasing, but at a decreasing rate.

Keywords: Japan, cereal production, cereal consumption, cereal trade, coarse grains trade, U.S. market share.

Japan has long been one of the world's largest coarse grain importers. In 1987, coarse grain imports accounted for 23.4 percent of world trade. The Japanese Government retains strict control on rice and wheat production by setting producer prices far above world prices. Japan's agricultural policies have played a major role in influencing the composition of cereal production and consumption of grain for food, feed, and industrial purposes.

Over the past 3 years in particular, grain price policies have been revised to reduce the disparity between world prices and Japanese domestic prices. Understanding the possible future direction of these policies requires some knowledge of the history of the Japanese cereals sector.

This article analyzes trends in Japanese cereal production and consumption over the past 30 years. It also evaluates trends in the volume, value, and composition of cereal trade. Finally, it compares the U.S. share of the Japanese cereals market to the shares of major competitors during 1955-87.

During the last three decades, rapid economic growth and limited arable land have made Japan a major importer of agricultural products, including cereals. In value terms, Japanese cereal imports have increased roughly 7-fold since 1955 (table A-1). In volume terms, cereal imports grew 6-fold (table A-2). Wheat imports increased at 3.4 percent annually, corn at 11.1 percent, and other coarse grains (mainly sorghum, but also including oats, rye, and millet) grew at 18.2 percent annually.

During each of the last 22 years, the United States was the largest single cereal exporter to Japan. Japan's cereal imports from the United States totaled 2.0 million tons in 1955, increased to a peak of 19.0 million tons in 1980, a 78-percent share, then declined to 18.4 million tons in 1987, a 66-percent share (fig. A-1). The variation in the U.S. share was mainly due to changes in relative prices on the world market.

The Role of Cereals In Japanese Diets

As their per capita income rose over the past three decades, the Japanese shifted away from a diet heavily reliant on food grains toward more red meat, fish, poultry, dairy products, vegetables, and fruits. Per capita consumption of chicken increased 32-fold during 1955-86, red meat 8-fold, dairy products 6-fold, and eggs 5-fold. In the same period, annual per capita consumption of food cereals decreased from 156 kilograms (kg) in 1955 to 107 kg in 1986.

Food cereals supplied two-thirds of the population's total daily caloric intake in 1955, but only 40 percent in 1986. Rice alone provided almost half of the population's total daily caloric intake in 1955, but has declined to nearer a quarter in 1986. On the other hand, as Japanese diets became more Westernized, wheat gained importance relative to rice. Wheat's share of the total caloric intake was 11 percent in 1955 and increased to more than 12 percent in 1986.

Barley utilization for industrial use (mainly brewing) and for feedlots has been increasing (7). [1/] Per capita use of coarse grains has also increased—by 4-fold—from 46.3 kg in 1955 to 181 kg in 1986.

*Agricultural economist, Economic Research Service, USDA.

[1/] Numbers in parentheses refer to references at end.

Table A-1--Japan's cereal imports by value, 1955-87

Year	Wheat	Rice	Barley	Corn	Other	Total
			Million dollars			
1955	167	197	40	26	6	436
1956	165	108	62	26	3	364
1957	163	48	56	36	0	304
1958	154	73	41	40	0	308
1959	161	38	28	53	1	281
1960	177	20	0	81	3	280
1961	179	17	0	107	12	315
1962	181	24	0	134	22	360
1963	217	29	10	158	45	460
1964	262	58	29	209	63	622
1965	251	145	41	231	93	761
1966	279	131	31	243	140	824
1967	308	82	40	271	174	875
1968	289	50	38	308	149	834
1969	297	9	34	332	171	844
1970	318	2	42	407	252	1,022
1971	342	1	59	363	283	1,049
1972	361	0	64	379	245	1,050
1973	661	5	143	740	392	1,942
1974	1,209	33	240	1,196	654	3,332
1975	1,117	17	256	1,138	590	3,117
1976	1,051	7	260	1,112	567	2,998
1977	739	9	221	1,063	619	2,650
1978	828	35	183	1,230	597	2,873
1979	1,090	4	203	1,486	719	3,502
1980	1,229	4	246	2,009	700	4,188
1981	1,273	34	311	2,459	651	4,729
1982	1,120	30	204	1,830	512	3,697
1983	1,126	4	208	2,119	484	3,942
1984	1,114	73	238	2,311	756	4,492
1985	974	4	217	1,908	652	3,755
1986	886	4	146	1,648	564	3,248
1987	785	3	133	1,525	421	2,867

Source: (8).

Table A-2--Japan's cereal imports by quantity, 1955-87

Year	Wheat	Rice	Barley	Corn	Other	Total
			1,000 tons			
1955	2,287	1,246	576	343	103	4,556
1956	2,277	760	922	345	42	4,346
1957	2,240	347	853	516	1	3,957
1958	2,280	505	716	666	3	4,171
1959	2,412	277	488	913	22	4,113
1960	2,678	175	0	1,354	50	4,257
1961	2,631	126	0	1,831	270	4,857
1962	2,562	178	0	2,316	416	5,472
1963	3,178	222	172	2,645	789	7,007
1964	3,592	415	471	3,229	1,057	8,764
1965	3,645	967	635	3,434	1,573	10,254
1966	3,917	812	447	3,598	2,365	11,138
1967	4,130	509	603	3,960	2,750	11,952
1968	4,073	271	634	5,145	2,452	12,575
1969	4,328	56	677	5,489	3,032	13,581
1970	4,685	19	768	6,018	4,088	15,577
1971	4,872	13	865	5,007	4,236	14,993
1972	5,148	3	1,004	6,052	3,960	16,167
1973	5,386	24	1,322	7,771	4,105	18,608
1974	5,377	63	1,418	7,940	4,760	19,557
1975	5,654	36	1,598	7,470	4,087	18,846
1976	5,827	22	1,762	8,383	4,529	20,523
1977	5,676	43	1,735	9,068	5,590	22,112
1978	5,564	62	1,490	10,534	5,439	23,089
1979	5,926	15	1,519	11,408	5,796	24,663
1980	5,682	14	1,416	12,830	4,531	24,473
1981	5,633	75	1,568	13,590	3,553	24,420
1982	5,713	66	1,330	13,571	3,686	24,366
1983	5,816	14	1,477	14,701	3,288	25,296
1984	5,978	165	1,567	14,170	5,064	26,944
1985	5,510	20	1,661	14,225	5,304	26,720
1986	5,620	21	1,363	14,653	5,463	27,119
1987	5,476	17	1,248	16,504	4,551	27,795

Source: (8).

Figure A-1
U.S. Share of Japan's Cereal Imports Market

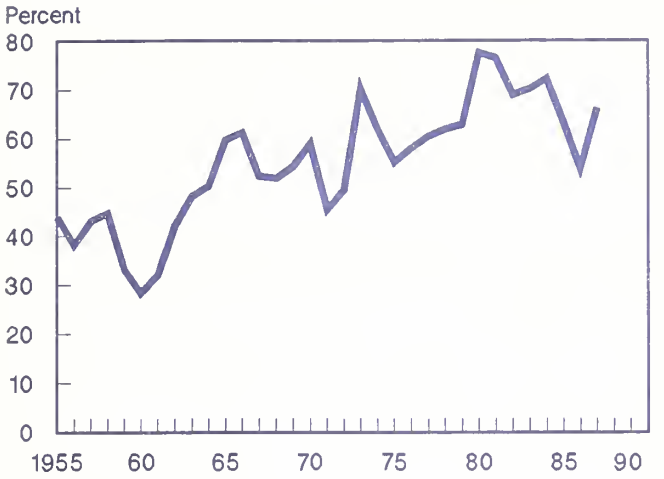


Figure A-2
Rice Production and Consumption

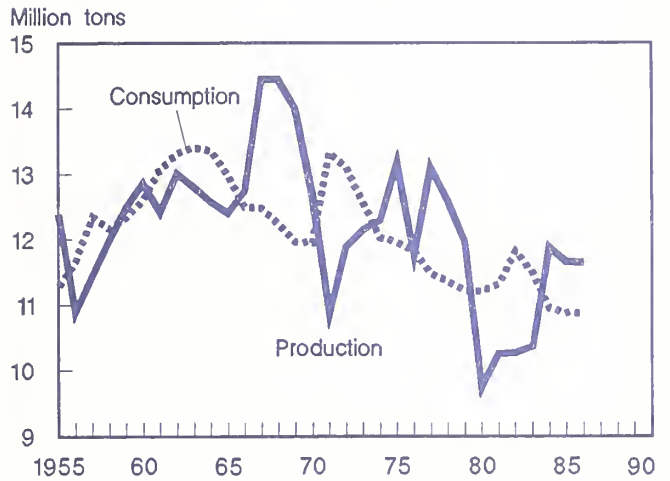


Figure A-3
Wheat Production and Consumption

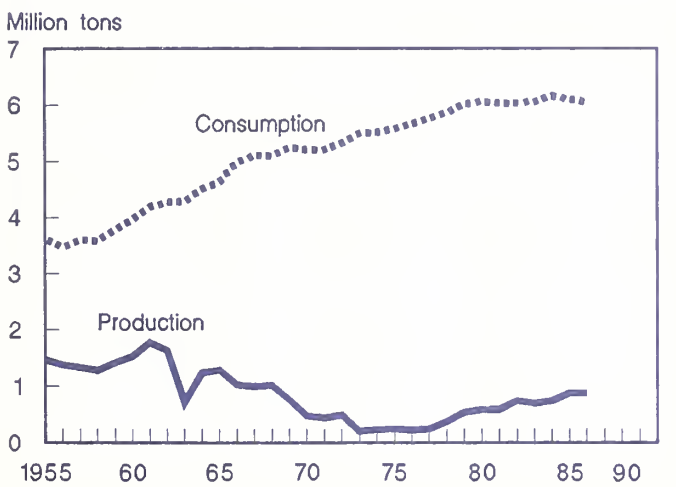
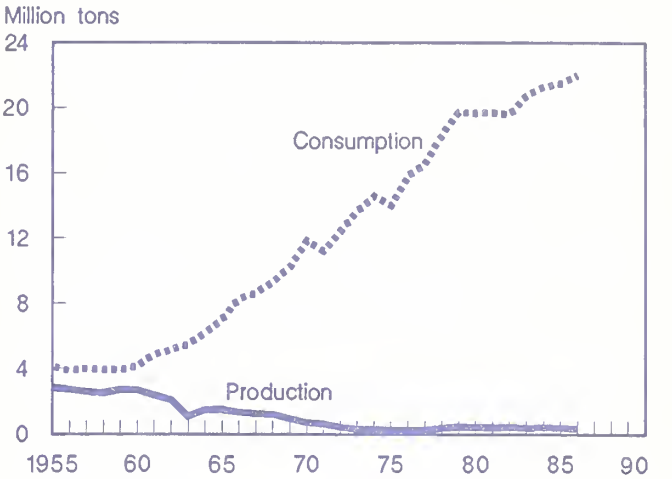


Figure A-4
Coarse Grain Production and Consumption



Cereal Production and Consumption

Japanese cereal production consists mainly of rice, wheat, and barley, in that order of importance (figs. A-2, 3, 4). Production of corn, sorghum, rye, and oats is trivial. Cereal production generally has been decreasing nearly 1.2 percent a year.

Following World War II, the Japanese Government initiated several programs to achieve self-sufficiency in rice in order to compensate for the loss of its rice-producing colonies Korea and Taiwan, to avoid repetition of the severe food shortages experienced during the war, and to save foreign exchange. The programs included improving the country's infrastructure and intensifying research and extension services to bring the latest farm technology to Japanese farmers. A succession of high-yielding varieties were introduced, fertilizer was subsidized, and rice farm prices were increasingly supported after 1960. For example, Japanese rice procurement prices were 2-3.5 times the international price of Thai, 5-percent-broken rice during 1976-82, and rose to 4-7 times the Thai price in 1983-87, after the appreciation of the yen against the U.S. dollar.

Since 1966, Japan has been essentially self-sufficient in rice. In 1969, the Government was faced with rice overproduction, while per capita rice consumption was declining after reaching a record high of 118.3 kg in1962 (5). In the early 1970's, the Government decided to stimulate consumption of rice and discourage that of wheat by raising the wheat resale price and taxing imported wheat. In earlier years, wheat resale prices were kept low and stable compared to rice prices, thus encouraging wheat consumption. These policy changes slowed growth in per capita wheat consumption, and may have slowed the decline in per capita rice consumption. In addition, the Japanese Government initiated supply management programs designed to reduce rice production, increase its local industrial and feed use, and increase the

production of alternative crops including wheat, soybeans, vegetables, forage, and perennial crops (3).

Generally speaking, rising per capita income was inversely correlated with per capita consumption of rice and barley, but positively correlated with per capita wheat consumption up to 1980, and with feed grain use during 1955-1987. Demand for feed grains increased as the Japanese consumed more red meat, poultry, and dairy products.

Rice is Japan's most important staple food. Likewise, it is easily the most important product in Japan's agriculture. In the 1980's, about 60 percent of the country's farm households received more than 60 percent of their farm cash receipts from rice (1).

In 1955, Japan was about 41 percent self-sufficient in wheat and 68 percent self-sufficient in coarse grains. In 1973, wheat self-sufficiency decreased sharply to 4 percent, and in 1976 self-sufficiency in coarse grains fell to 2 percent. However, after the Government raised the procurement price of wheat to make it as profitable as rice, the self-sufficiency rate for wheat increased to 14 percent by 1986, while that for coarse grain was under 2 percent (figure A-5).

Pattern of Cereal Consumption

A time trend regression analysis of per capita rice consumption in logarithmic form indicates a declining trend at a composite annual rate of 1.73 percent during 1955-86 (table A-3). However, to capture changes in the consumption pattern over time, the 1955-86 period was separated into three parts, with similar regression equations conducted for each. Results show that per capita rice consumption was increasing at a rate of just over one-half percent annually during 1955-65, decreasing by almost 2 percent in 1966-76, and decreasing by about 1.5 percent annually in 1976-86.

Figure A-5
Cereal Self-Sufficiency Rates

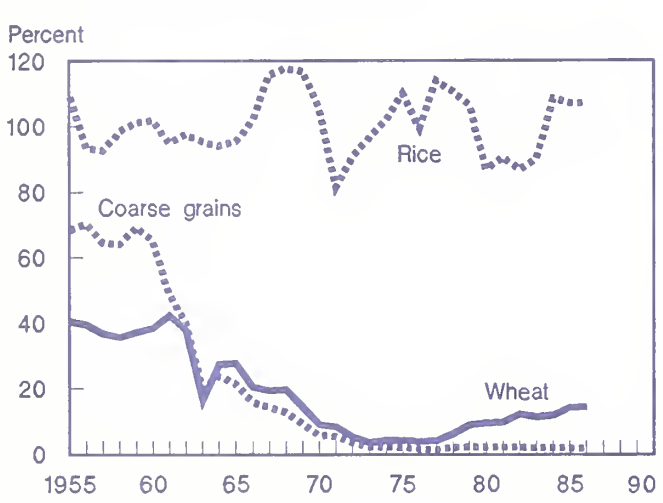


Table A-3--Trend growth rates in per capita grain consumption

Period	Rice	Wheat	Coarse grains
	Annual percent change		
1955-65	0.53	1.54	4.72
1966-76	-1.94	0.03	5.15
1976-86	-1.48	-0.03	2.18
1955-86	-1.73	0.92	5.48

Note: Growth rates were estimated by regressing the logarithm of per capita consumption on time.

In the case of wheat, the time trend regression of per capita consumption in logarithmic form indicates that Japan's wheat consumption has been increasing at an annual rate of nearly 1 percent over the 32-year period. Using the same subperiods as for rice, the analysis shows that wheat consumption grew 1.5 percent a year in 1955-65, and then virtually stagnated for the rest of the period.

Because of barley's declining food use, all coarse grains were analyzed as a whole. Results of a time trend regression analysis for coarse grains indicated that Japan's demand for these cereals grew at an annual rate of around 5 percent in 1955-65 and 1966-76, falling to just over 2 percent in 1976-86. Corn and sorghum are the main cereals used for feeding livestock. Corn is also used for industrial purposes, including the production of high fructose corn syrup, corn starch, corn flakes, ethyl alcohol, and other alcoholic drinks. Barley is mainly used as feed, in brewing beer, and for whisky (1).

The slower growth rate of coarse grain consumption since 1976 is probably due to Japan's increasing imports of chilled and frozen meat replacing raising livestock in the country. Domestic production of livestock products has been increasing at a slower rate during the last few years after becoming less profitable in face of cheaper imports. If this trend continues, Japan's coarse grain imports will probably grow at a slower rate and imports of finished livestock products will grow at a faster rate in the 1990's. Recent indications are that high costs of production and environmental problems in the Japanese livestock sector may be constraining production.

Composition of Japanese Cereal Imports

Japan exported 6.02 million tons of heavily-subsidized surplus rice stocks in 1969-84. Except for surplus disposal, Japan is a net importer of all cereals.

Rice—Japan's rice imports began dropping sharply in the 1950's. Most of Japan's rice imports now consist of specialty rice converted into products such as rice wine and rice cakes (2). But in 1984, Japan imported 165,000 tons, most of which came from the Republic of Korea under special circumstances. Japan needed the rice to replenish stocks, which were critically low after 4 successive years of unusually bad weather in its rice growing regions. Korea, which

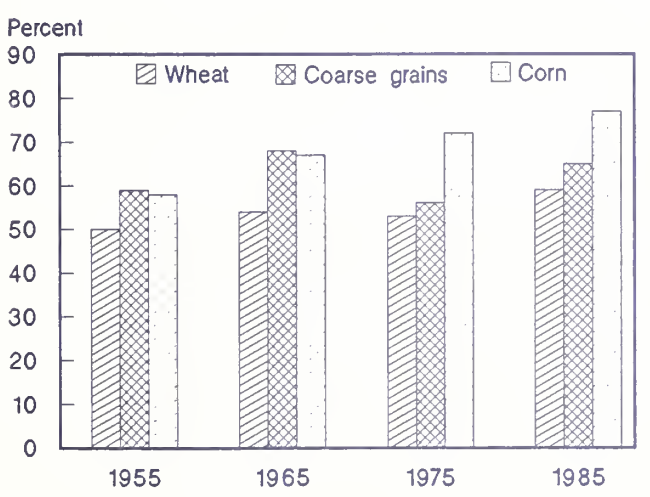
had a rice surplus, used the occasion to repay rice debts incurred years earlier, when Japan was exporting its surplus stocks on highly concessional terms.

The policy of rice self-sufficiency effectively eliminated imports by the late 1960's, and growing domestic stocks actually converted Japan into anoccasionally significant rice exporter with export prices heavily subsidized. In 1969, for instance, Japan exported 363,713 tons of rice. Rice exports climbed to 966,178 tons in 1971, but declined sharply to 218 tons in 1976. In 1981, Japan exported 855,054 tons in a program designed to reduce its stocks. Since then, Japan's rice exports have declined to negligible levels (8).

Wheat—Japan's wheat imports increased from 2.3 million tons in 1955 to 5.9 million in 1979, but declined slightly to 5.5 million in 1987. The U.S. share was 50.4 percent in 1955 (figure A-6). During the 1960's, competition among Canada, the United States, and Australia was keen: The U.S. share fluctuated between 30 and 55 percent, Canada's between 23 and 55 percent, and Australia's between 10 and 29 percent. During the 1970's, the U.S. share varied between 49 and 67 percent, Canada's share stayed between 22 and 28 percent, and Australia's share varied from 3.4 to 22 percent. Since 1980, Japan's wheat imports have come from the United States (57-60 percent), Canada (23-25 percent), and Australia (16-19 percent). Variability in U.S. shares was basically due to slight price differences offered by Canada and Australia.

Japan's wheat flour imports are small. They grew from 33,000 tons in 1955 to a peak of 77,000 tons in 1961. During the last 20 years, imports of wheat flour have been minimal, fluctuating between 80 and 222 tons. Between 1955 and 1965, 60 to 99 percent of imported wheat flour came from the United States, with the rest mainly from Canada.

Figure A-6
U.S. Share of Japan's Cereal Imports



Japan's wheat flour exports increased sharply from an average of 35,000 tons in the 1970's to 99,000 tons in 1980, and 298,000 tons in 1987. The sharp increase of the 1980's was mainly due to increasing demand from Hong Kong, China, Thailand, and Singapore. In 1987, for example, these countries accounted for 38 percent, 35 percent, 15 percent, and 9 percent, respectively, of Japan's wheat flour imports.

Corn—Japan's corn imports increased from 343,000 tons in 1955 to 3.4 million tons in 1965. From that level they more than doubled to 7.5 million tons in 1975, and again to 16.5 million tons by 1987.

Within this growing market, the U.S. share increased from 58 percent in 1955 to 67 percent in 1965, 74 percent in 1975, and an all-time high of 97 percent in 1984, when drought hit South Africa. In 1987, the U.S. share declined to 78 percent. South Africa's share of Japan's total imports grew from 14 percent in 1955 to a peak of 38 percent in 1962, but subsequently declined to only 10.2 percent by 1987. South Africa specializes in white corn, which the Japanese use to manufacture starch. Other corn exporters to Japan included China and Thailand.

Barley—The United States had a 57-percent share of the Japanese barley import market in 1955, but met stiff competition from Canada and Australia in selling to Japan in the 1960's and 1970's. By 1987, these countries virtually owned the market, with shares of 56 and 44 percent.

Other grains—This group consists mainly of sorghum, but includes rye and oats. The U.S. share of other grain imports has fluctuated widely. Argentina, the Republic of South Africa, and other countries have entered the market. China has recently become an important supplier, accounting for 10.7 percent of total imports in 1986. By 1987, the U.S. share was 54 percent, Argentina's 17.7 percent, and China's 6 percent.

Conclusions

During the last three decades, Japan went through substantial changes in the pattern of its cereal production, consumption, and foreign trade. Current patterns are heavily influenced by changes in consumer tastes, but even more so by government agricultural policies. Japan has become, through major subsidies, self-sufficient in rice production, but far less self-sufficient in wheat, barley, and other coarse grains than in 1955. This self-sufficiency has come with a high cost, however. Liberalization of Japan's rice and wheat markets would benefit Japanese consumers and save the Japanese Government significant outlays of funds.

Per capita consumption of rice has been decreasing during the last three decades. Wheat consumption rose early in this period, and has been relatively stable since the early 1970's. Per capita consumption of coarse grains has been increasing

due to Japan's rising demand for livestock products and other industrial uses. However, over 1976-86, coarse grain imports grew more slowly than in 1966-76. This is probably due to increasing imports of livestock products, which substitute for producing these products domestically.

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China's Grain Policy at a Crossroads

by

Shwu-Eng H. Webb*

Abstract: Faced with inflation, recent political turmoil, and a leveling off of grain production, China's agricultural policymakers have reinstituted certain centralized policies discarded since the reforms of 1979. These may reverse a 10-year trend of rising grain imports. On the other hand, if the reforms continue on track, or if pressures to provide cheap grain to urban areas is great enough, grain imports may rise.

Keywords: China, agricultural policy reform, grain imports.

Concerns with inflation, stagnating grain and cotton production, and political upheavals have caused the Chinese leadership to reconsider the liberalization of domestic agricultural policies initiated in 1979. Within the last year, the leadership has re-implemented many of its discarded centralized policies, placing in doubt earlier forecasts that China would continue to be a major grain importer. The real question is how far will China go toward re-centralization? Are the current policy changes only a temporary divergence from the longer term trend of more market-oriented policies, or do they signal a long-term trend toward reestablishing central control?

China's Agricultural Policies In Review

Agricultural policy in China since 1949 can be divided into two periods—the period before the 1979 economic reforms in rural areas and the period afterwards. Prior to the 1979 economic reforms, maintaining self-sufficiency was China's top priority. Grains (mainly rice, wheat, corn, and soybeans, which are considered a food grain in China) are the country's main food staples. Oilseed crops and cotton are also considered important to basic needs. Therefore, the production and marketing of grains, oilseed crops, and cotton were tightly controlled by the State. For cotton, virtually the entire crop was sold to the State.

The State's unified procurement system started in 1955. There were two types of procurement—quota and above-quota—under two different sets of prices for grains and oilseed crops. Production teams in the commune system that produced a surplus were required to let the State procure a fixed amount of output (usually 80 to 90 percent of the surplus after meeting the team members' food, feed, and seed demand) at low fixed prices. The State had to purchase whatever surplus peasants wanted to sell. With the exception of 1960, prices paid for the above-quota procurement were the same as quota prices before 1965.

During 1955-65, procurement prices increased 35 percent, while the prices of food grains sold by the State to urban residents remained stable. This caused government sale prices of grains to be lower than the corresponding government procurement prices.

In 1966, the State created an incentive system to encourage production teams to increase above-quota procurement. This system combined an in-kind reward and a higher (by 30 to 50 percent) above-quota price. The quota prices of food grains also increased 17 percent. Meantime, the Government raised urban sale prices of food grains, except soybeans, to their procurement prices. However, after the increase, the procurement prices of food grains were kept the same throughout 1966-78. The only exception was soybeans, for which prices increased 9 percent in 1971 and 23.4 percent in 1978. As a result, the costs of producing food grains exceeded their procurement prices by more than 7 percent in 1978 (9). [1/]

Before 1979, the economy was rigidly centrally planned. Production, marketing, and trade of almost all agricultural products, as well as industrial goods, were tightly controlled by the central Government. What and how much to import and export were regulated by the Ministry of Foreign Trade. Foreign exchange rates were set by the State.

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[1/] Numbers in parentheses refer to references at end.

With controlled trade, political criteria instead of the principles of comparative advantage were used to guide trade. For example, when the Government implemented the First 5-Year Plan (1953-57), industrialization was the top priority. The Government had to introduce a compulsory procurement system to increase grain supplies at low prices to support industrial growth. Imports were limited to foreign capital goods and key industrial materials. Imports of consumption goods were limited to around 8 percent or less of total imports (6, p. 277). The Government also regulated the kinds of goods exported to earn foreign exchange. In the 1950's, agricultural and processed agricultural products made up more than three-quarters of the total value of exports.

To increase peasants' incentives to produce, the Party's Central Committee decided in late 1978 to reform the commune system and introduced the "production responsibility system" (PRS). The PRS links peasants' rewards directly with the value of output. By the end of 1983, contract household systems became the most prevalent type of PRS, with more than 95 percent of production households.

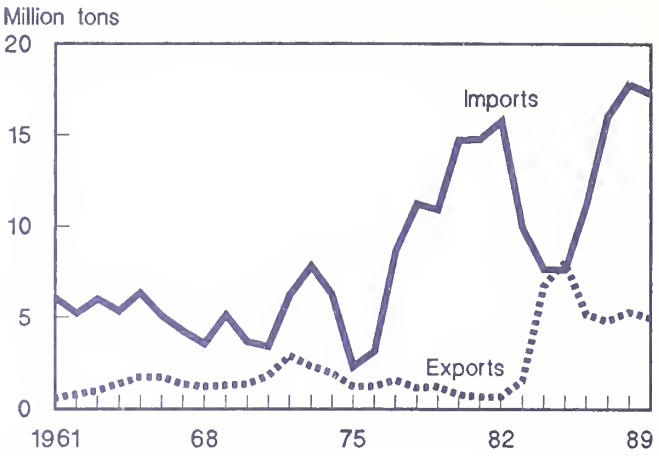
With the reforms, the State gradually relaxed the restrictions on what and how much to procure and allowed peasants to sell their surpluses not only to local markets but to other counties or provinces. To encourage farm production, especially grains, the State lowered the quota procurement and raised procurement prices a number of times since the 1979 economic reforms. In 1979, the price of 18 major farm products increased by 24.8 percent. (1, p. 30) Above-quota prices were set 50 percent above the new quota prices.

In 1985, the Government abolished compulsory purchasing quotas, and negotiated contracts with farmers before they planted their crops. The contracted quantities were purchased at a weighted average of 30 percent of the previous quota prices and 70 percent of the previous above-quota prices. The State could procure beyond the contracted amount only at the "negotiated" prices in the open market. Peasants were allowed to sell surpluses after meeting contracted quantities. The average procurement prices for food grains, oilseed crops, and cotton increased 139, 64, and 62 percent, respectively, between 1978 and 1987 (3, p. 91). The 1987 average procurement prices for all agricultural products were about double the 1978 average.

Effects of the 1979 Economic Reforms On Grain Production and Consumption

Economic efficiency has been stressed since 1979, and the State has relaxed some of its regional self-sufficiency policies. Farmers were allowed to specialize in crop and livestock production. Restrictions on markets for agricultural inputs like land were loosened. The State started to permit transferable land use rights and extended land leases to 15 years. In some areas, land lease contracts were granted for

Figure B-1
China's Grain Imports and Exports[1]



1/ Milled rice, wheat, and coarse grains.

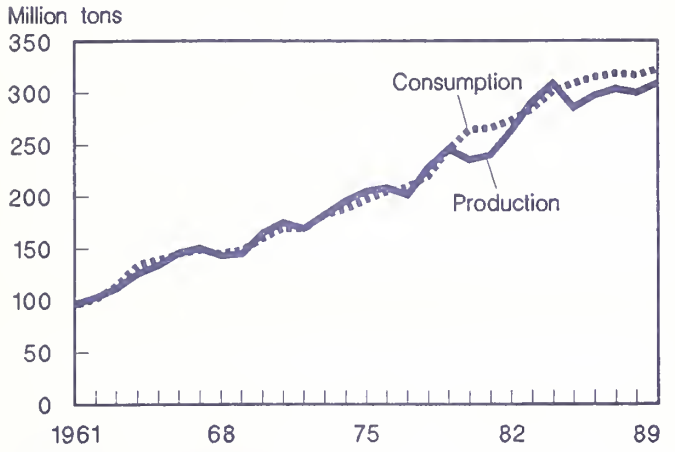
50 years. As a result, more households have specialized on cash crops, livestock production, and increased their operations to specialize in single-crop production instead of a mix of grains for self-sufficiency. The improvement in productivity released substantial numbers of laborers from farming who were allowed to work in other rural enterprises or move to urban areas to take work in the construction sector.

To support increasing numbers of nongrain-producing households, imports of food grains, especially wheat, continued to increase, except in 1985, a year after a record crop (fig. B-1). With the Government relaxing some of the restrictions on grain imports and exports, grain trade has increased substantially.

With increasing autonomy under the PRS, peasants were guided by economic returns to determine what and how much of a commodity to produce, subject to meeting State contract requirements and other institutional constraints. As a result, the structure of the rural economy changed significantly and became more diversified. Agricultural production became less important, and the proportion of the rural labor force employed in primary industry decreased from 90 percent in 1978 to 80 percent in 1987.

The agricultural sector itself has become more diversified, and crop farming has become relatively less important. The proportion of output value provided by traditional products like grains, oilseeds, and other economic crops—although still the largest—continued to decline from 77 percent in 1978 to 61 percent in 1987. Among crop farming activities, areas sown to grain crops have continued to decrease from more than 80 percent in 1978 to 77 percent in 1987. Hence, if economic reforms are to be continued and the agricultural sector continues to decentralize and economic efficiency is to be stressed, grain production is likely to decline in importance.

Figure B-2
China's Grain Production and Consumption[1]



1/ Milled rice, wheat, and coarse grains.

The diversification of China's agriculture has taken place against a background of rising labor productivity. Despite an average annual population growth rate of 1.3 percent and a 3.4-percent decrease in grain area sown since 1978, per capita grain production increased 18 percent from 319 kilograms in 1978 to 377 kilograms in 1987. (Total grain production increased from 304.8 million tons in 1978 to 404.7 million tons in 1987.) Per capita production of cotton increased 74 percent, oilseeds 158 percent, meats 105 percent, and aquatic products 82 percent (2).

Grain consumption rose even faster than grain production (fig. B-2). With increases in per capita income, people could afford to eat more meat and dairy products, items once considered luxury goods. Per capita consumption of meat and aquatic products increased substantially. The increase in meat and aquatic production has doubled feed demand for grain in China over the last 10 years, from 42.3 million tons in 1978 to 90 million tons in 1987. Liquor consumption increased more than three times over this period, and caused a substantial increase in demand (about 21 million metric tons) for food grains.

China is a low-income country, and wheat, meat, and dairy products have relatively high income elasticities of demand. Increases in income mean substantial increases in demand for wheat for food, and corn and soybeans for feed and industrial use. As a result, China could be expected to increase its imports of these commodities, other factors remaining the same.

Political leaders are sensitive to urban demands and urban resistance to higher food prices. Government policies remain biased in favor of urban residents. As a result, the State continues to heavily subsidize the urban consumption of farm products. Urban subsidized prices have remained stable despite higher incomes and procurement prices.

Income increases imply diversification of urban diets and less reliance on staple goods. But with subsidized prices and guaranteed quantities of food grains and other essential goods, urban residents do not conserve on the consumption of these goods, as they would if the reforms extended to removal of price subsidies and prices were allowed to rise.

The urban subsidies have become an increasingly large financial burden to the Government. In 1986, the State spent about 24.4 billion yuan (about 13 percent of expenditures) just to make up the differences between the procurement prices and prices that the Government charged to urban residents. In addition, the Government spent at least an additional 200 yuan per ton in processing, storing, and transporting food from rural to urban areas.

Increasing Pressures To Import Grain

Although grain procurement prices have increased substantially over the last 10 years, the return on grain crops still fell far behind other cash crops. For example, using the domestic procurement prices to calculate net returns, the profit per hectare on sugar cane was about three times that for grain crops (8). Grain production has decreased since 1984 and has fallen below targeted production 4 years in a row. This made it difficult to procure enough to meet the increasing demand, and added pressure to increase grain imports.

More and more of the State-procured grains remained in rural areas to support the increasing number of specialized households. The increase in specialized and nongrain-producing households added pressures to increase imports. The Government has loosened rules restricting grain imports, especially wheat, in order to support urban residents.

Although the 1979 economic reforms have brought increasing liberalization to the agricultural sector, the Government still intervenes heavily. For example, by 1986, the Government had increased the portion of food grain procurement at negotiated prices 6-fold, but this still accounted for only about one-third of total procurement.

The Government still intervenes directly in production and consumption in a variety of ways: (1) procurement policies and marketing systems; (2) input use policies that are tied to procurement policies; (3) heavy subsidies on agricultural products to urban residents; and (4) border measures adopted by the State to restrain trade of agricultural commodities.

The economic reforms recognized the importance of economic efficiency. However, food security is still a very important priority. This is reflected in the difference between domestic and world grain prices and the price ratio of wheat and rice. To encourage wheat production, the Government set wheat prices higher than rice prices. In the world market, wheat prices are generally lower than rice

prices. The difference between the domestic market price and world price is larger for rice than any of the major agricultural products. The ratio of procurement prices of wheat and rice is just the reverse of the ratio of world prices. Domestic prices of wheat, corn, and soybeans are about the same as their respective world prices. In China, rice farmers are taxed much more heavily than wheat producers.

The procurement prices are paid at the farm gate. Once the Government procures these crops, it provides transportation, storage and other services that add to the crop's value. Procurement prices do not reflect these costs. In addition, transportation difficulties prevent peasants from expanding their open market sales. The market prices that peasants can charge are in line with procurement prices. Domestic market prices of wheat, corn, and soybeans are already very close to world reference prices. If government intervention were removed, market prices would reflect the true costs borne by the private producer. The market prices would easily exceed their corresponding world prices. Rice and peanuts—which currently are taxed more heavily than other crops—would likely be the only two crops for which China might have a comparative advantage.

Outlook

The continued reforms mean continued decentralization, and a better economic structure in which different types and levels of economic activities will maximize the net economic returns to society. However, the current austerity measures that were adopted to deal with inflation and stagnation of grain production appear to have put economic reforms on hold. In the near term, the measures certainly will have adverse effects on the prospects of China as a market for grain exporters.

China's enthusiasm for economic reforms in the past 10 years has been dampened by an increased inflation rate (18.5 percent in 1988). During the first quarter of 1989, price increases were even larger than last year. The price index rose more than 25 percent in the first quarter of 1989, compared with first-quarter 1988. As a result, the Central Committee decided in March to increase central control and adopted austerity measures to slow down social spending.

Because grain production fell short of target for 4 years in a row since 1985, the Government decided to make grain production a top priority in early 1989. Several measures were taken to reach the targeted production this year.

First, the Government raised procurement prices of food grains and cotton by 18 and 20 percent, respectively. However, this measure is not likely to stimulate peasants to increase grain production because the increase in grain procurement prices was less than the inflation rate. Second, China raised taxes on peasants who produce crops other than grains and cotton.

Third, tighter controls were placed on the outflow of rural laborers to urban areas. Fourth, the Government forced peasants to reserve better land for grain production. Fruits and other cash crops can only be produced on less productive land. Fifth, more controls were placed on grain exports. Trade in grains and cotton, along with other "essential materials," are back under direct control of the central Government. For example, provinces with surplus corn in the northeast were forced to ship produce to the south instead of exporting to gain foreign exchange.

Current measures to increase grain production will be at the expense of other economic activities, which could bring higher income to China using the same resources. Given the same amount of resources, the economic crops (for instance, oilseeds) and cash crops (for instance, fruits) yield output values that are 60 to more than 100 percent higher than cereal grains. The returns on livestock products and light industrial goods for export are even higher. Using forceful measures to switch the production from other economic activities to grain crops would result in losses in foreign exchange earnings that are greater than the increase in the value from grain production.

China's wheat imports from all sources, including the United States, likely will be down in the coming year if China goes back to pre-1979 self-sufficiency policies. On the other hand, wheat imports are likely to rise if reforms continue on track and if the Government places high priority on providing cheap grain to urban areas, particularly after the current turmoil.

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Thailand's Rice Sector in Transition

by

Douglas H. Brooks*

Abstract: The net effect of government intervention in Thai rice markets during 1982-87 has gradually shifted from positive to negative (subsidy to tax) for consumers and from negative to positive (tax to subsidy) for producers. Export taxes have been phased out, and input subsidies (principally free irrigation) have dominated the policy effects. Rising per capita income made the implicit subsidy to consumers less important, while the demands for foreign exchange for industrialization increased Thailand's need for export earnings from rice.

Keywords: Thailand, agricultural policy, rice exports, consumer subsidy equivalents, producer subsidy equivalents.

Until recently, agricultural policy in Thailand was aimed at exploiting agricultural surpluses to provide resources for development, primarily in urban areas. Rural-urban migration in Thailand both fed and followed the growth of manufacturing industries and led to rapid growth of urban areas, particularly Bangkok, with accompanying congestion and pollution problems. With new potential sources of government revenue from manufacturing and rising demand for foreign exchange, the emphasis of intervention in agriculture is shifting from taxation to support of and promotion of exports.

Supporting agriculture is a way to slow the exodus of rural population to urban areas, while increased agricultural exports an provide the foreign exchange needed to import industrial capital and intermediate goods. Support has been maintained through the rise in world rice prices during 1987-1989, and the reduced government intervention in Thailand's agriculture across all export commodities indicates that there is a more fundamental transition underway than could be explained simply by the fall in world commodity prices in the early 1980's.

The expansion of cultivated land during the 1960's and 1970's, spurred by increased investment in roads, use of tractors, and expanded and improved irrigation, greatly increased Thai agricultural production and potential exports. Despite the recent rapid growth in manufactures, agricultural exports continue to account for a significant, although declining, portion of total exports. Rice is generally (with the exception of 1978) the leading agricultural foreign exchange earner.

A gradual shift from taxation to support of agriculture typically accompanies growth in national income (1, 10). [1/] There is also a negative correlation across countries between rates of nominal protection and comparative advantage in food production (8, 12). With Thailand's strong agricultural comparative advantage and rapidly rising income, the recent phasing out of rice export taxes may represent a fundamental transition toward government support of Thai rice and agriculture in general, rather than simply a response to recent market conditions.

Thai Rice Policy

Thai rice policy has aimed at three sometimes conflicting objectives: (1) to help farmers get higher prices; (2) to ensure that domestic demand is fully satisfied at reasonable and stable prices; and (3) to export the largest volume at the highest price possible. Emphasis has shifted among these goals depending on world prices and domestic politics.

Rice export taxes have been used to generate government revenue, earn foreign exchange, and influence terms of trade. Following World War II, Thai policymakers counted on their country's monopolistic position in world rice trade to shift the tax burden to foreign consumers. The large-country effect in world markets was expected to more than offset the tax, benefiting Thai producers, consumers, and the national budget (5, 7).

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[1/] Numbers in parentheses refer to references at end.

A high degree of variability in rice prices results from a thin world rice market (only 4 percent of production is traded) and weather (most production is rainfed). Moreover, Thailand's domestic stabilization policies may have a destabilizing effect on world prices, although domestic price stabilization is often proclaimed as a goal of Thai rice policy. In times of surplus rice production and low prices on world markets before passage of the U.S. Food Security Act of 1985 (in 1983, for example), Thai export taxes were lowered and exports promoted, putting additional downward pressure on world rice prices (5).

In recent years, the United States and Thailand have competed for the position of leading rice exporter. Increased rice production and generally stagnant domestic consumption allowed Thailand to expand exports from 2.7 million tons in 1980 to over 4.6 million tons in 1984. This expansion was assisted by the price floor for rice in the 1981 U.S. farm bill. As Thai rice exports grew, increased world production and generally flat demand depressed prices and by 1985 they were the lowest in three decades.

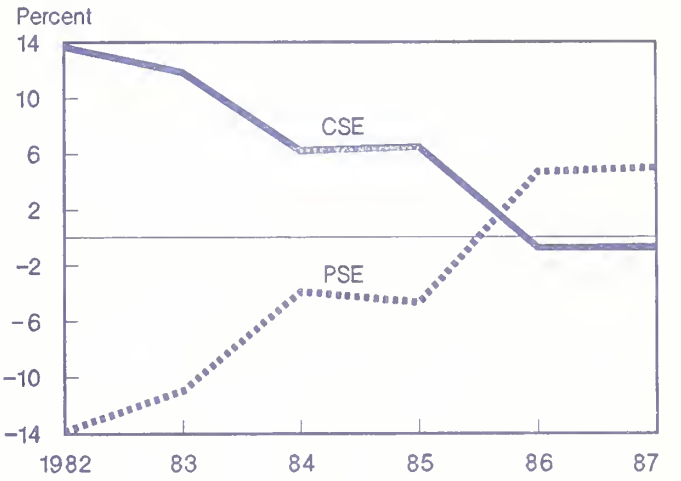
While the U.S. Food Security Act of 1985 set out to rebuild the U.S. rice market share, Thai rice policy aimed to shore up domestic farm prices. It set minimum export and mill prices, and required exporters to maintain minimum stocks. When millers balked at paying above-market prices and paddy prices fell even further, the Thai Government abandoned its price support program. Finally, in early 1986, Thailand lifted the last of its restrictions on rice trade (6).

Increased competition resulting from the 1985 U.S. act has yet to have a noticeable effect on Thai rice export volume. Unusually large Brazilian purchases in 1986 and Iranian and Bangladeshi demand in 1987 offered ready markets for Thai rice. Drought reduced 1987 production in much of Asia, including Thailand, but Thai exports in 1988 reached a record 4.8 million tons. However, prices and farm incomes have been lower than might be expected in the absence of U.S. marketing loans. Fears of increased competition in a thinly traded market remain, and less U.S. intervention in rice markets would be welcomed by Thailand (3).

Measuring Intervention in Thai Rice Markets

One aggregate measure of farm protection useful for analyzing government intervention and monitoring trade liberalization is the subsidy equivalent. Producer and consumer subsidy equivalents (PSE's and CSE's) are estimates of the amount of subsidy or tax that would be necessary to exactly offset the impact on producers and consumers of removing government intervention (9). Subsidy equivalents attempt to measure effects of policies that directly and indirectly influence the production and prices of particular commodities, by assessing the "wedge" driven between domestic and world reference prices or the budget costs due to particular policies.

Figure C-1
Thai Rice PSE's and CSE's



There are four basic types of policies that significantly influenced Thai rice markets during 1982-87. Two directly affected rice prices and two affected inputs to production. Export taxes were phased down from being a substantial negative influence on production in 1982 to a nonexistent influence in 1986. The resulting effect on Thailand's rice PSE was a shift from negative to positive (fig. C-1), a change from effective taxation to support.

The remaining policies which have been measured have positive effects on rice producers' revenues. Rediscount facilities subsidize short-term commercial loans to rice exporters with the subsidy effectively passed back to the producer. On the input side, fertilizer subsidies play a role, but one that has been declining over time. Government provision of irrigation has been the most important form of subsidization to rice production.

Thai rice policies are described in more detail below, with their quantitative effects and subsidy equivalents summarized in tables C-1 and C-2.

Rice Export Taxes and Rediscount Facilities

Export taxes took three forms in the 1980's (table C-3) (2, 11). A specific tax (the rice premium) was levied by the Ministry of Commerce in the 1950's. Its rate varied over time with policy objectives and world prices. For 1982 and 1983, it was 400 baht (US$17) per ton (for white rice 5 percent), and 200 baht for 1984 and 1985. [2/] As its importance as a source of government revenue declined and policy emphasis shifted to export promotion in response to falling prices, it was ended in January 1986.

2/ Exchange rates are presented in table C-3.

An *ad valorem* export duty was used to raise revenue for the Ministry of Finance. The rate was 5 percent from 1955 until 1984, when it was reduced to 2.5 percent, and in October 1985 it was lifted entirely. The export duty reduction followed the decline in world rice prices and was intended to help insulate Thai farmers from the price drop.

A rice reserve requirement that exporters sell rice to the Ministry of Commerce at below-market rates for subsidized sale to consumers was eliminated in May 1982 after prices had fallen dramatically from their 1981 peak. In 1985, as prices fell further, exporters were required to maintain stocks in proportion to exports. Fears of U.S. Food Security Act consequences led to removal of the stocking requirements together with the last of the export taxes in January 1986.

Table C-1--Calculation of producer subsidy equivalents

Item	Unit	1982	1983	1984	1985	1986	1987
Production:							
Paddy	Million tons	17.77	16.88	19.55	19.91	20.26	18.87
Milled rice	Million tons	11.73	11.14	12.90	13.14	13.37	12.45
Producer price:							
Paddy	US$/ton	125.04	127.70	117.81	85.61	87.49	93.81
Milled rice	US$/ton	189.45	193.48	178.50	129.71	132.56	142.13
Producer value	Million US$	2,221.96	2,155.19	2,303.07	1,704.07	1,772.55	1,770.14
Effects of government intervention:							
Export taxes	Million US$	-400.10	-334.12	-185.82	-163.80	0	0
Rediscount facilities	Million US$	20.02	20.02	18.54	18.77	15.99	17.32
Fertilizer subsidy	Million US$	7.55	5.30	4.05	1.51	.57	4.42
Irrigation subsidy	Million US$	65.05	72.95	73.88	64.03	67.28	66.78
Net policy transfers	Million US$	-307.49	-235.85	-89.36	-79.49	83.27	88.52
Producer subsidy equivalents:							
PSE per unit value	Percent	-13.84	-10.94	-3.88	-4.66	4.70	5.00
PSE per unit quantity--							
Paddy	US$/ton	-17.30	-13.97	-4.57	-3.99	4.11	4.69
Milled rice	US$/ton	-26.22	-21.17	-6.93	-6.05	6.23	7.11

Table C-2--Calculation of consumer subsidy equivalents

Item	Unit	1982	1983	1984	1985	1986	1987
Consumption 1/	Million tons	8.00	8.10	8.75	8.75	8.50	8.23
Consumer price 2/	US$/ton	237.04	238.61	205.55	169.74	163.09	197.18
Total consumer cost	Million US$	1,896.35	1,932.73	1,798.56	1,485.24	1,386.23	1,622.77
Policy transfers to consumers	Million US$	259.26	229.49	112.29	96.59	-10.16	-11.65
Consumer subsidy equivalents:							
CSE per unit value	Percent	13.67	11.87	6.24	6.50	-0.73	-0.72
CSE per unit quantity	US$/ton	32.41	28.33	12.83	11.04	-1.20	-1.42

1/ Supplies for domestic consumption include food, industrial use, feed, seed and waste, in terms of milled rice.
2/ Bangkok wholesale price for 5 percent grade white rice.

Table C-3--Thailand: Rice export taxes

Item	Unit	1982	1983	1984	1985	1986	1987
Rice exports	Metric tons	3,784,143	3,476,480	4,615,803	4,062,240	4,523,597	4,443,301
	Million baht	22,510	20,157	25,932	22,524	20,315	22,703
Total export premium	Million baht	1,513.66	1,390.59	923.161	812.448	0	0
Total ad valorem tax	Million baht	1,125.50	1,007.85	648.3	563.1	0	0
Reserve requirement	Million baht	330	0	0	0	0	0
Exchange rate	Baht/US$	23.000	23.000	23.639	27.159	26.299	25.723
Total export taxes	Million US$	129.09	104.28	66.48	50.65	0	0
Per unit export tax	US$/ton	34.11	30.00	14.40	12.47	0	0
Effect on producer value	Million US$	-400.10	-334.12	-185.82	-163.80	0	0

Short-term export packing and restocking credits were provided through commercial banks and then rediscounted at the Bank of Thailand through its export-refinancing facilities. The U.S. Department of Commerce concluded, in its countervailing duty determination on rice from Thailand, that these rediscount facilities of promissory notes constituted a grant (or subsidy) to rice exporters (4).

Export taxes and subsidies affect the quantity exported and, conversely, the quantity available for domestic consumption. With efficient price transmission from export to wholesale markets, taxation of exports increases domestic supply and effectively subsidizes domestic consumption. It is assumed that export taxes and rediscount facilities affect prices of total production and consumption at the same rate as exports. The consumer subsidy effect of the export taxes (or tax effect of the rediscount facility) is calculated accordingly, and the resulting CSE is shown in table C-2. The per-unit CSE declined, and eventually became negative, from 1982-86 as export taxes were removed and world prices fell.

Input Subsidies

Thailand procures and distributes subsidized fertilizer to some rice farmers through the Marketing Organization for Farmers. The fertilizer subsidy is small, and fertilizer use on rice is very low in Thailand, limited mostly to the small, irrigated, second crop, and to low application rates per hectare. Consequently, the fertilizer subsidy has had little effect on fertilizer use and rice yields, the general level of fertilizer prices, or the income of more than a small number of large, well-off farmers (11).

Of the indirect subsidies provided to rice producers, irrigation benefits are by far the largest. Irrigation water is provided at no charge to rice producers. About 30 percent of the area planted to rice is irrigated. An operations and maintenance charge of about US$25 per hectare has been suggested in a World Bank study of irrigation in Thailand. The World Bank also credits the expansion of irrigated rice area with over 75 percent of the increase in total agricultural output and 85-90 percent of the increase in rice production in recent decades (11).

Several policies affecting rice have not been measured here. Publicly funded extension and research services exist in Thailand, as in most countries, but data are insufficient to allocate the benefits to individual crops. The reserve requirement reintroduced in 1985 only requires exporters to maintain certain stocks. Exporters are no longer required to sell stocks to the Government. The effects of this stocking requirement on rice prices are probably small and are difficult, if not impossible, to measure. The latest version of a rice price stabilization program was introduced in 1986, but is generally acknowledged to affect too small a fraction of traded rice to be effective.

Macroeconomic policies, with the possible exception of interest rate and credit policies, had little effect on agriculture during the period under study. Protection given the industrial sector may have slightly biased the terms of trade between agriculture and industry against the farmers (7). Inflation was low and minimum wage legislation ineffective. The baht was pegged to the dollar until being devalued by 14 percent in 1984 and set relatively free. The effects of skewed exchange rates are difficult to quantify and are not agriculture-specific, but the overvalued baht in the early 1980's represented an additional tax on rice exports at that time.

The availability of public forestland for agricultural expansion, even when illegal, has played an important role in the growth of Thai agriculture. Most of the increase in production over the last 30 years can be attributed to agricultural land expansion since use of fertilizer and high-yielding varieties in Thailand remain among the lowest in Asia. The existence of additional land at little or no private cost has lowered the opportunity costs (in terms of alternative crops) of policies supporting rice production. Continued extensive growth in rice production without additional irrigation is limited, and in recent years most of the expansion in agricultural land has been in other crops. Increasing concerns about the environmental consequences of deforestation also serve to limit future expansion.

Conclusions

The removal of export taxes has been the main Thai policy change affecting rice production and consumption in recent years. The net effect of government intervention in Thai rice markets has gradually shifted from positive to negative (subsidy to tax) for consumers, and from negative to positive (tax to subsidy) for producers during 1982-87. The export taxes were phased out, and totally removed in 1986, as the importance of the rice tax to government revenue declined, national income rose, and world rice prices fell. The input subsidies, principally free irrigation, then dominated the policy effects. Higher per capita income made the implicit subsidy to consumers less important while industrialization's demands for foreign exchange increased the need for export earnings from rice.

Whether these changes represent a short-term response to declining world prices or are indicative of a longer-term shift in policy focus as the country develops should become clear in the next few years. The fact that the Government has resisted the reimposition of export taxes despite high rice prices during the last 2 years indicates that the shift may well be a longer-term transition that is part of the development process. Even so, the level of intervention in Thailand, as indicated by rice PSE's and CSE's and preliminary research on other commodities, is still far lower than in most other countries.

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Wheat Substitution in Developing Country Markets

by

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Abstract: Unwillingness of importing countries to substitute one kind of wheat for another constitutes a serious nonprice constraint on wheat-exporting countries like the United States. This article reports findings of a study of four classes of wheat exported to developing countries.

Keywords: Wheat markets, nonprice factors, U.S. market share, product differentiation.

Slow growth in world wheat trade in the 1980's has prompted the United States to try to increase its share by subsidizing or reducing prices relative to other exporters. Success depends on the willingness of importers to substitute one wheat for another when relative prices change. A recent study found only 25 percent of major developing country importers willing to substitute cheaper U.S. wheats for those of other suppliers. This points up one limitation on price-subsidizing policies in developing country wheat markets.

Although the United States could increase its wheat trade by lowering prices, this practice alone may not boost sales if importers differentiate among wheats on the basis of such characteristics as hardness or class of wheat. For example, soft wheat cannot by itself be used to make a product of the same quality as hard wheat. Therefore, a reduction in the price of soft wheat relative to hard wheat may not expand soft wheat sales.

Importers may also base wheat purchases on the point of origin or supplier. Because there are several wheat varieties within each class, importers may differentiate among supplier-specific wheats within a class because of familiarity with the wheat. The importer may also have an immediate need for the wheat, making availability and shipping time crucial elements in the purchase decision. These factors may lessen substitutability among wheats, regardless of changes in relative price relationships.

The willingness of an importer to substitute one wheat for another when relative prices change is measured by the elasticity of substitution. Wheats that are perfect substitutes have an infinite elasticity, because any change in relative prices will prompt an importer to exclusively purchase the lower-priced wheat. A recent study [1/] found that an elasticity of 10.0 or above approximates perfect substitutability. An elasticity below 10.0 means that importers differentiate wheats, and will not switch from one to another as readily when relative prices change. An elasticity of zero means that an importer will not shift purchase patterns on the basis of relative price changes.

This definition suggests that the United States will have the greatest success in increasing its market share in those countries where the elasticity exceeds 10.0. Developing country markets that fall into this category have been identified. Wheats exported by the United States, Canada, Australia, Argentina, and the European Community (EC) were aggregated into four classes [2/] based on similar physical characteristics. Based on purchasing patterns from 1968-84, substitution elasticities between suppliers within each class were estimated. The results for those developing countries that imported an annual average of at least 50,000 tons of each of the classes during the study period are summarized below.

Developing Country Results By Class of Wheat

There are 21 developing countries where the United States and Canada compete for sales of *hard spring* wheat. However, only three (India, Pakistan, and Syria) appear willing to substitute U.S. and Canadian hard spring wheats for each other. Therefore, relative price reductions in U.S. hard spring wheat would be more effective if targeted at these countries than at the 18 markets with a limited, or nonexistent, response to relative price shifts.

The United States, Australia, and Argentina are the major suppliers of *hard winter* wheat. The United States and Australia compete in 21 developing country markets, of which 9 (Bangladesh, Chile, Colombia, Egypt, Indonesia, Jordan, Mexico, Pakistan, and Singapore) substitute at rates in excess of 10.0. In the 25 markets where the United States and Argentina compete, 10 importers (Bangladesh, Colombia, Egypt, Indonesia, Jordan, Mexico, Morocco, Pakistan, Singapore, and Turkey) view these two wheats as perfect substitutes for each other. This suggests that the United

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1/ Paul S. Patterson, "An Application of the Armington Trade Flow Model in International Wheat and Coarse Grain Markets," unpublished M.S. thesis, Purdue University, 1987.

2/ Hard spring, hard winter, soft, and durum.

States will find it easier to generate shifts through price reductions in hard winter wheat market shares than in hard spring wheat market shares.

The United States exports two *soft* wheats—soft red winter (SRW) and white (WHI); the EC is the world's other major supplier. Substitution elasticities between U.S. SRW and EC wheat were measured for 15 developing countries. Of these, only Algeria perceives them as perfect substitutes. U.S. WHI competes with EC wheat in 14 developing country markets, none of which had a substitution elasticity greater than 10.0. These findings suggest that U.S. price reductions relative to EC prices will have little effect on the relative import shares of soft wheat in these markets.

Although many developing countries have imported *durum* wheat, only three purchased an annual average of at least 50,000 tons during the study period. The United States, Canada, Argentina, and the EC share these markets. However, only Algeria demonstrates an elasticity greater than 10.0 when determining the relative import shares of U.S. and Argentine durum.

Overall, the study finds that most developing countries base supplier-specific import decisions on variables other than relative prices. Therefore, countries relying on relative price changes to increase their market shares will enjoy limited success in many of these markets. However, countries may boost their market shares by targeting those markets with relatively high substitution elasticities.

How the Dollar's Value Affects U.S. Agricultural Exports To Developing Countries

by

Mary E. Burfisher*

Abstract: U.S. exports may not always increase when the dollar falls on world currency markets. While a falling dollar makes U.S. products less expensive in relation to those of other countries, thereby stimulating U.S. exports, much also depends on what happens to the importing countries' purchasing power. This article measures the effect of changes in the dollar's value from 1972 to 1986 on the import-buying power of 22 developing countries, and the relationship between these changes and the countries' demand for U.S. corn and wheat.

Keywords: Agricultural exports, currency exchange rates.

The deterioration in U.S. agricultural trade has been attributed in part to the rising value of the U.S. dollar in the early 1980's, compared with the currencies of its competitors, which made U.S. agricultural exports relatively expensive (2, 7, 9, 12). [1/] The depreciation of the dollar is expected to improve U.S. export competitiveness, helping increase its market share of world agricultural trade.

However, because developing countries depend on hard currencies to set world prices for their exports and to conduct trade, exchange rate realignments can affect developing countries' import purchasing power by altering external terms of trade (price of imports in terms of exports). Reductions in import purchasing power can work against the stimulating effects of dollar depreciation on the demand for U.S. farm products.

This study measures the contribution that exchange rate realignments have made from 1972 to 1986 in terms of the real (adjusted for inflation) import purchasing power of 22 developing countries (4). A simple model was used to analyze the effect of changes in the value of the dollar both on the relative price of U.S. exports and on the import purchasing power (or terms of trade) of developing countries.

The relationship between changes in import purchasing power due to exchange rate movements and demand for U.S. corn and wheat is analyzed. In fiscal 1987, the 22 countries in this study took 47 percent of U.S. corn exports and 57 percent of U.S. wheat exports.

Effects of the Dollar's Value On Developing Countries' Import Purchasing Power

An important feature of developing countries' foreign exchange positions is their dependence on hard currencies to transact their world trade and to set the prices of many of their exports. This feature exposes them to changes in the import purchasing power of their export earnings, when the currencies used in their trade realign, regardless of the developing countries' foreign exchange arrangements.

Realignment among major world currencies changes developing countries' terms of trade because they typically use different currencies for exports and imports. The U.S. dollar is the primary export currency for many developing countries, and is used to set commodity prices and/or to denominate their export trade.

For their imports, however, developing countries use a more diverse set of currencies. A surplus in a hard currency is accumulated when there is an imbalance in the currencies used in developing countries' trade. For example, a developing country exporting goods denominated in dollars and importing goods denominated mainly in yen holds a surplus of dollars, which must be converted to yen to pay for imports. When the dollar depreciates against the yen, the developing country's terms of trade deteriorate, and the import purchasing power of its export revenues declines. Net wealth may also fall if the country holds foreign exchange reserves denominated in a depreciating currency.

Developing countries whose exports are denominated in non-dollar currencies (for example, the yen) but whose imports are denominated mainly in dollars have a dollar deficit. A depreciation of the dollar against the yen helps improve the developing country's terms of trade.

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[1/] Numbers in parentheses refer to references at end.

The degree to which major currency realignments can affect a small country's terms of trade depends on its net trade position in the major currencies. Most developing countries have a bilateral trade imbalance, where transactions for their primary commodity exports, such as coffee and rubber, are typically denominated in dollars.

The effect of changes in the dollar's value on developing countries' import purchasing power was measured by calculating real effective exchange rate indices measuring the contribution of exchange rate movements to their external terms of trade (the import purchasing power of their export revenues). The indices utilize the concept of net trade weights in which the weight on each bilateral exchange rate is defined as the difference between the share of exports and the share of imports denominated in each currency (1).

The real effective exchange rate index is calculated as:

$$RER = \Sigma (\alpha_{ij} - \beta_{ij}) \ (loge_{ij} + \log P_i^o)$$

where:

α_{ij} = export weight for ith partner of small country j

β_{ij} = import weight for ith partner of small country j

e_{ij} = price in units of domestic currency per unit of foreign currency, indexed as (1.0 = 1972)

$P_i{}^o$ = wholesale price index in the partner country, indexed as (1.0 = 1972).

Note that

$$\Sigma \ \alpha_{ij} = \Sigma \ \beta_{ij} = 1$$

When a country is a net exporter ($\alpha_{ij} - \beta_{ij} > 0$) in a currency, its export earnings exceed its import expenditures in that currency, and the surplus is converted to other currencies to purchase imports. A surplus in a depreciating currency reduces import purchasing power, represented by a fall in the exchange rate index. Conversely, the country experiences a valuation gain when it is a net exporter in an appreciating currency, and the index consequently rises. The country experiences no valuation gain or loss when it maintains a trade balance in trade currencies.

The exchange rate indices are based on the 22 developing countries' trade with five partners, as reported to the United Nations by the partners: the United States, the United Kingdom, France, West Germany, and Japan. Trade was assigned to five currencies: U.S. dollar, pound, deutschemark, yen, and French franc. Assignments were based on observed patterns in the currency invoicing of international trade (6, 8). Trade in most primary agricultural products (Standard International Trade Classification 2 less 22, 27, 28), coffee, rubber, cotton, and petroleum, was assigned to the dollar. Trade in cocoa, tea and nonferrous metals was assigned to the pound sterling. All other trade was assigned to the currency of the bilateral trade partner.

Twenty of the 22 countries earn dollars in excess of their expenditure of dollars on imports from the United States and other dollar-denominated goods, and use their surplus dollar export earnings to purchase imports in several currencies. Consequently, the recent depreciation of the dollar has reduced the import purchasing power of their export earnings. Developing countries engaged in little substitution among suppliers of both agricultural and nonagricultural trade during 1972-86. This finding indicates that they do not offset the valuation effects of exchange rate movements on their export earnings by changing suppliers.

Table E-1 shows trends in import purchasing power in 1972-86. Because most developing countries have dollar surpluses, trends in their import purchasing power mirrored movements in the dollar's real exchange value. Import purchasing power declined during the 1970's as the dollar gradually weakened. Conversely, exchange rate changes increased import purchasing power in the mid-1980's, when the dollar strengthened. Import purchasing power peaked in 1984, and began to decline as the dollar started to depreciate in February 1985.

Oil exporting countries have experienced a particularly sharp deterioration in terms of trade since 1984 because nearly all their export earnings are denominated in dollars. For example, 99 percent of Algeria's exports are denominated in dollars. With its strong trading ties to France, 54 percent of its imports are denominated in French francs. Exchange rate movements between the dollar and franc caused its real exchange rate terms of trade index to fall from 1.25 in 1984 to .82 in 1986.

Some countries benefited from the weaker dollar. Argentina's import purchasing power grew in 1985-86, when the dollar fell because its trade patterns changed. Argentina switched from being a dollar-surplus to a dollar-deficit country. Its growing trade surplus in the pound and yen, combined with the strength of the yen, boosted its import purchasing power.

In contrast, the newly industrialized countries have experienced a tremendous drop in the import purchasing power of their export earnings. This can be attributed to an increasing dollar surplus in their trade and the falling exchange value of the dollar.

Model

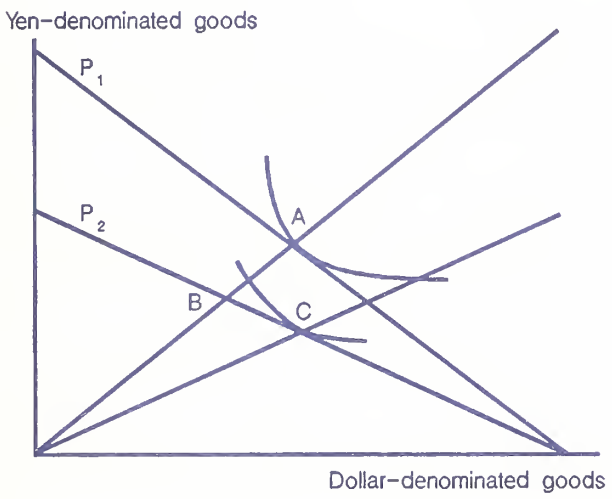
The ambiguous response of developing countries' import demand to a decline in the dollar's value can be seen in fig.

Table E-1--Real effective exchange rates, 1972-86

Country	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
							Index: 1.00 = 1972 1/								
Algeria	1.00	0.93	0.91	0.89	0.88	0.77	0.63	0.70	0.80	0.90	1.01	1.10	1.25	0.97	0.82
Argentina	1.00	1.03	1.01	1.07	1.06	1.10	1.13	1.26	1.01	0.93	1.03	1.11	0.94	0.90	1.03
Brazil	1.00	.99	.99	1.02	1.01	.98	.93	.97	.99	.97	.99	.96	.92	.96	.93
Burkina Faso	1.00	.94	.94	.88	.96	.80	.89	.75	.97	1.09	1.14	1.19	1.26	1.05	.99
Cameroon	1.00	.94	.91	.89	.93	.91	.84	.85	.87	.98	1.01	1.09	1.20	1.05	.90
China	1.00	1.00	.93	.98	.94	.84	.81	.91	.91	.92	.94	.92	.94	.82	.77
Cote d'Ivoire	1.00	.92	.89	.88	.88	.80	.82	.84	.94	1.05	1.06	1.14	1.15	1.03	.91
Egypt	1.00	1.00	.97	.99	.99	.96	.92	.89	.84	.92	.95	.96	.98	.93	.83
Ghana	1.00	.97	.98	.96	.98	1.05	1.04	1.04	1.12	1.18	1.07	1.16	.99	.98	.99
Hong Kong	1.00	.95	.97	.95	.90	.84	.76	.85	.83	.84	.87	.86	.90	.82	.74
India	1.00	1.01	1.01	.99	.99	1.03	1.01	1.01	1.01	1.00	.99	.97	1.02	.97	.91
Indonesia	1.00	.85	.82	.86	.84	.75	.66	.73	.70	.76	.85	.84	.91	.83	.71
Kenya	1.00	.98	.98	.97	.96	.86	.84	.88	.85	.91	.92	.94	.97	.91	.88
South Korea	1.00	1.00	.98	.97	.96	.91	.83	.94	.93	.94	.96	.94	.96	.90	.82
Mexico	1.00	.98	.97	.98	.97	.95	.93	.95	.96	.95	.93	.94	.96	.95	.89
Morocco	1.00	1.01	1.03	1.00	1.02	1.07	1.06	1.04	1.05	1.04	1.02	.99	.96	1.04	1.08
Nigeria	1.00	.98	.94	.83	.90	.78	.71	.75	.74	.78	.93	.91	.93	.96	.88
Philippines	1.00	.97	.95	1.00	.97	.94	.88	.95	.99	.95	.96	.96	.95	.95	.94
Senegal	1.00	1.02	1.01	1.02	.99	1.02	1.04	1.03	1.04	1.03	1.02	1.02	.96	1.01	1.03
Singapore	1.00	.94	.94	.97	.95	.86	.77	.88	.83	.85	.90	.91	.94	.89	.80
Taiwan 2/	1.00	.98	.93	.97	.95	.88	.79	.89	.85	.87	.94	.93	.96	.89	.80
Thailand	1.00	.98	.99	.99	.97	.92	.85	.96	.90	.89	.92	.89	.92	.88	.84
Venezuela	1.00	.98	.97	.97	.97	.90	.88	.91	.90	.95	.96	.99	1.00	.95	.93

1/ A rise in the index indicates an appreciation of the export currency against the import currency, and an increase in import purchasing power of export revenues. 2/ Province of China.

Figure E-1
Dollar-Surplus Country



E-1, which shows a hypothetical small country for which changes in domestic production, exports, and imports have no effect on world prices of traded goods. Because world prices are constant, only exchange rate movements change relative prices in domestic currency. This is a realistic assumption for most of the 22 countries in this study, with a few exceptions. (For instance, changes in the domestic supply of cocoa in the Cote d'Ivoire and Brazil can be expected to significantly affect world prices.)

Yen- and dollar-denominated imports are assumed to have low substitutability, either because they are different goods or because of friction in switching among suppliers. This, too, is a realistic assumption because the market shares of developing countries' trade partners show little variation. The limited ability of developing country importers to substitute among suppliers is important: It exposes them to changes in their import purchasing power.

With perfect substitution, the importing country could switch to nondollar suppliers whenever the value of its dollar earnings rose, thereby gaining purchasing power. It could switch back to dollar-denominated suppliers whenever the value of the dollar fell, and thereby avoid exposure to real losses in the value of its dollar-denominated export earnings.

Fig. E-1 illustrates the more typical case of a developing country holding a surplus in U.S. dollars. In this simplified model, the country exports goods denominated solely in dollars, and imports goods denominated in both dollars and yen. As the dollar depreciates, the relative domestic currency price of dollar goods declines against the price of yen goods, in a shift of the price line from P1 to P2. Relative prices change regardless of the developing country's exchange rate arrangement.

If the developing country pegs to the dollar, the domestic currency price of its exports is unchanged, while the relative price of its imports rises. If the developing country pegs to the yen, the domestic currency price of its imports is unchanged, but the relative price of its exports falls. If the developing country pegs to some weighted basket, then the relative prices of its exports and imports fall and rise, respectively, by amounts determined by the weights. If the exchange rate is flexible, dollar depreciation still reduces the purchasing power of the dollar-denominated exports in relation to yen-denominated imports.

Fig. E-1 shows how a dollar depreciation can lower imports of dollar-denominated goods. As the dollar's value falls, terms of trade deteriorate at P2. This reduces income, and in

the absence of substitution between dollar- and yen-denominated goods, consumption of both goods contracts along a ray from point A to B. The decline in relative price of dollar goods can be expected to induce some substitution toward these goods, in a move from point B to C. The magnitude of this latter effect depends on the elasticity of substitution between dollar- and yen-denominated goods. In the short run, this will likely be constrained by long-term contracts, traditional suppliers, and a commodity composition of bilateral trade that limits substitution among suppliers.

Fig. E-1 shows that, on net, purchases of dollar goods rise and yen goods fall as the developing country's import basket shifts from point A to C. Dollar depreciation increases dollar exports to the developing country, although this gain is held in check by the decline in terms of trade. However, dollar exports to the developing country could also have fallen if the effect of terms of trade deterioration on reducing consumption of dollar goods had outweighed the substitution toward dollar-denominated goods as their relative price fell.

Effects of Exchange Rate Movements On U.S. Agricultural Exports

The significance of the dollar's value in determining U.S. agricultural exports is currently debated, and the empirical evidence is mixed (3, 9, 11, 12). For developing countries, the significance of the dollar's value is not the only issue. The likelihood that a fall in the dollar's value will increase or decrease demand for imports in those countries where dollar depreciation reduces import purchasing power is also important.

To determine this, the demand of selected developing countries for U.S. corn and wheat during 1972-86 was econometrically estimated (5). Per capita commercial U.S. exports were estimated as a function of per capita domestic production, real local price in domestic currency, real income (defined as per capita gross domestic product (GDP) or, in some cases, real financial import capacity), U.S. aid shipments, and the index of real exchange rate terms of trade (10, 13, and 14). Seemingly unrelated regression estimators (SUR) were used to estimate the equations jointly.

In general, the findings support the hypothesis that exchange rates influence the volume of U.S. exports to developing countries. [2/] As shown by other studies, exchange rates tend to be more important in determining demand for wheat than for corn imports from the United States (7), although foreign demand responses to exchange rate changes vary by country (11). An important finding with respect to dollar-surplus developing countries is that the drop in their income associated with a fall in the dollar's value can in some cases result in declining imports from the United States as the dollar depreciates. This holds for 6 of the 12 corn-importing countries holding a surplus of dollar export earnings, and 2 of the 10 dollar-surplus, wheat-importing countries. For dollar-deficit countries, the relationship between the exchange rate and import demand for U.S. corn and wheat was negative, as expected, for two of the three corn importers, and one of the two wheat importers.

Conclusions

For most countries, increases in domestic production had the expected negative impact, and income the expected positive impact, on demand for U.S. exports. For most countries, the price variable was represented by the U.S. commodity price, in real domestic currency terms, which was significant (at the .10 level) for most corn importers, but for only three of eight wheat importers.

These price results suggest the probable importance of domestic policies and other factors in buffering the domestic market from world price fluctuations. The relative U.S. price of corn and wheat, and the price of the developing countries' leading non-U.S. supplier, was found to be significant (at the .10 level) for only a few countries, mainly those where the U.S. market share was highly variable, such as corn exports to Asian countries where competition from Thailand is keen. In most of the markets, the U.S. market share tends not to vary.

Public Law 480 shipments of corn were not significant in determining corn import demand; however, they were significantly related to wheat import demand in five countries, positively related in three and negatively related in two (significant at the .05 level).

The results are consistent with other analyses of exchange rate effects, in that the exchange rate terms of trade, although significant, tend to be less important than domestic production, price, and income (9) in determining demand for U.S. exports.

2/ The maximum likelihood ratio was used to test for the significance of the exchange rate variable. It was found to be significant at the .01 level for all corn importers combined, but significant for only 6 of the 18 individual importers. The exchange rate variable was significant at the .10 level for all wheat importers combined, and each wheat importer individually.

Developing countries' demand response to fluctuations in the dollar's value may be determined not only by the change in relative prices of U.S. goods, but also by an income effect associated with the dollar's value. The size and sign of this effect are determined by the dollar's role in denominating these countries' primary product exports.

This is a simplified treatment of the effect of the dollar's value on developing countries' demand for U.S. exports. Clearly, many other factors determine import levels, including the domestic price effects of policy interventions (such as consumer and producer subsidies), and the effects that changes in exchange rates will likely have on world prices of traded goods (particularly primary products). This simple approach can nevertheless be used to highlight the dollar's important role in developing countries' world trade and the implications of changes in the dollar's value.

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