United States
Department of
Agriculture

ERS

Agricultural
Economic
Report
Number 713

An Economic Research Service Report

Rice

Background for 1995 Farm Legislation

Randall D. Schnepf
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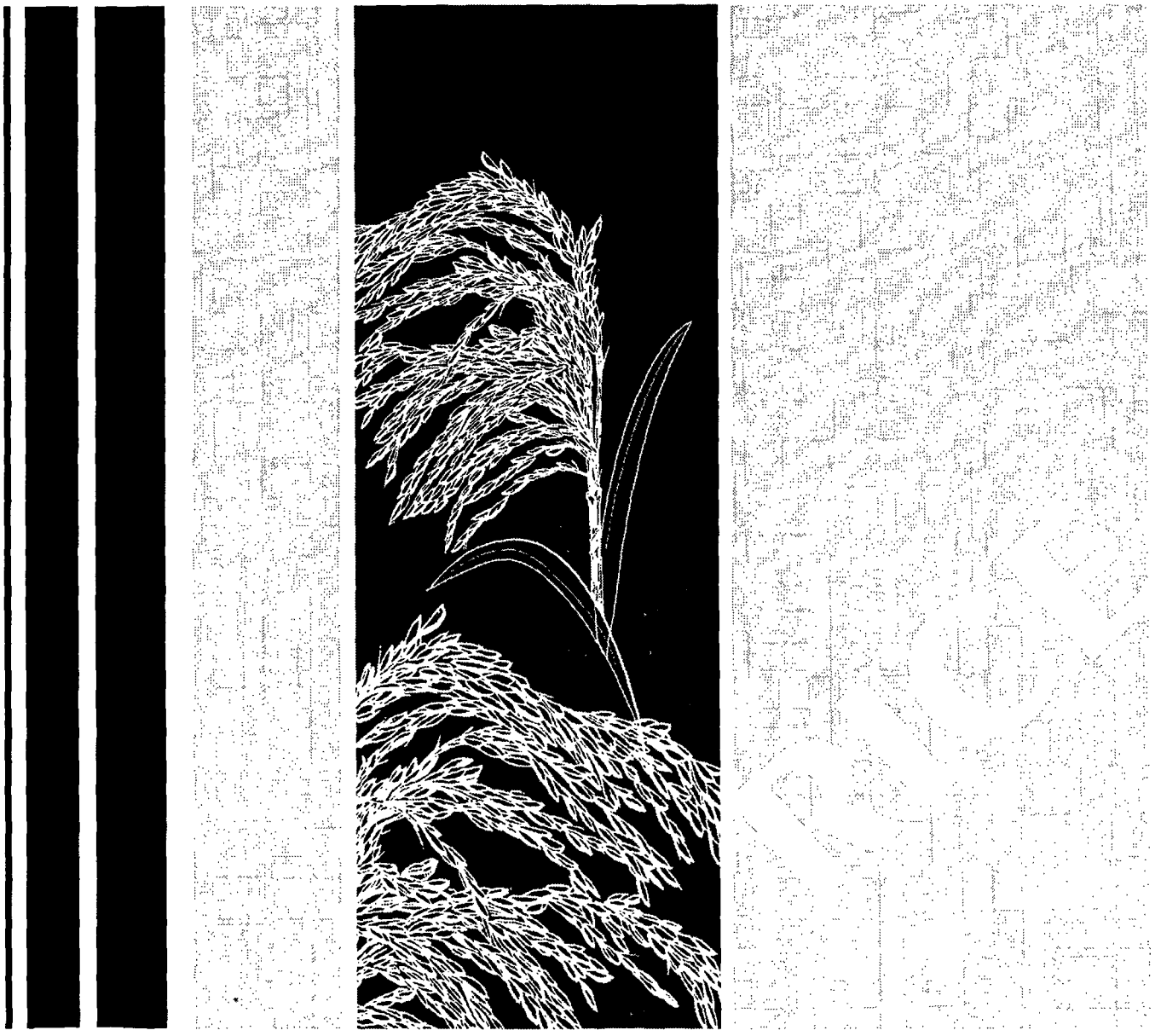

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Rice: Background for 1995 Farm Legislation. By Randall D. Schnepf and Bryan Just. Commercial Agriculture Division, Economic Research Service, U.S. Department of Agriculture. Agricultural Economic Report No. 713.

Abstract

U.S. rice sector income has shown steady growth in recent years, reaching $2.1 billion in 1993/94. However, Government program payments have also grown in importance. Since 1985/86, rice program outlays have averaged $733 million per year, 42 percent of all returns from rice farming. Farm and industry economic health are linked to costs of production which vary significantly across the six rice-producing regions. Because of inflation in the cost of production since the early 1980's, frozen payment yields, reduced target prices, and continued reductions in farm program benefits due to budgetary pressures, some rice farmers have been operating at a loss. Any reductions in current rice program support levels would probably accelerate the trends of a declining number of U.S. rice farms, increasing farm size, and a shift of rice growing from the high-cost production regions along the gulf coast to the upper Delta States, while reducing both the participation rate and dependency on government program revenue.

Keywords: Rice, farm programs, farm returns, farm cost-of-production, program effects, domestic use, prices, world trade

Foreword

Congress will soon consider new legislation to replace the expiring Food, Agriculture, Conservation, and Trade Act of 1990. In preparation for these deliberations, the U.S. Department of Agriculture and other groups are studying previous legislation and current situations to see what lessons can be learned that are applicable to the 1990's and beyond. This report updates *Rice: Background for 1990 Farm Legislation* (AGES 89-49), by Nathan W. Childs and William Lin. It is one of a series of updated and new Economic Research Service background papers for farm legislation discussions. These reports summarize experiences with various farm programs and the key characteristics of the commodities and the industries that produce them. For more information, see the Additional Readings at the end of the text.

Acknowledgments

The authors appreciate the reviews and constructive comments of Eugene Rosera (Consolidated Farm Service Agency), Andrew Aaronson (World Agricultural Outlook Board), Scott Thompson (Foreign Agricultural Service), and Sara Schwartz and Kathy Lipton (both of the Economic Research Service). The authors also thank Lindsay Mann and Linda Hatcher for editorial assistance.

Washington, DC 20005-4788 April 1995

Contents

Summary

Currently, a typical U.S. rice farm is likely to benefit from two types of government program outlays: target price deficiency payments and marketing loan gains. Since the inception of the marketing loan program for rice in the 1985/86 marketing year, government outlays for the rice program have averaged $733 million per year, or 42 percent of all returns from rice farming.

Some rice farmers have been operating at a loss, because of inflation in production costs since the early 1980's, coupled with frozen government payments, reduced target prices, and continued reductions in farm program benefits because of budgetary pressures. Additional costs are being placed on rice farms by increasing environmental regulations, including restrictions on the registration and use of pesticides, wetland regulations, and concern for the quality of both ground water and surface water. Gulf coast and California rice producers are particularly vulnerable to cost increases.

Any reductions in current rice program support levels would probably accelerate the trends of a declining number of U.S. rice farms, increasing farm size, and a shift of rice growing from the high-cost production regions along the gulf coast to the upper Delta States, while reducing both the participation rate and dependency on government program revenue.

Domestic rice acreage, production, and income have increased in recent years. Since 1990, rice plantings have averaged slightly more than 3 million acres per year, up from an average of 2.8 million in the 1980's. Most of the increase has been in the areas where production costs are lower—along the Mississippi River and in the nondelta areas of Arkansas. Domestic rice production has averaged 160 million hundredweight (cwt) since 1990, up from 140 million cwt during the 1980's. Total returns to the rice industry have averaged $1.9 billion since 1990, up from approximately $1.6 billion during the 1980's.

The U.S. domestic rice market has been growing at more than 4 percent a year for the past 25 years and has now overtaken the international market as the principal outlet for U.S. rice. Direct food use is the largest domestic use. However, with numerous new products and effective marketing, use of rice in processed foods is the fastest growing area of the domestic market. Despite its small area and value relative to other field crops, U.S. rice production plays a major role in those States in which it is grown.

U.S. rice growers are younger than farmers on average, more likely to be part-owners and tenants, and more likely to participate in government programs. Farm profitability and industry viability are linked to costs of production, which vary significantly across rice-producing regions.

Movements in and out of rice farming tend to occur more slowly because all rice farms are irrigated and therefore tend to require greater start-up expenses. Expanding production outside the government program has larger risks for rice farmers than for growers of other field crops because of

(1) the large investments in machinery and irrigation equipment required;

(2) the growing potential for further constraints being placed on agricultural water uses; and

(3) a dependency on export markets and their inherently volatile international prices.

New technology tends to be more readily adopted by rice growers than other grain producers. The rice industry is smaller than other grain sectors and since rice growing is concentrated in six States (Arkansas, California, Louisiana, Mississippi, Missouri, and Texas), market information is more quickly disseminated.

The United States is the world's second-largest rice exporter, supplying 17 percent of the world's rice exports in 1991-93. The United States depends on exports for more than 40 percent of total rice disappearance. However, U.S. rice traditionally trades at a significant price premium to foreign rice. As a result, most rice-importing countries view the United States as a residual supplier, implying that international trading patterns and prices strongly affect the U.S. supply and use situation.

The U.S. rice industry competes in a policy-dominated international marketplace where prices are kept artificially low by rigid trade and production policies that have combined to decrease import demand, while increasing exportable supplies from major competitors. Policies oriented toward self-sufficiency have closed the large rice markets of Indonesia, Japan, South Korea, and Taiwan, while allowing only limited access to the European Union's large market.

Rice

Background for 1995 Farm Legislation

Randall D. Schnepf
Bryan Just

Introduction

This report provides background for addressing policy issues facing the U.S. rice industry. It is important that policymakers engaging in the farm bill debate have an appreciation of the consequences of program changes for the aggregate U.S. rice sector, as well as for individual producing regions.

A discussion of the structure of the U.S. rice sector and the global and domestic supply and demand conditions under which it operates provides a backdrop for discussion of the pertinent policy issues. Characteristics of production, marketing, trade, and use that are peculiar to rice are identified. Program effects on farm costs and returns are presented.

Supplementing the discussion of issues and economic structure of the U.S. rice industry is a description of the pertinent features of the government rice program and the problems they have attempted to deal with.

Structure of the U.S. Rice Sector

Domestic rice acreage, production, and income have been increasing over the past decade. With this growth, the U.S. rice sector has evolved in terms of its own structure as well as its competitiveness vis-à-vis other field crops.

Production Characteristics

Rice production in the United States is small relative to other field crops. In 1993, rice acreage accounted for slightly more than 1 percent of total area planted to the major program crops (wheat, coarse grains, rice, soybeans, and cotton) and only 3 percent of their value. Rice plantings of 3.4 million acres in 1994 were the third highest on record but paled in comparison to corn, wheat, and soybeans plantings of 78.8, 70.5, and 61.8 million acres, respectively.

Over 95 percent of the U.S. rice crop is produced in five States. Rice production is concentrated in Southern States along the Mississippi River, the gulf coast, and in California. The 1992 Census of Agriculture reports rice production for eight States. The Consolidated Farm Service Agency (CFSA), the USDA agency responsible for administering farm programs, reports rice farms in 12 States.[1] The National Agricultural Statistics Service (NASS) reports current crop production data for the six major States. The six NASS reporting States account for over 99 percent of the U.S. rice crop.

Despite its small area and value relative to other field crops, U.S. rice production plays a major role in those States in which it is grown and in the international marketplace. The United States is the world's second largest rice exporter, supplying 17 percent of the world's rice exports in 1991-93. During that same period, rice accounted for 12 percent of the value of field crop production in the four primary rice-producing Southern States—Arkansas, Louisiana, Mississippi, and Texas—and 9 percent in California.

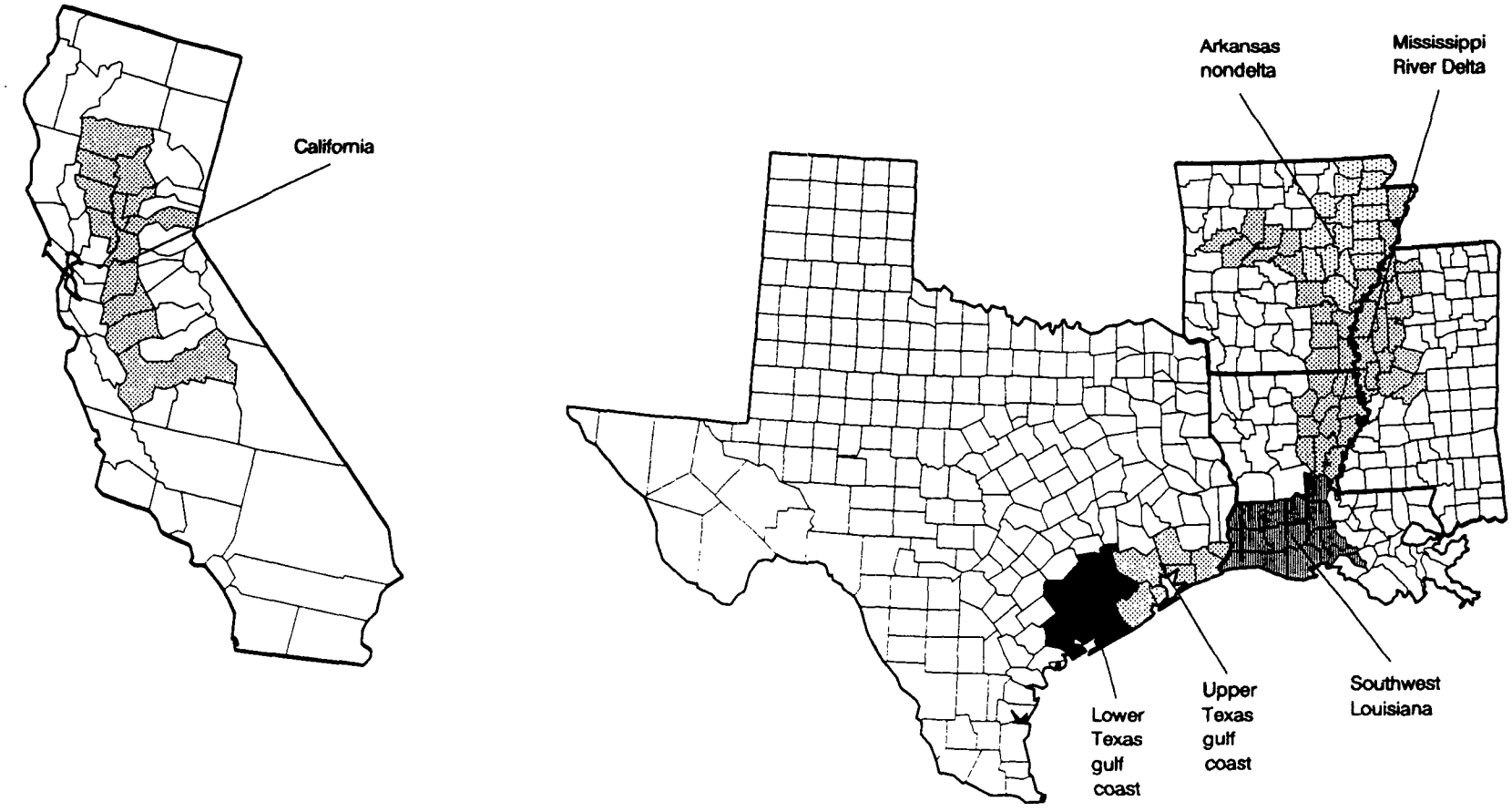
The Economic Research Service (Salassi, 1992) identifies six major U.S. rice-producing regions based upon similar production practices and soil characteristics (fig. 1). These six areas include (1) the nondelta areas of Arkansas; (2) California; (3) the Mississippi River Delta areas of Arkansas, Louisiana, Mississippi, and Missouri; (4) southwest Louisiana; (5) the upper Texas gulf coast; and (6) the lower Texas gulf coast. To simplify exposition of data, this study combines the last three areas into a single region called the gulf coast.

The U.S. rice crop is grown during the spring and summer and harvested in summer and early fall. The U.S. rice marketing year runs from August of the crop production year through July of the following year.[2]

[1]Before 1995, the Agricultural Stabilization and Conservation Service (ASCS) was responsible for administering the farm programs. Under the 1994 USDA reorganization, the ASCS was combined with several other USDA agencies into the CFSA.

[2]See Setia, Childs, Wailes, and Livezey (1994) for a glossary of technical terms related to the U.S. rice industry and government farm programs.

Figure 1
Major rice-producing areas



The majority of rice farms produce a single crop; however, farms along the gulf coast are often able to harvest a second cutting called a "ratoon" crop. This ratoon crop is often crucial to boosting yields and reducing variable costs per hundredweight (cwt) for high-cost rice farms.

Structure of Rice Farms

The 1992 Census of Agriculture reported that 11,212 farms harvested rice, a decline from 12,013 in 1987 (tables 1 and 2).[3] Farms engaged primarily in rice production totaled 6,687, also a decline from 7,396 in 1987.[4] The decline in the number of farms harvesting rice and the numbers of farms primarily engaged in rice production followed the national trend of decreasing farm numbers. From 1987 to 1992, farms with any harvested cropland decreased 9 percent.

[3]The Census of Agriculture defines a farm as having at least $1,000 in annual sales of agricultural produce. The individual farming unit may consist of several distinctly separate pieces of land that are managed by a single management team (whether an individual, a family, or a partnership). The CFSA defines a farm differently for program participation and payment purposes. At sign-up, a farm is identified as a single, independently managed entity and receives a unique farm identification (ID) number. As a result, a single farm under the Census of Agriculture may comprise several farm ID numbers for CFSA purposes. For example, if a farm crosses two counties the land in each county must have separate ID numbers. Often the parcelling of family farming units into multiple ID numbers is undertaken to avoid CFSA payment limitations on any single CFSA farm ID number. In 1993 the CFSA listed 21,877 farms in its final compliance report.

[4]A farm is defined by the Census of Agriculture as engaging primarily in rice production if rice provides at least 50 percent of the value of annual agricultural sales.

Table 1—Number of rice farms by size and share of output, 1992

Acres of rice harvested	Farms	Share of rice farms	Share of rice output	Average yield per acre
	Number	*Percent*		*Pounds*
1-99	2,620	23.4	4.3	5,287
100-249	3,772	33.6	20.4	5,729
250-499	3,296	29.4	36.3	5,579
500-999	1,232	11.0	25.8	5,585
1,000 or more	292	2.6	13.2	5,917
Total	11,212	100.0	100.0	5,643

Source: U.S. Department of Commerce, Bureau of the Census, 1992 Census of Agriculture.

Farms engaged primarily in rice production in 1992 had an average farm size of 743 acres and averaged 496 acres of harvested cropland, behind farms engaged primarily in wheat or cotton production (table 3).

The rice sector tends to be dominated by a relatively few large producers. In 1992, the largest 14 percent of rice farms produced over 39 percent of total production. Larger farms also reported higher yields than smaller farms, suggesting that factors affecting yield growth probably vary by farm size. The largest yield increases were probably captured by the implementation of new technology. Yield increases on smaller farms were probably limited by input constraints.

Profile of Rice Operators

Occupation and ownership of farms harvesting rice are different from farms harvesting other field crops. Operators of farms harvesting rice are more likely to be involved in farming as the primary occupation. In 1992, 88 percent of the 11,212 farms harvesting rice reported farming as the primary occupation. However, these same farm operators were more likely to be part-owners and tenants than full-owners. Farms producing other major field crops reported much higher rates of full ownership. Operators of rice-producing farms tend to be younger than other cash grain producers. The 1992 Census of Agriculture reported 42 percent of rice producers were less than 45 years

Table 2—Number of rice farms by State and share of output, 1992

State	Farms	Share of U.S. output	Average size[1]	Average yield/acre
	Number	*Percent*	*Acres*	*Pounds*
Arkansas	4,924	42.9	277	5,532
Louisiana	2,197	5.3	268	4,562
Mississippi	748	8.9	362	5,779
Missouri	475	2.9	216	4,893
Texas	1,276	11.4	290	5,419
South	9,620	81.3	280	5,305
California	1,575	18.1	255	7,943
Total[2]	11,212	100.0	278	5,643

[1]Average size of rice area harvested. [2]Includes some farms in minor rice-producing States: Florida and Tennessee.

Source: U.S. Department of Commerce, Bureau of the Census, 1992 Census of Agriculture.

Table 3—Enterprise and operator characteristics of selected grains, 1992

Year	Rice	Wheat	Corn	Soybeans	Cotton
			Number		
SIC farms[1]	6,687	62,144	140,252	75,068	20,447
			Percent		
Tenure:					
Full-owner	19.5	30.4	36.7	32.2	23.1
Part-owner	40.6	54.2	48.0	50.0	50.5
Tenant	39.9	15.4	15.3	17.8	26.4
Age:					
Less than 35	16.1	12.5	14.2	14.3	13.9
35-44	25.6	21.3	22.2	22.2	22.4
45-54	25.0	20.6	21.5	21.3	22.1
55-64	19.6	22.5	22.2	22.3	22.0
65 or older	13.9	23.0	19.9	19.8	19.6
			$1,000		
Per farm value of:					
Land/buildings	697	459	546	330	860
Machinery/equipment	112	79	80	51	133
			Acres		
Total, harvested acres[2]	496	551	339	298	617
Total, farm acres	743	1,152	442	228	939

[1]Based on farms for which the indicated crop is the principal crop grown, accounting for more than 50 percent of sales of agricultural products. [2]Includes all crops.

Source: U.S. Department of Commerce, Bureau of the Census, 1992 Census of Agriculture.

of age and only 14 percent were over 65. For operators of other cash grain producing farms, at most 37 percent were under 45 and at least 20 percent were over 65 years of age.

Asset values for farms engaged primarily in rice production are higher than for farms engaged primarily in the production of any other specific major field crop except cotton. In 1992, average value per farm was $697,000 for land and buildings and $112,000 for machinery and equipment. These high asset values make entry into and exit from rice farming slower and more dependent upon the long-term market outlook.

Trends in Production

Rice plantings have been on an upward trend during the last decade and production has been increasing. Since 1990, rice plantings have averaged slightly more than 3 million acres (fig. 2). Most of the increase in area has been in low-cost producing regions in the Mississippi River Delta and nondelta Arkansas (fig. 3). Very little abandonment of rice-planted acres occurs in the United States since all of the area planted is irrigated.

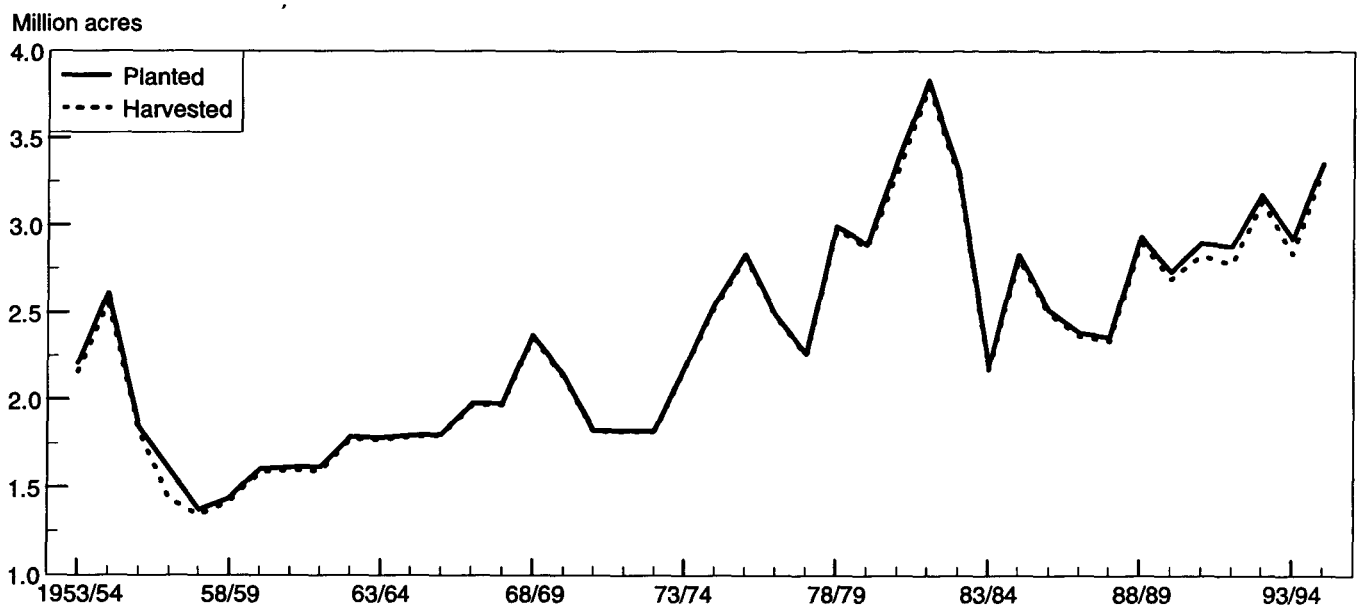
The expansion in area planted has come very gradually over time due to the nature of rice farming. Expanding production outside of the government program has inherently larger risks for rice than for other field crops due to (1) the large investments in machinery and irrigation equipment required, (2) the growing potential for further constraints placed on agricultural water uses, and (3) a dependency on export markets and their inherently volatile international prices. These factors prevent farms from easily and quickly shifting into and out of rice.

Rice Classes

In the United States, rice is referred to by length of grain: long, medium, and short grain. Long-grain rice is produced primarily in Southern States and medium- and short-grain in California. Long-grain rice has had an ever-increasing share of area and production over the past two decades. Since 1984/85, long-grain has accounted for 74 percent of area harvested and 70 percent of production (figs. 4 and 5).

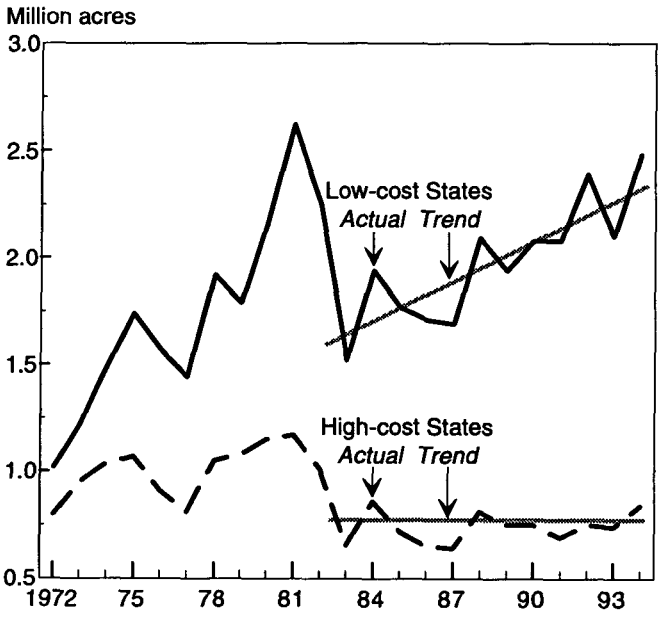
The different types of rice are considered imperfect substitutes, except by users who purchase rice for further processing. Because of class distinctions,

Figure 2
U.S. rice acres, planted vs. harvested



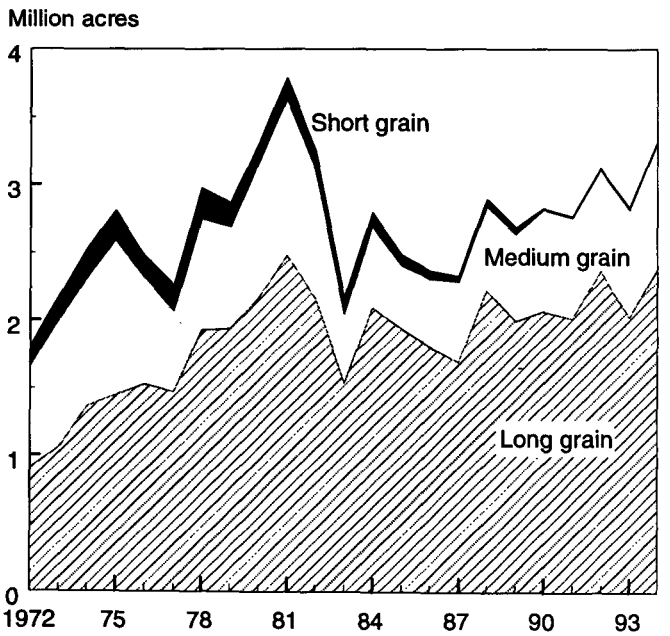
Source: USDA.

Figure 3
Harvested rice acres: high-cost and low-cost States



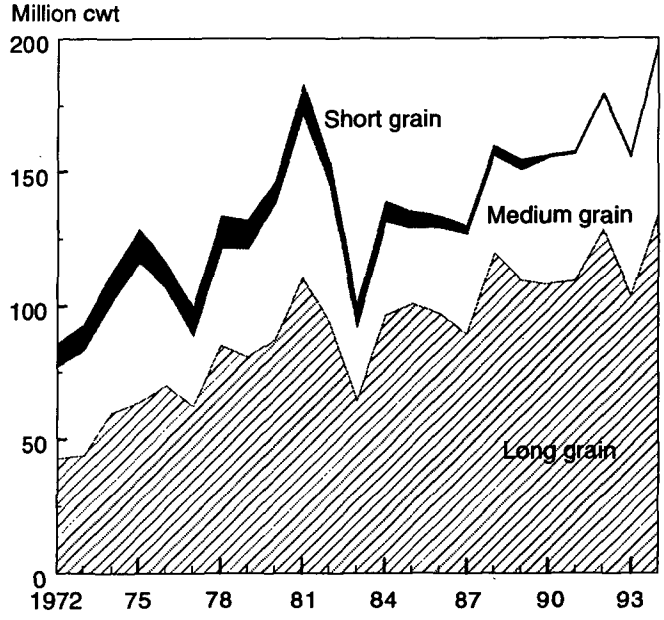
Source: USDA.

Figure 4
U.S. harvested rice acres, by type and crop year



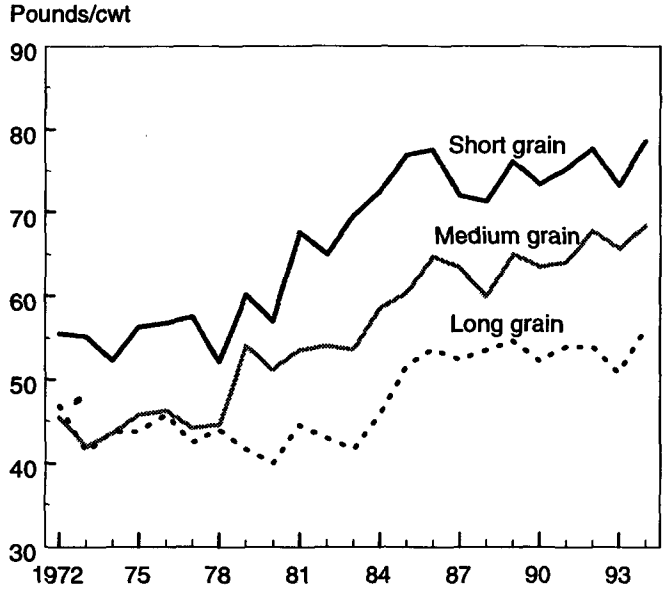
Source: USDA.

Figure 5
U.S. rice production, by type and crop year



Source: USDA.

Figure 6
U.S. rice yields, by type and crop year



Source: USDA.

supply-demand imbalances for the rice market as a whole are not necessarily good indicators of the market situation for any single class of rice. Long-grain rice traditionally commanded the premium price in the rice market and remains the dominant type found in retail outlets. The shorter grains have been lower priced and are predominantly used in processed foods and beer, where processors are more price-sensitive. However, medium- and long-grain price relations have changed dramatically in recent years. Vietnam's entrance into the world market in 1989 as a major source of long-grain rice pressured U.S. long-grain prices to a discount with medium-grain by 1992. Then, Japan's surge in medium-grain imports in 1994 sent medium-grain export prices to a 50-percent premium over long-grain.

This distinction between rice classes will become more important with the implementation of the recently completed Uruguay Round of GATT (UR-GATT) negotiations. Minimum access criteria agreed to under UR-GATT are expected to open the previously closed markets of several high-income East Asian medium-grain rice-consuming countries.

Arkansas, Louisiana, Mississippi, Missouri, and Texas produce mostly long-grain rice. California produces over 60 percent of the medium- and short-grain rice grown in the United States. Yields vary by type of rice produced, with short-grain achieving the highest yields per acre, followed by medium- and long-grain (fig. 6).

Since 1990, Arkansas has accounted for slightly more than 40 percent of total harvested acres and production. California is the next leading producer, with an average of about 400,000 acres of rice plantings, or 15 percent of the U.S. total. In 1994, 99 percent of California's rice crop was medium- and short-grain. Although rice acreage in California is relatively small, yields are the highest of any State.

Rice farms in Texas and Mississippi produce almost entirely long-grain rice, while nearly one-third of Louisiana's rice crop is medium-grain. Rice plantings average nearly 600,000 acres in Louisiana, over 300,000 acres in Texas, and slightly more than 250,000 acres in Mississippi.

Yields and production on rice farms in Texas and southern Louisiana are supplemented by a ratoon crop. This involves harvesting the secondary growth that follows the first harvest's cutting. Often an application of fertilizer is put on the fields after the first cutting to help improve ratoon yields.

Acreage Response

The relationship between rice prices and production is important in estimating the effect of policies on supply and demand equilibrium. Rice acreage changes

when expected net returns from producing rice change relative to returns from other crops. Changes in acreage also affect yields because, as prices change, less productive land is brought into rice production or withdrawn from it and adjustments are made in input use. Using 1982 data, Grant, Beach, and Lin (1984) estimated that each 100,000-acre change in rice acreage results in an opposite change in rice yields by 30-40 pounds per acre. However, this varied widely by State. They also estimated that a change in the price of rice of $1.00 per cwt adjusted for any offsetting change in cost of production will cause farmers to change harvested area in the same direction by about 44,000 acres.

Sustained high or low prices over several years would likely result in even larger acreage shifts than short-term price changes. Farmers might be able to adjust resources that could not be changed in a single season, perhaps by preparing land for irrigation or acquiring equipment (irrigation, combines, and rice dryers) or finding alternative uses for idled land and machinery. Support prices and acreage reduction programs also make producers less responsive to price changes.

The size of the acreage shift in response to a price change depends on profit opportunities with other crops. Rice has generally been competitive enough to hold on to its acreage base. In 1987, the principal alternative crops in the Delta region were wheat, soybeans, and cotton.

Alternatives in Texas and California were more limited than in the other major rice-growing States. Soil and water constraints made crop alternatives possible on only a small share of available rice acreage. For the majority of land on which rice is grown in Texas, no alternative crops are planted in the 2-3 year rotation (Texas Rice Task Force, 1993). In California, slightly over half of the rice acreage is considered "rice only" soil, very poorly suited to rotation crops. There are relatively few choices for most of the remaining acreage, the most common being wheat or safflower every third or fourth year (UC Agricultural Issues Center, 1994).

When cash receipts minus cash expenses are compared among crops, the relative economic advantage of producing rice is evident (table 4). Cash receipts (including government program payments) less expenses have been higher for rice than for other major field crops in all years since 1988. However, regional returns may vary.

The lack of perfect substitutability among crops and rice's high entry costs likely cause rice acreage response to price increases to be less than for other major field crops. And, once land is prepared for rice, sustained low prices may be required to shrink U.S. rice production capacity.

Rice Area and Yield Potential

Grant and Holder (1975) attempted to estimate the potential for further expansion of rice area in the United States under the assumption that potential new rice area should lend itself to irrigation: (1) the surface slope of the land should be relatively flat for irrigation water control, (2) internal drainage should be poor in order to hold surface water in a flood condition, (3) irrigation water is available, and (4) practical crop rotation patterns are adhered to.

They estimated that U.S. rice acreage could expand to a sustainable 4.4 million acres and to 9.7 million acres on a short-term basis (table 5). Their estimate ignored market conditions, government acreage restrictions, and competing crop net returns, and simply considered maximum potential acreage.

The long-term price signal necessary to trigger an expansion in U.S. rice area to 4.4 million acres would require farmer confidence in a sustained market price at or above the national average economic cost per cwt which was estimated to be $9.96 in 1992.[5] The

[5]See tables 8 and 9 for a description of average costs by region. The Interagency Agricultural Projections Committee of USDA projects the season average farm price for rice to increase from $6.10 per cwt in 1994/95 to $9.10 in 2005/06 under a set of normalcy conditions (WAOB 95-1, 1995). Thus, barring a dramatic change in international conditions, U.S. rice acreage would probably not expand near the estimated 4.4 million acre potential.

Table 4—U.S. average returns above cash expenses per planted acre, selected crops[1]

Year	Rice	Wheat	Corn	Soybeans	Cotton
	Dollars/planted acre				
1986	240	88	135	73	147
1987	379	92	211	105	209
1988	237	94	126	111	122
1989	290	66	163	78	130
1990	236	63	140	89	108
1991	282	69	110	78	103
1992	257	78	143	97	179

[1]Returns are cash receipts and government payments less cash expenses. See table 7 for income components for rice.

Sources: USDA, Consolidated Farm Service Agency, and USDA, ERS, *Economic Indicators of the Farm Sector,* 1994.

Table 5—Estimated acres of cropland, acres suited to rice, sustainable rice production acres, and reported planted acres in 1991-93 and 1994 for the major rice-producing States

Area	Total cropland	Potential rice area[1]		Reported rice area	
		Suitable	Sustainable	1991-93[2]	1994[3]
			1,000 acres		
Arkansas	4,340	2,749	1,359	1,327	1,440
Louisiana	2,031	1,930	965	578	625
Mississippi	2,350	1,351	675	252	315
Missouri	1,397	559	279	106	131
Texas	2,550	2,430	596	333	355
California[4]	661	661	503	396	487
Total	13,329	9,680	4,377	2,991	3,353

[1]Increased water resource and environmental constraints along with non-agricultural development have likely decreased the potential area for rice expansion in some areas. [2]Average planted acres for 1991, 1992, and 1993. [3]"Crop Production: 1994 Summary," CR PR 2-1(95), NASS, USDA. [4]Excludes data from San Joaquin Valley.

Source: Grant and Holder, Jr., 1975.

distribution of farm-level cost-of-production per cwt across and within regions would affect the actual rates at which rice area expansion would be economically justifiable.

On a regional basis, Louisiana, Mississippi, Missouri, and Texas have the largest amounts of sustainably expandable acreage above 1994 plantings. The cost structure of Texas and southern Louisiana rice farms would probably require a sustained market price above $10 per cwt to encourage acreage expansion, whereas Mississippi offers the most opportunity for expansion with a sustained market price in the $9 range. These prices compare with 1993/94's estimated season average market price of $7.98 per cwt and with the 4-year average of $7.00 for 1990/91 to 1993/94.

Tremendous productivity gains in rice have been realized over the last four decades through a combination of improvements in fertilizer, water management, and varieties. In addition, U.S. rice yields are not as subject to many of the weather-related swings that affect other U.S. field crops because the entire crop is irrigated and fertilized. Hence, rice has both higher and more stable yields than other crops.

Since the early 1950's, U.S. yields have progressed in four stages (fig. 7). From 1953/54 to 1967/68, U.S. rice yields grew at an annual average rate of 4 percent, rising from under 2,500 pounds per acre to over 4,500, principally as the result of improved production methods and irrigation infrastructure development. From 1967/68 to 1980/81, yields were stagnant at an average of 4,511 pounds per acre. Then widespread adoption of semidwarf varieties in the early 1980's moved U.S. rice yields higher at a 3.7 percent annual growth rate before again leveling off in the late 1980s. Finally, during 1986/87-1993/94, yields per acre showed marginal annual trend growth of 0.4 percent, averaging 5,654 pounds per acre.

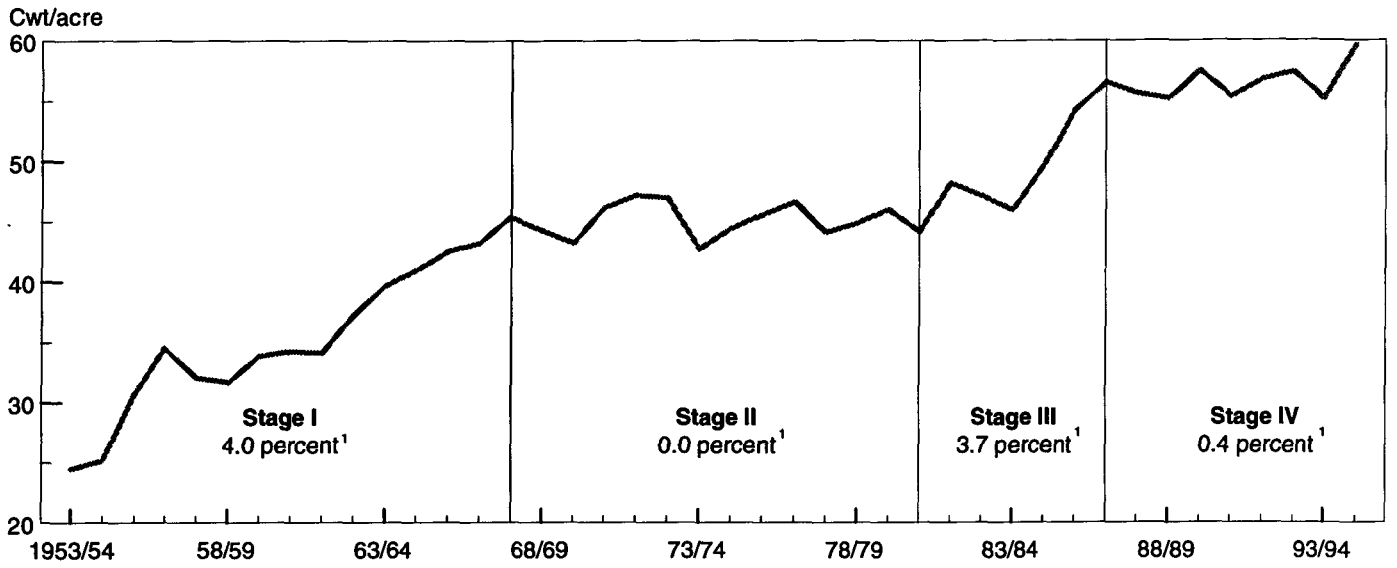
Future growth in U.S. yields depends on several factors: (1) investment in varietal research; (2) new varieties currently in research stations; (3) length of time for transmission of new varieties from the research station to the farmer's field (currently estimated at 10 years); (4) the rotation period and weed control; (5) chemical dependency; and (6) water availability, cost, and control.

The U.S. rice industry does not appear poised to move to the next "yield plateau," but rather appears likely to see yields continue to creep marginally higher at a rate that lags cost-of-production rises, thus eroding the industry's economic viability. If a major breakthrough occurred in the research station today, it is estimated that nearly 10 years would be required before the new variety would be commercially accessible.

The U.S. Rice Program

Government programs incorporate several objectives such as ensuring a stable food supply at stable prices

Figure 7
U.S. rice yields



[1] Average annual growth.
Source: USDA.

via a variety of acreage controls, supporting farm incomes with a minimum of market interference, and preserving American farmlands. This multiplicity of objectives lends to program complexity, while the income support aspect of government programs lends to their widespread use.

Program Provisions[6]

The U.S. Government's current rice program addresses six specific issues: (1) supply control; (2) price support; (3) income support; (4) planting flexibility; (5) market orientation; and (6) budgetary restrictions.

Supply Control

Supply controls have been an essential element of U.S. farm programs since their inception. The objective of supply control is to prevent an excessive buildup of total stocks. Excessive stocks cost the Federal Government in the form of direct storage costs, plus indirectly via increased deficiency payments due to the price-depressing effect of large stocks overhanging the market.

Supply controls have been implemented through acreage control programs such as the Paid Land Diversion (PLD) or Acreage Reduction Program (ARP). Acreage control programs limit production by restricting land that can be used for the commodity.

A key concept under acreage control is an individual farm's crop acreage base that is eligible for government program benefits. For rice, the crop acreage base is the average of the acreage planted and considered planted to rice for harvest on the farm in the 3 preceding crop years.

Current legislation includes authority for Acreage Reduction Programs (ARP) from base acres. An ARP is a voluntary annual land retirement program; however, compliance is required for program payment eligibility. Acres reduced under an ARP are not eligible for program payments, but are considered planted for crop acreage base purposes.

The Secretary has discretion in setting an ARP level, which can range from 0 to 35 percent.[7] However, by law the ARP must be chosen with the objective of producing a projected level of ending stocks for the next marketing year's crop that is 16.5 to 20 percent of the average total use for the 3 preceding marketing years.

[6] For a history of the U.S. rice program and the development of program provisions through 1988, see Childs and Lin (1989) and Setia, Childs, Wailes, and Livezey (1994).

[7] Authority also exists for having no ARP. Under such a program (never established for a crop) producers' plantings of rice would not be limited, although target price payments would be made only on payment acres. However, all production would be eligible for price support loans.

An ARP reduces government outlays by reducing payment acres and by reducing area, thus reducing production and increasing market prices. Because demand for rice is inelastic, the ARP-induced higher prices increase farm income.

Acreage control programs have two inherent weaknesses. First, when program participants idle land, "slippage" may occur. That is, the idling of frequently less productive land is offset by either greater use of nonland inputs in production or by increased plantings by nonprogram participants in anticipation of higher market prices. Second, inefficient uses of inputs often result (Halberg, 1992).

Price Support

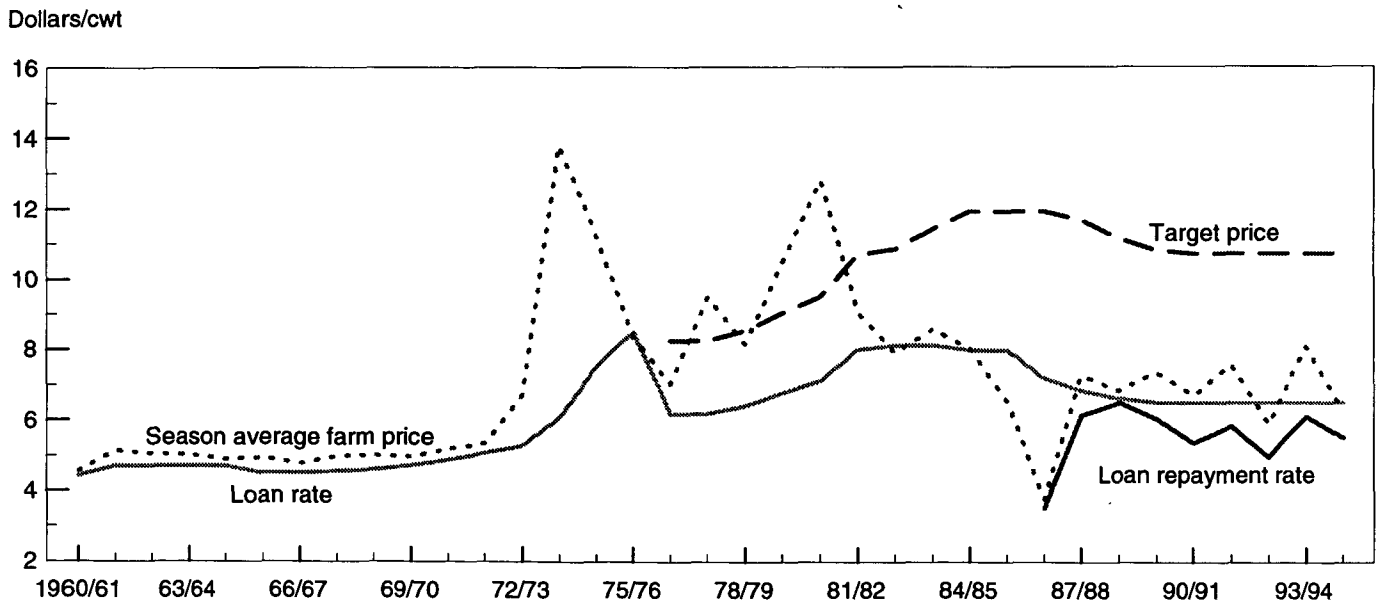
Price support is provided by loan programs which provide a guaranteed minimum farm price. Producers may place their rice under a nonrecourse government loan while waiting for improved market selling opportunities. Once they have placed their rice under loan, producers have a 9-month period in which to redeem their loans. At the end of that period they must decide whether to redeem the loan or forfeit their rice to the Commodity Credit Corporation (CCC). If a farmer forfeits her or his crop to the Government, the farmer retains the loan proceeds. Only farmers participating in farm programs are eligible for such loans. The loan is available on eligible acreage—permitted rice base that is planted and flex acres. Under a no-ARP, all plantings would be eligible. When an ARP is in effect, only acreage planted by program participants is eligible. Plantings on acreage outside the program (nonbase plantings) are not eligible.

The basic loan rate is set at 85 percent of the simple average price for the preceding 5 years, deleting the high and low price. The loan rate, however, cannot fall below $6.50 per cwt in accordance with the Food Security Act of 1985. Since 1989, the loan rate has been constant at $6.50 per cwt, rough basis (fig. 8).

Loan rates for warehouse loans are based on the actual milling quality of individual lots of rice, whereas farm-stored rates are based on historical milling qualities of the different classes of rice by State. In recent years these rates, whether warehouse or farm-stored, have been established by setting the whole-kernel loan rate for medium- and short-grain at $1.00 per cwt less than the long-grain rate.

The acreage reduction and target price provisions of the program are uniformly applied to all rice classes and much of the information available for supply, demand, and price movements focuses on the all-rice market.

Figure 8
Season average price received and government program prices, 1960/61-94/95



Source: USDA.

Income Support

Farm income support is provided by the target price deficiency payment program. When the national average price received by farmers falls below the announced target price, deficiency payments are made. The total deficiency payment is the product of the payment rate, payment acreage, and program yield.

For the 1994 crop, the payment rate is the difference between the target price and the higher of the loan rate or the lower of the 12-month calendar year average price or the average price during the first 5 months of the marketing year plus $0.27 (an adjustment factor implemented to lower program costs). Since 1990, the target price has been constant at $10.71 per cwt, rough basis.

Payment acreage is generally equal to the established rice acreage base, less normal flex acres, any acres placed in the required ARP, and nonpaid acreage under the 50/85 provision. Only producers that comply with any required ARP are eligible for income support payments.

The program yield is the level of production per acre eligible for target-price deficiency payments. Production above the program yield only receives market returns. Program yields were frozen in 1990 and have not been adjusted since then.

Planting Flexibility

Planting flexibility provisions allow program participants to plant established crop acreage base to a nonbase crop without a reduction in the established crop acreage base.

Planting flexibility is important for field crops requiring regular rotations. Rotations are used to control plant diseases and enhance soil fertility. In the past, inflexible program restrictions locked producers into certain crops to maintain payment acreage base, thus hindering efficient farming operations. The benefits of greater planting flexibility and crop rotation include improved environmental quality, reduced production costs through yield improvements and reduced input costs, and an increased revenue share from market returns.

Policymakers saw increased planting flexibility as a way to both move producers away from making production decisions in response to the program and facilitate their response to market signals.

Current program planting flexibility first became available under the Food Security Act of 1985 in the form of underplanting via the 50/92 program. The 50/92 program was only available when an ARP was in place. If a producer planted between 50 and 92 percent of maximum payment acres to rice, and devoted the remainder to a conserving use, then 92 percent of maximum payment acres were eligible to receive deficiency payments. The 50/92 program was changed to the 50/85 program in 1994 with provisions of the original 50/92 program intact except that now farmers are eligible to receive payments on only 85 percent of maximum payment acres.

Planting flexibility was increased by the concept of "triple base" under the Food, Agriculture, Conservation, and Trade Act of 1990. Triple base provisions of the legislation divide the crop acreage base into three components. First, normal flex acres (NFA) are the 15 percent of crop acreage base not eligible for payments. Second, maximum payment acreage is equal to the crop acreage base less NFA or any ARP. A program participant is eligible to plant certain crops on NFA without decreasing established base.[8] NFA receives no deficiency payments, even if the base crop is planted. Third, optional flex acres (OFA) are an additional 10 percent of maximum payment acres that can be planted to the same nonprogram crops.[9] If OFA are planted to rice, then OFA are eligible for rice program payments; if planted to another crop, they are not eligible for rice program payments; but if planted to another program crop or oilseeds, such plantings are eligible for price support loans. Planting flexibility exists on both NFA and OFA because the crop acreage base is protected for future years, even if another crop is planted.

Market Orientation

During the early 1980's, loan rates well above market prices decreased U.S. competitiveness in world markets by serving as a "floor price" for U.S. rice. Loan rates in excess of international prices isolated U.S. crops being held under loan from the market. This caused large quantities of grain to be forfeited to the Government and a large U.S. price premium in international markets. Commodity Credit Corporation inventory increased from none in 1980/81 to 44 million cwt by 1985/86, while U.S. rice exports decreased from 91 million cwt to 59 million cwt.

Three principal market-oriented features were instituted under the Food Security Act of 1985 to reduce

[8]All crops may be harvested on flex acreage except fruits and vegetables (not including adzuki, faba, and lupin beans), peanuts, tobacco, wild rice, trees, and nuts.

[9]Refer to footnote 8.

government-held stocks, to make U.S. rice more competitive in world markets, and to place more emphasis on market returns to guide planting decisions.

First, the announced loan rate (ALR) was allowed to decline from $8.14 in 1983/84 to $6.50 by 1990/91. By lowering the loan rate, farmers were forced to look more to the marketplace for selling their crop.

Second, a marketing loan program was introduced that linked loan repayment rates to the prevailing world price of rice rather than the higher announced loan rate. Rice producers could now repay loans at the lower of a USDA-calculated world price or a set percentage of the loan rate. Producers who redeem their loans, repay their loans at a rate equal to the USDA-calculated world price (loan repayment rate or LRR). Alternatively, producers can receive an equivalent loan deficiency payment with agreement to forgo placing their crop under loan. The difference between the ALR and the world price is called the marketing loan gain. If the world price is above the ALR, the LRR equals the ALR. The loan gain is based on rough rice prices.

Third, NFA receive no target price deficiency payments. Instead, producers must rely solely on the market for returns.

Budgetary Restrictions

By the mid-1980's, Congress was under increasing pressure to address the rapidly rising national budget deficit. Farm program benefits were targeted under the Food Security Act of 1985 (FSA) as part of an effort to control escalating farm program spending.

Program parameters affecting deficiency payments were changed. Both the target price and loan rate were allowed to decline from $11.90 and $8.00, respectively, in 1984/85 to $10.71 and $6.50 by 1990/91. A lower loan rate reduced the likelihood of crop forfeiture. A lower target price helped bring U.S. prices more in line with international prices.

The 1985 Act also instituted underplanting provisions under the 50/85 program (originally the 50/92 program). The 50/85 program was originally designed to reduce government stocks by permitting farmers to reduce plantings and, at the same time, receive government payments (Broussard, 1992).

In 1990, further pressure to lower program costs led to a freeze in payment yields at their 1990 level under the Food, Agriculture, Conservation, and Trade Act of 1990. The Omnibus Budget Reconciliation Act of 1990 further lowered program costs by limiting payment acres to 85 percent of crop acreage base, thus instituting the normal flex acreage concept.

Program Participation

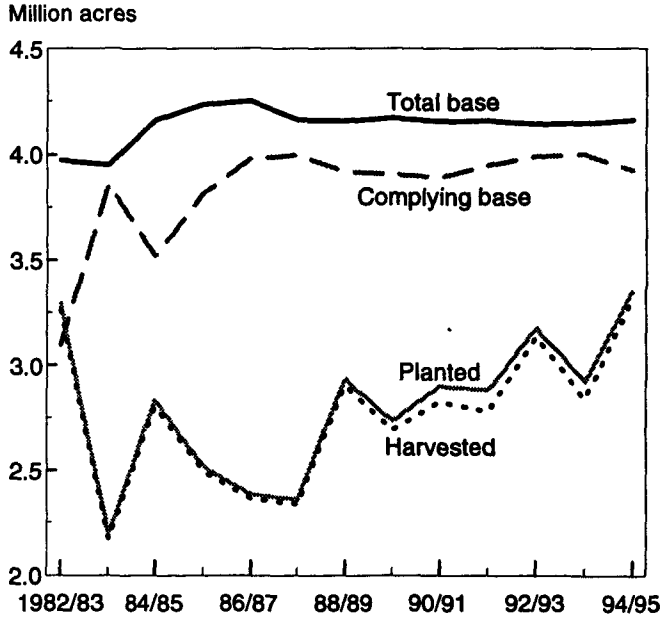
The income support provided by the government rice program has prompted high farm participation rates. Acreage base enrollment in the rice program is highest among program crops, averaging more than 95 percent since 1990/91. This is more than 10 percent higher than base enrollment for wheat or feed grains.

Base Acres

Since the current concept of crop acreage base was started in 1982, participation in the rice program has averaged over 92 percent (app. table 3). The rice base has been stable during this period averaging 4.14 million acres, ranging from a low of 3.97 million acres in 1982 to a high of 4.25 million acres in 1986 (fig. 9). Rice base acreage has averaged 4.14 million acres since 1982.

One possible reason for the high participation rate is that some rice producers have limited alternative uses for rice acreage. Also, program provisions are favorable for participation. Since 1990, the target price has averaged 35 percent higher than the season average farm price. This compares with wheat and corn target prices that have averaged 25 and 15 percent higher than their respective season average farm prices.

Figure 9
U.S. rice acreage



Source: USDA.

Normal and Optional Flex Acres

Under a combined NFA and OFA, up to 25 percent of crop acreage base can be flexed out of rice. As a result of high participation rates, eligible flex acreage has been near 1 million acres since 1986. For the crop years 1991/92-1993/94, there were nearly 600,000 normal flex acres, while almost 400,000 acres were eligible for flexing under the optional flex acreage provision (app. table 6). Although not eligible for deficiency payments, NFA can be planted to certain other crops.[10]

A rice producer is confronted with three alternatives for flex acreage: plant to rice, plant to other crops, or idle the acreage (Salassi, 1991). A decision to plant a crop other than rice suggests that rice is less competitive without government deficiency payments. A decision to idle the land suggests that high costs of production make rice unprofitable, while limited short-term crop alternatives to rice exist for the land.

During 1991/92-1993/94, 26 percent of national rice NFA was planted to rice, while another 47 percent of was flexed to other crops. Arkansas producers planted the largest percentage of rice NFA to rice, more than 33 percent. Texas producers planted less than 4 percent of NFA to rice, well under the national average. Mississippi led the way in planting NFA to other crops, averaging 73 percent.

Nationally, 26 percent of NFA was idled between 1991/92 and 1993/94. Program participants in Texas, California, and Louisiana each left large percentages of NFA idled. Texas producers idled 75 percent of NFA, California producers idled an average of 55 percent, and Louisiana producers, 35 percent. Without income support from the target price/deficiency payment program, high production costs may have resulted in the large amount of idled acres for these States. No government payments or market returns were received on these idled acres. Also, during those years when the flex provisions were in place, there was either a 0- or 5-percent ARP requirement, down significantly from the preceding 9 years when ARP's ranged from 15 to 35 percent. This may have caused some producers to idle a larger percentage of flex acres.

The 50/85 Program[11]

Initially, the 50/85 program was designed to help reduce excess U.S. supplies via reduced plantings while still allowing producers to retain their government payments. More recently, the 50/85 program has been used to satisfy different farm-level objectives. First, it offers farmers greater planting flexibility needed to respect crop rotation practices without losing rice program acreage base. Second, an increasing number of producers has cited water constraints as a reason for participating in 50/85. Finally, and perhaps most importantly, producers have cited increasing production costs relative to market returns as incentives to reduce plantings under 50/85. Being guaranteed payments for 85 percent of the maximum payment acres (MPA), while only planting 50 percent of the MPA, has provided income these producers may not have generated if the entire crop acreage base had been planted. In some areas, particularly Texas, financing without the guaranteed 50/85 payments is difficult to obtain for some producers.

Participation in the 50/85 program has increased since 1986 from 18 percent of the total effective rice base enrolled to a record 38 percent in 1993 (table 6). The 50/85 provision has been used in all the rice-producing States; however, Texas has shown the greatest reliance with an average of 76 percent of complying base acres since 1990. Mississippi at 45 percent and California at 43 percent are also aggressive users of the 50/85 provision, although much of California's prior reliance is attributable to a prolonged drought that ended in 1993 when only 24 percent of effective base was enrolled in the 50/85 program.

From 1991 to 1993, Texas idled an average of 141,000 acres (25 percent of complying base acres) under 50/85. Arkansas idled an average of 125,000 acres (only 7 percent of complying base) under 50/85.

Program Costs

Under the current Federal rice program legislation, the Government incurs program costs via program payments to rice producers and CCC market activities.[12]

Government payments include (1) target price deficiency payments, (2) marketing loan gains, (3) Conservation Reserve Program (CRP) payments, and (4) disaster payments. Payments were also made under various diversion and payment-in-kind programs.

Costs arising from CCC market activities include storage costs of rice forfeited under the loan program and resale losses (profits) incurred when CCC market sales are made below (above) the loan rate plus storage costs.

[10]See footnote 8.

[11]For further details, see Broussard (1992).

[12]The Federal costs of program administration and overhead are ignored in this report.

Deficiency payments have made up the bulk of direct payments to rice producers since 1981 (table 7). During 1991/92-1993/94, deficiency payments accounted for two-thirds of government direct payments, with marketing loan gains accounting for the remaining third. CRP payments are a minuscule share of government rice program payments because only 13,000 acres of rice base are enrolled in the CRP.

The 1977 Food and Agriculture Act imposed payment limitations on producers for the first time. Payment limits were initially set at $52,250 for one or more crops but, by 1980, payments could not exceed $50,000 per person for total payments received under the grain and cotton programs. However, there are no limits to the amount of payments that one farm can receive. As a result, the payment limitation "per person" has not proven an effective constraint on reducing government payments on a farm basis.

Table 6—50/85 program acres: Total enrolled, enrolled as a share of complying base, and acres idled, by State[1]

Year	AR	LA	MS	MO	TX	Southern States	CA	U.S.
				1,000 acres				
Acres enrolled in 50/85:								
1986/87	192	95	86	9	292	673	41	717
1987/88	253	162	119	15	332	881	47	928
1988/89	150	96	61	5	249	561	48	609
1989/90	241	143	120	11	340	854	59	914
1990/91	253	134	106	11	368	872	190	1,062
1991/92	332	182	173	21	400	1,108	337	1,443
1992/93	345	163	143	16	427	1,094	286	1,384
1993/94	432	271	166	26	479	1,374	134	1,512
1994/95	177	111	65	2	375	730	65	798
				Percent				
Acres enrolled in 50/85 as a share of complying base:								
1986/87	11	13	24	9	50	20	7	18
1987/88	15	23	33	14	59	26	8	23
1988/89	10	14	18	5	46	17	8	16
1989/90	15	20	34	10	60	26	10	23
1990/91	16	19	32	10	65	26	32	27
1991/92	21	26	49	18	70	33	58	37
1992/93	21	23	40	13	74	32	49	35
1993/94	27	38	47	21	84	40	23	38
1994/95	11	16	19	2	66	22	12	20
				1,000 acres				
Acres idled under 50/85:								
1986/87	46	21	20	3	74	164	10	174
1987/88	65	41	29	4	90	229	12	241
1988/89	34	21	13	1	60	129	9	138
1989/90	62	35	32	3	98	231	14	245
1990/91	65	34	28	3	110	240	48	287
1991/92	132	84	148	14	121	499	154	654
1992/93	93	45	41	5	141	325	119	446
1993/94	125	78	64	9	162	437	43	481
1994/95	51	32	19	1	126	229	17	247

[1]From 1986/87 to 1993/94, the program operated under the name 50/92. See text for differences. 1994/95 data based on CFSA "1994 Preliminary Compliance Report." Totals may not add due to rounding.

Source: USDA, Consolidated Farm Service Agency.

Table 7—U.S. rice sector farm-level income: Market returns and government direct payments to rice producers

Payments	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94
						Million dollars							
Market returns	1,654	1,246	876	1,119	881	500	942	1,092	1,135	1,046	1,194	1,058	1,263
Gov. payments	21	267	618	380	790	902	745	611	627	696	680	929	872
Deficiency	21	267	233	380	375	495	545	549	456	555	458	613	570
Marketing loan[1]	--	--	--	--	322	407	200	62	170	141	221	315	301
CRP	--	--	--	--	--	0	0	0	0	1	1	1	1
Diversion	--	--	23	--	93	--	--	--	--	--	--	--	--
Disaster	--	--	--	--	--	--	--	--	--	--	--	--	--
Payments-in-kind	--	--	362	--	--	--	--	--	--	--	--	--	--
Total returns	1,675	1,513	1,494	1,499	1,671	1,402	1,687	1,703	1,762	1,742	1,874	1,988	2,135
						Dollars/ cwt							
Season average farm price	9.05	7.91	8.57	8.04	6.53	3.75	7.27	6.83	7.35	6.70	7.58	5.89	7.98

-- = Not available.

[1]Includes loan deficiency payments (both cash and certificates) and marketing loan gains.

Source: USDA, Consolidate Farm Service Agency.

Rice Farm Sector Returns

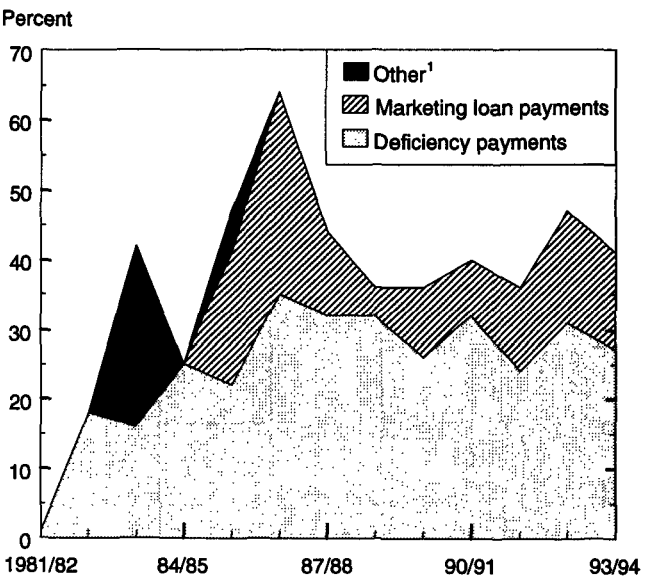
At the farm level, the two sources of rice sector income are market returns and Federal farm program payments. Rice sector income has shown steady growth in recent years, reaching $2.1 billion in 1993/94 (table 7); however, much of this increase is attributable to growth in government program outlays (fig. 10).

Market Returns

Total market returns are a function of production and market prices. Because the United States has traditionally looked to the international market for a substantial share of total use, U.S. domestic prices are closely linked to international market conditions (fig. 11). As a result, U.S. market returns are depressed by foreign agricultural trade policies that suppress import demand while exaggerating export supplies.

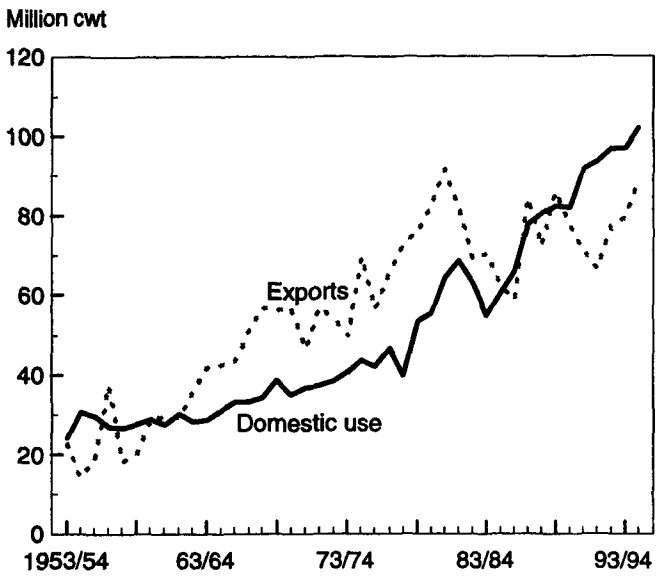
In 1981/82, market returns peaked at nearly $1.7 billion, accounting for 99 percent of total rice sector income on the strength of large, high-priced exports to South Korea. By the mid-1980's, most of the major Asian rice importing countries (including Indonesia, Japan, and South Korea) had implemented self-sufficiency policies designed to stop imports. International and U.S. market prices plummeted, while U.S. stocks rapidly accumulated to historic levels. U.S. rice producers began to depend more on government programs to make up for the deficiencies of the international marketplace. By 1986/87, the U.S. sea-

Figure 10
U.S. rice program payments as a share of sector income



[1] Diversion, disaster, CRP, and payments-in-kind.
Source: USDA.

Figure 11
U.S. rice total use, exports vs. domestic use



Source: USDA.

son average market price had fallen to $3.75 per cwt, while market returns were a meager $500 million, only 36 percent of sector returns.

Since 1986/87, the U.S. rice industry has successfully used the marketing loan program to reduce its burdensome stocks. In addition, a rapidly growing domestic market has replaced the international market as the principal source of demand for U.S. rice. The importance of the domestic market has been further supported by a tendency for excess supply, strong competition, and low prices in the international marketplace since the entrance of Vietnam in 1989 as a source of large, low-priced rice supplies.

Government Program Outlays

A high participation rate in Federal farm programs indicates the importance of program payments on rice sector income. Since 1986/87, deficiency and marketing loan payments have averaged about $726 million, or 42 percent of rice sector income. Rice sector income has been increasing over the last decade, and the components have varied with market conditions. In years of low market prices, government payments play a more important role.

Rice Farm Sector Cost Structure

A principal factor in determining the economic viability and sustainability of an individual rice farm operation is its cost structure. In the short term, a rice farming operation is concerned with profitability as measured by the difference between the gross returns from rice operations and the variable costs. Variable costs include expenses for the purchase of inputs that are consumed in one production period. Expenses for seed, fertilizer, chemicals, fuel, lubrication, machinery repairs, harvesting, drying, and custom operations are typical variable cash expenses on crop farms.

However, a rice farm's long-term viability depends on the gross returns from operations covering all of the costs associated with rice farming operations on a sustained basis. Total costs include two additional cost components: fixed cash costs and noncash costs. Fixed or overhead costs include expenses for utilities, real estate taxes, property taxes, insurance, as well as general farm business expenses such as accounting and legal fees, registration and license fees, farm office-equipment purchases, and association memberships. Noncash costs include valuations for operating capital and land as well as management and risk. Total cash costs (variable plus fixed cash costs) represent the break-even point for viable financial operations, while total economic costs (total cash costs plus total non-cash costs) represent the break-even point for optimum use of society's resources across various industries and occupations.

Background and Methodology

In 1973, Congress required USDA to produce cost estimates for the major program crops and dairy to better evaluate and regulate program support levels. USDA designed its estimates to produce costs and returns exclusive of the direct effects of government programs because the programs themselves have a strong influence on the estimates. If the direct effects of the programs were included in the estimates and then used for policy purposes to establish support levels, an escalating effect would be built into the process of setting support levels because of the effect of the program benefits on costs (Salassi, Ahearn, Ali, and Dismukes, 1990).

However, it is important to consider the direct effects of government programs to evaluate farm profitability and the trade-offs in commodity area allocation decisions faced by rice farms. These effects are especially critical for rice because program participation rates regularly exceed 90 percent and because rice-producing farms often reorganize into smaller units to avoid payment limitations.

The principal differences between including and excluding the direct effects of government programs are that (1) government payments inflate land values and rents, raising economic costs; (2) participation in government programs places restrictions on planted acres and often requires cover crops to be planted on set-aside acres, raising cash costs; (3) program deficiency payments and marketing loan-gain payments raise gross returns; (4) income from grazing or haying set-aside acres raises gross returns, and (5) because government rice program payments are larger than benefits to other commodities, a higher share of fixed costs is allocated to rice production when including the direct effects of government programs.

National Cost Structure

When direct government program effects are excluded from the cost-of-production data, the Farm Costs and Returns Surveys (FCRS) undertaken in 1978, 1984, 1988, and 1992 demonstrate a clear pattern of eroding profitability on a cash basis, falling from a U.S. average $1.85 per cwt profit after cash expenses in 1978 to a negative $0.12 in 1992 (table 8). In other words,

Table 8—Gross value of production, costs, and returns per cwt for the major rice growing regions, with and without direct government program effects[1]

	Without government programs[2]				With government programs[2]	
Region/item	1978	1984	1988	1992	1988	1992
			Dollars/cwt			
Arkansas (nondelta):						
Gross production value	7.78	8.19	6.93	6.49	10.92	10.12
Total cash costs	5.78	6.45	5.99	6.07	6.22	6.21
Net returns	1.99	1.74	0.94	0.42	4.70	3.90
Total economic costs	7.55	9.17	8.26	8.85	9.53	9.76
Net returns	0.23	-0.98	-1.33	-2.36	1.39	0.36
California:						
Gross production value	7.57	7.63	5.95	5.57	10.67	9.44
Total cash costs	6.41	6.94	6.42	6.76	6.59	6.93
Net returns	1.16	0.00	-0.47	-1.19	4.08	2.51
Total economic costs	7.37	8.48	9.07	9.18	10.20	10.01
Net returns	0.19	-0.85	-3.12	-3.61	0.47	-0.57
Delta:						
Gross production value	7.81	8.03	6.94	6.51	10.76	9.85
Total cash costs	5.66	7.25	6.84	5.93	7.08	6.11
Net returns	2.15	0.78	0.10	0.58	3.68	3.74
Total economic costs	7.24	9.17	9.29	8.65	10.44	9.23
Net returns	0.57	-1.14	-2.35	-2.14	0.32	0.62
Gulf coast:						
Gross production value	8.09	8.23	7.03	6.46	11.16	10.73
Total cash costs	6.07	8.26	7.17	7.13	7.32	7.23
Net returns	2.02	-0.03	-0.14	-0.67	3.85	3.50
Total economic costs	7.97	10.20	9.54	9.99	10.56	10.85
Net returns	0.11	-1.97	-2.51	-3.53	0.60	-0.13
U.S. average:						
Gross production value	7.82	8.05	6.82	6.32	10.91	10.09
Total cash costs	5.98	7.25	6.52	6.44	6.72	6.58
Net returns	1.85	0.79	0.30	-0.12	4.18	3.51
Total economic costs	7.57	9.30	8.90	9.16	10.07	9.96
Net returns	0.25	-1.26	-2.08	-2.84	0.84	0.12

[1]Farm Cost and Return Survey for 1978, 1984, 1988, and 1992. [2]Principal differences with government direct effects include (1) inflated land values, (2) higher gross returns, and (3) inflated cash and fixed costs.

Source: USDA, ERS, *Economic Indicators of the Farm Sector: Costs of Production—Major Field Crops and Livestock and Dairy*, various issues.

by 1992, the average U.S. rice farm was headed towards insolvency without government programs. When total economic costs are considered, while still excluding government program direct effects, net returns fall from $0.25 per cwt in 1978 to a negative $2.84 in 1992.

Salassi, Ahearn, Ali, and Dismukes (1990) calculated the direct effect of government programs using data from the 1988 and 1992 FCRS's. They found that the gross value of production, production costs, and net returns per cwt (and per planted acre) were all higher when the direct effects of government programs were included.[13]

In 1988, government direct payments on the average U.S. rice farm equalled 37 percent of the gross value of production (table 9), while government direct pay-

[13]Readers should refer to Salassi, Ahearn, Ali, and Dismukes (1990) for methodology concerning deriving production costs with and without government programs. Refer to Salassi (May 1992 and October 1992) and various issues of the *Economic Indicators of the Farm Sector: Costs of Production* annual report for details on the 1978, 1984, 1988 and 1994 FCRS's.

Table 9—Gross value of production per cwt for the major rice growing regions: Market returns and government direct payments

Item	1988/89	1989/90	1990/91	1991/92	1992/93
			Dollars/cwt		
Arkansas (nondelta):					
Market value	6.93	7.52	6.08	7.70	6.49
Government payments[1]	3.99	4.06	4.77	3.45	3.63
Total gross returns	10.92	11.58	10.85	11.15	10.12
California:					
Market value	5.95	6.61	5.35	6.69	5.57
Government payments[1]	4.72	4.25	5.06	4.19	3.87
Total gross returns	10.67	10.86	10.41	10.88	9.44
Delta:					
Market value	6.94	7.53	6.12	7.68	6.51
Government payments[1]	3.82	3.82	4.23	3.70	3.34
Total gross returns	10.76	11.35	10.35	11.38	9.85
Gulf coast:					
Market value	7.03	7.63	6.27	7.69	6.46
Government payments[1]	4.13	4.64	4.78	3.73	4.27
Total gross returns	11.16	12.27	11.05	11.42	10.73
U.S. average:					
Market value	6.82	7.45	6.06	7.52	6.32
Government payments[1]	4.09	4.16	4.69	3.71	3.77
Total gross returns	10.91	11.61	10.75	11.23	10.09
			Percent		
Government share of total gross returns:					
Arkansas (nondelta):	37	35	44	31	36
California	44	39	49	39	41
Delta	35	34	41	33	34
Gulf coast	37	38	43	33	40
U.S. average	37	36	44	33	37

[1]Target price deficiency payments plus marketing loan payments. Haying and grazing revenues are negligible on a per cwt basis.

Source: USDA, ERS, *Economic Indicators of the Farm Sector: Costs of Production—Major Field Crops and Livestock and Dairy,* various issues.

ments were responsible for changing "net returns after total cash expenses" from only $0.30 per cwt to $4.18, and for changing "net returns after total economic costs" from a loss of $2.08 per cwt to a profit of $0.84.

By 1992, the importance of government programs to the average U.S. rice farm had not diminished. Government direct payments were still 37 percent of the gross value of production, while they were responsible for changing "net returns after total cash expenses" from a loss of $0.12 per cwt to a profit of $3.51, and for changing "net returns after total economic costs" from a loss of $2.84 per cwt to a profit of $0.12.

Under the rice industries' 1992 cost structure and market conditions, government programs make the difference between profitability and loss for the average rice farm.

Total costs (both economic and cash) have shown a strong tendency to rise over time on a "per acre" basis. "Per cwt" total costs, which depend on both yields and changes in costs, have been far more variable (figs. 12 and 13). Average national yields had stagnated in the late 1970's and early 1980's, while land values and fuel prices were peaking. This produced sharp rises in both per cwt and per acre costs. In the early 1980's, land and fuel prices plummeted at the same time that U.S. rice yields moved to a higher plateau. As a result, costs per cwt fell precipitously in the mid-1980's, while per acre costs were stable. Then stagnating yields and gradually rising cost factors once again combined to drive national average economic costs per cwt to nearly $10. Record yields in 1992 reversed this trend, while costs per acre continued to rise. Increasing environmental regulations and concern for both surface and ground water quality and availability are expected to place further restrictions and costs on rice farms.

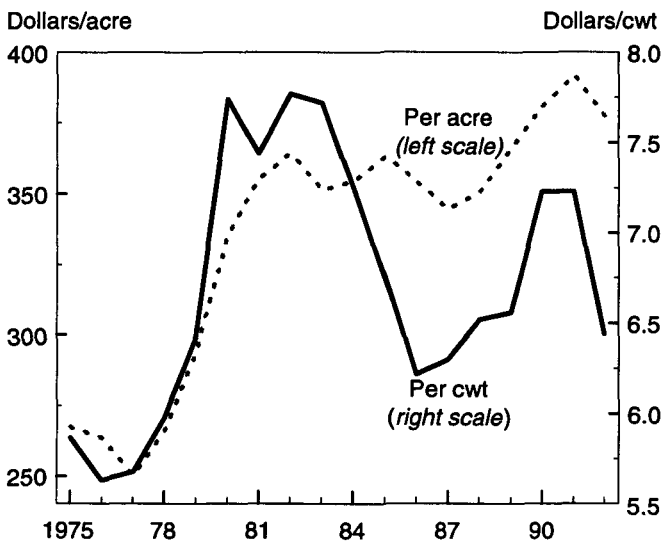
Distribution of U.S. Cost Structure

The national average cash costs of production for rice farms from 1976 to 1992 were near or above the season average farm price (SAFP) since 1984, and exceeded the loan rate in every year since 1989. National average economic costs exceeded both the SAFP and loan rate since 1981 (fig. 14).

Including government effects from 1988 to 1992, national average cash costs were near or above the SAFP and exceeded the loan rate in every year since 1989. National average economic costs were near the target price, exceeding it in 1990/91 and 1991/92 (fig. 15). The single largest difference from costs, excluding government effects, is the value of land which rises significantly under government program effects.

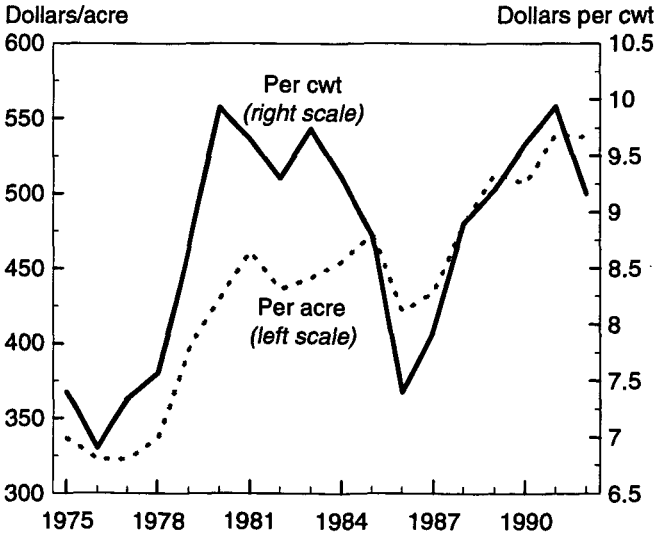
The distribution of U.S. rice farms by variable costs of production for 1992 reveals that about one-fourth had variable costs of production above the marketing

Figure 12
Average U.S. cash costs, excluding government effects



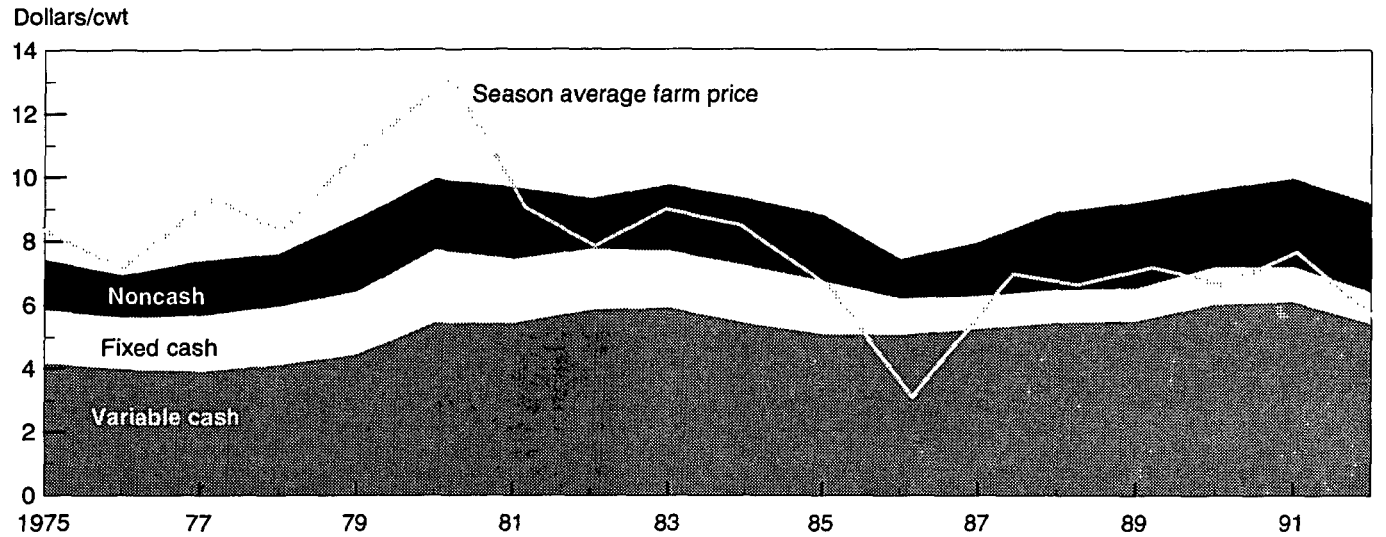
Source: USDA, ERS, 1992 Farm Costs and Returns Survey.

Figure 13
Average U.S. economic costs, excluding government effects



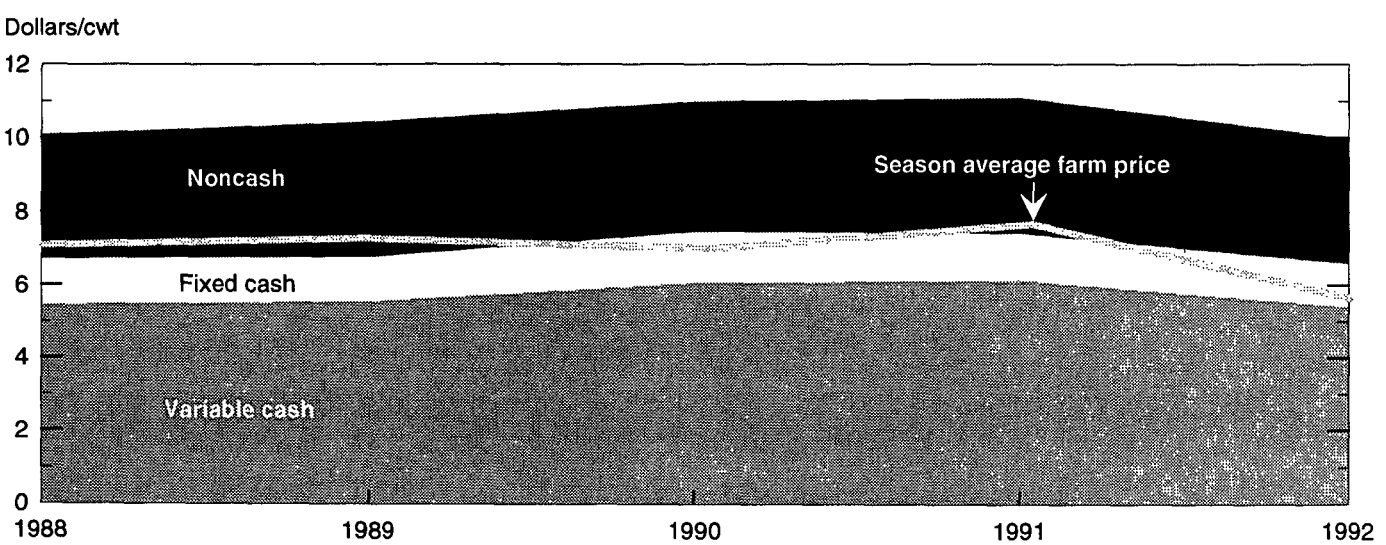
Source: USDA, ERS, 1992 Farm Costs and Returns Survey.

Figure 14
Average rice production costs, excluding government effects



Source: USDA, ERS, 1992 Farm Costs and Returns Survey.

Figure 15
Average rice production costs, including government effects



Source: USDA, ERS, Farm Costs and Returns Survey.

loan rate of $6.50 per cwt, while less than 5 percent had variable costs above the target price (fig. 16).

The bottom 25 percent had the highest average levels of total farm sales, government payments, net cash income, and net farm income. Producers with the lowest cost per cwt, on average, planted larger acreage and had higher yields per acre.

Regional Cost Structure

Regional differences in crop growing conditions and production practices also have influenced production costs. Most low- and mid-cost rice farms are located in the Arkansas nondelta and the Mississippi River Delta regions. In the gulf coast region, high costs for water and custom operations raise variable costs above the national average, while in California above average costs for drying, custom operations, chemicals, and the economic value of land combine to raise costs.

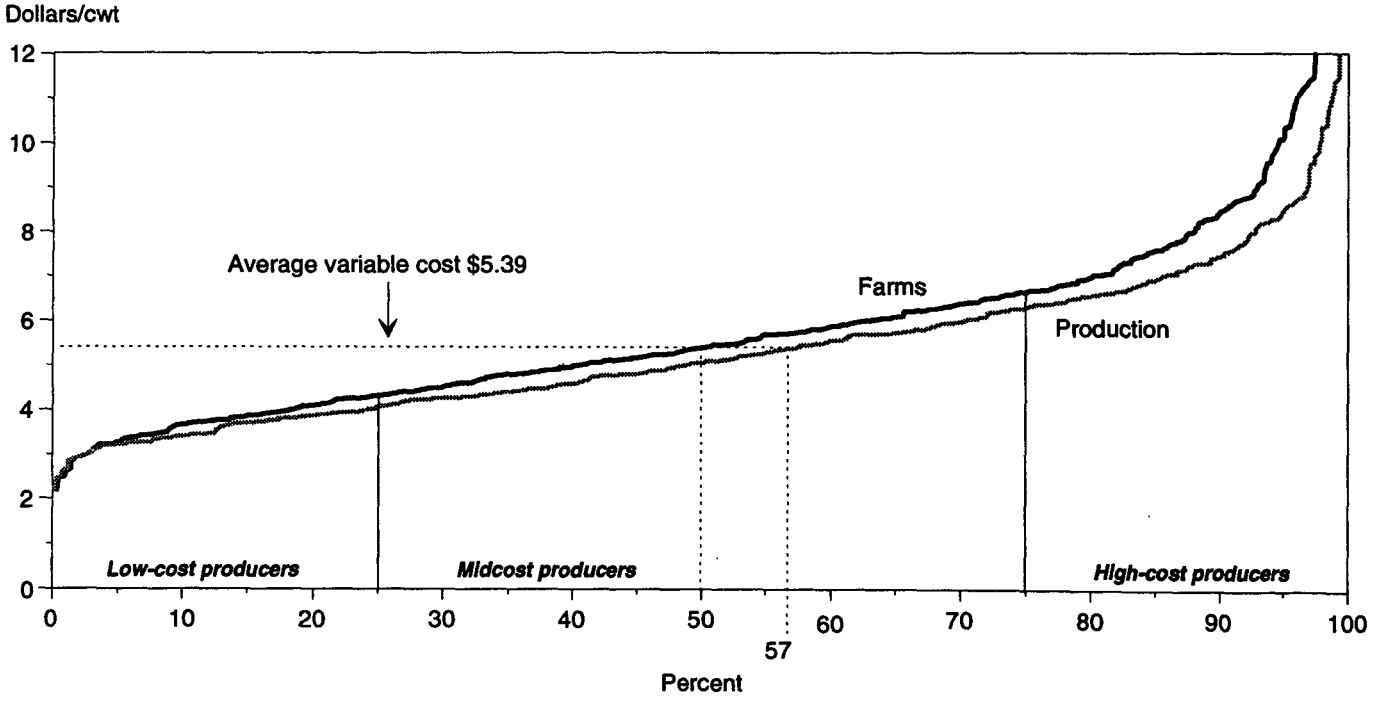
The Mississippi River Delta and the Arkansas nondelta regions are more cost-efficient at growing rice. Both regions were able to profitably produce rice independent of government programs in 1992, while California and the gulf coast regions required government programs in order to show positive returns after cash expenses.

California and gulf coast rice farmers have shown a higher dependence over time on Government programs than Delta and nondelta Arkansas rice farmers. In the gulf coast region, this dependence appears to be increasing, rising from 37 percent of total gross revenues attributable to direct government payments in 1988 to 40 percent in 1992. In California, the dependence on direct government payments as a share of total gross revenue declined to 41 percent in 1992 from 44 percent in 1988, but remains the highest of all rice-growing regions (table 9).

When considering the best overall allocation of society's resources (that is, economic costs), on the average, none of the regions' rice sectors demonstrated long-term stand-alone viability without government programs, according to the 1984, 1988, and 1992 FCRS's. California and the gulf coast rice-growing sectors also failed to demonstrate long-term viability even with government programs.

This narrow approach ignores both rotational and off-season economic opportunities of the rice land, as well as possible exports of California japonica rice to Japan and South Korea as negotiated under UR-GATT. In California and, to a lesser extent, the gulf coast region, off-season waterfowl hunting fees represent important returns to rice acreage.

Figure 16
Distribution of rice variable cash expenses, 1992



Source: USDA, ERS, 1992 Farm Costs and Returns Survey.

The visible consequence of rice farming's changing cost structure since 1985 have been a gradual shift of harvested area out of the gulf coast to more cost-efficient areas of the Delta States and nondelta Arkansas (fig. 3).

Maintaining government programs at current levels would probably encourage a continuation of the gradual shifting of area out of the gulf coast regions and into the Delta and upper-Mississippi River regions. Any reduction from current government programs would likely accelerate this process.

Although California's rice acreage declined in the 1980's, the California rice industry's high-quality product has helped developed a strong domestic base, reversing the acreage trend in the early 1990's. Acreage jumped sharply in 1994 when Japan entered the world market to purchase 2.3 million tons of rice (including 500,000 tons of California rice). The implementation of the UR-GATT minimum access requirements for Japan and South Korea portend further planting incentives for California producers of japonica rice beginning in 1995 and expanding through the year 2000.

Problems Faced by Gulf Coast and California Rice Farmers

California and the gulf coast rice-growing regions are confronting severe water and environmental constraints. Barring major technological breakthroughs, the severity of these constraints is likely to worsen with time, threatening the regions' ability to competitively produce rice even with government programs maintained at current levels.

Gulf Coast[14]

There are four principal factors generating Texas' high costs of production: (1) lack of a feasible production alternative to include in a crop rotation, thus preventing the spread of fixed costs across the enterprise; (2) abbreviated time periods for critical field operations due to weather; (3) above-average pest management problems, including weeds, insects, and diseases, resulting in higher costs than occur in other States; and (4) higher than average water pumping and distribution costs as well as increasing municipal, industrial, and recreational competition for scarce water resources.

[14]Refer to Texas Rice Task Force (1993) for further information on this subject.

California[15]

Above-average costs of production in California are due to high variable costs for custom operations, drying, and storage costs; as well as significantly above-average costs for general farm overhead, taxes, and insurance.

In addition to high production costs, California rice growers face the most stringent air and water pollution controls in the Nation. Four important problems confront the economic viability and expansion of California's rice industry: (1) competition with urban users for an increasingly scarce water supply; (2) water quality issues, particularly concerning pesticide runoff; (3) restrictions imposed on the burning of rice straw; and (4) urban growth. Higher water-user costs and increased regulatory pressure concerning pesticide runoff and straw burning are likely to further raise the costs of rice production. Rapid urban growth directly converts rice land to urban uses. Indirectly, urban growth puts competing demands on water and increases the need for greater regulation on aerial application of pesticides as well as the level of pesticide runoff from irrigation water.

From Farm to Consumer

The U.S. domestic rice market has been growing more than 4 percent a year for the past 25 years and has now overtaken the international market as the principal outlet for U.S. rice. Behind this growth is a rapidly rising per capita consumption rate, an expanding market structure, and a diversification of new rice food products.

Defining the Product

Nearly all rice is traded in some processed form, but government programs treat only the farm product. Thus, it is important to distinguish between rough or paddy rice (the farm product) and milled rice (the traded commodity). Physical characteristics, demand, and prices vary considerably between the farm and consumer.

Rough, or paddy, rice contains the hull and bran. Rough rice value is based on milling yield of whole kernels, class, and other quality factors including variety. Discounts and premiums are applied to reflect the presence or absence of certain quality characteristics (such as smut or peck) in the rough or milled rice.

[15]Refer to Agricultural Issues Center (1994) for further information on this subject.

Depending on the extent of the milling process, four different products can be produced from rough rice. Rough rice may be parboiled, a process of soaking and pressure-cooking that causes the bran to blend with the inner kernel and also unifies kernels that may have broken inside the hull. From an economic position, millers can salvage what otherwise would be sold as broken-kernel milled rice. In general, only long-grain rice is parboiled. The shorter grains are too gummy for parboiling equipment.

Whether the rice is parboiled or not, the next stage of milling is removing the hull. This produces an intermediate product called brown rice. The final stage of milling removes the bran, leaving white milled rice.

Many of the kernels are cracked during harvest or broken when rice is milled. These pieces of rice are referred to as brokens and are classified and priced according to their length: second heads (the longest), screenings, and brewers (the shortest). Brokens are generally used in processed foods, primarily cereal, candy, and pet food, or in beer brewing where length of grain and appearance may be less important.

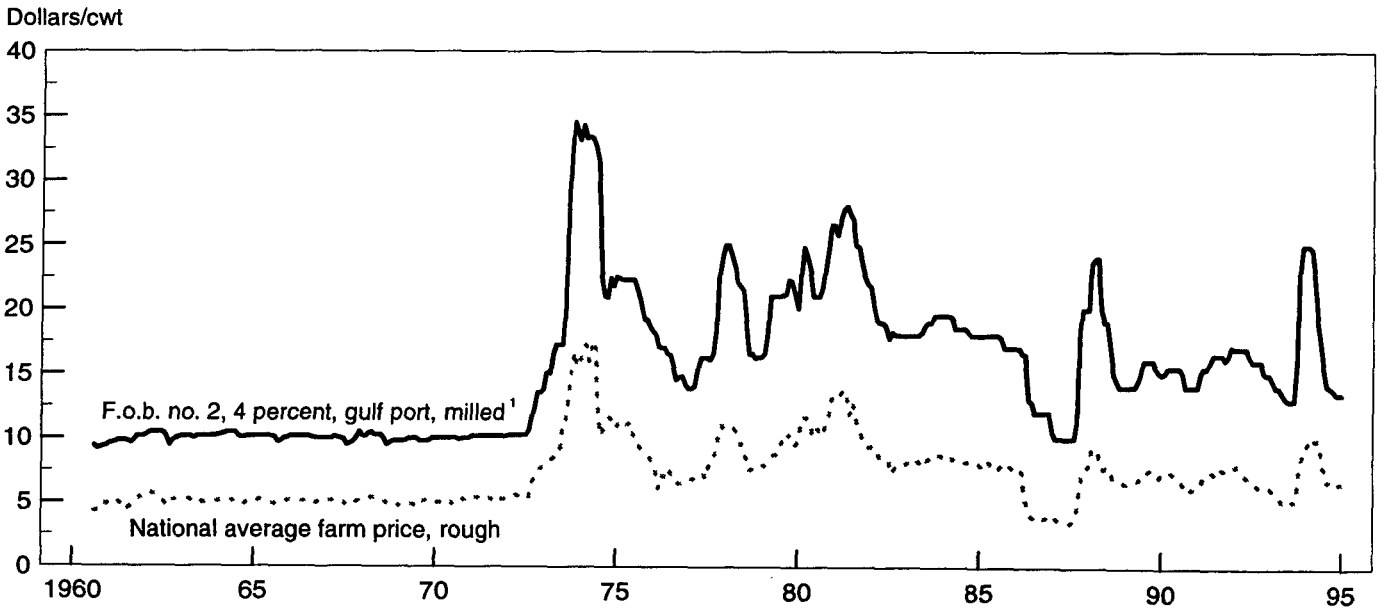
Thus, there are four types of final products: parboiled, brown, milled, and broken rice. Rice is usually referred to by the length of grain and the milling process: long-grain parboiled, medium brown, or short milled, and so on. However, broken kernels lose their class identity and are often sold simply as brewers or screenings.

Long-grain rice traditionally received a premium price relative to medium- and short-grain, while whole kernels are always worth more than brokens. However, in recent years long-grain rice's premium over medium- and short-grain rice has changed to a discount. Medium-grain's premium can be expected to continue with the implementation of the UR-GATT. Parboiled rice ordinarily sells at a premium to white rice since it is usually processed for specific domestic and export markets.

Prices: Farmgate vs. F.O.B. Mills and Retail

Prices for milled rice (f.o.b. mills) are roughly two to three times the farm prices (figs. 17 and 18). This margin partly reflects the actual costs incurred in milling rough rice plus subsequent bagging and delivery charges. But it also reflects the costs of obtaining

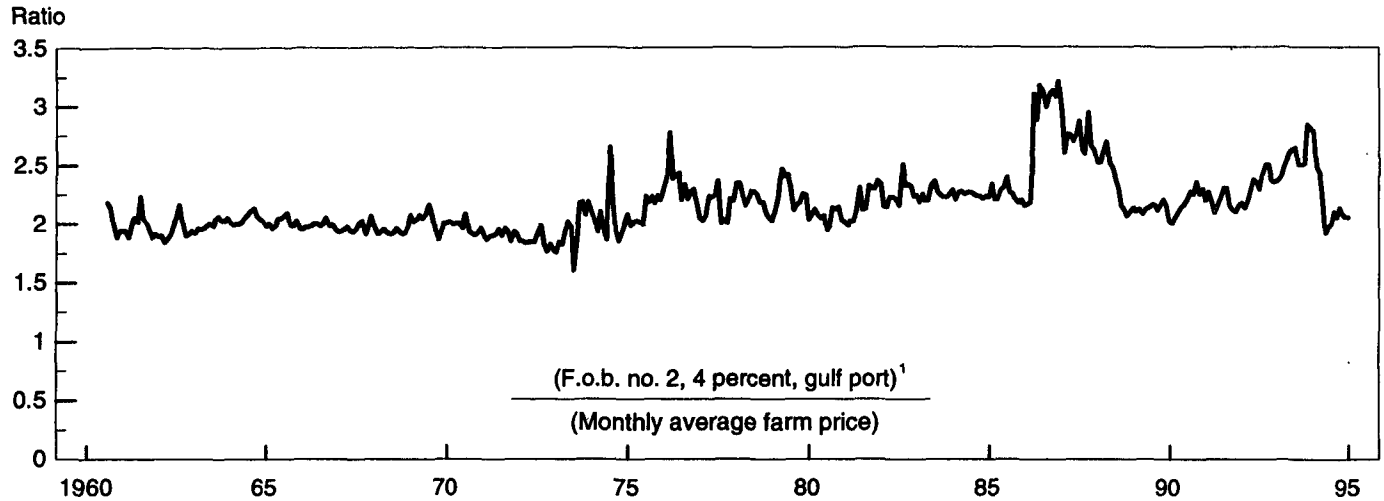
Figure 17
Export vs. farm price, monthly, January 1961-October 1994



[1]No. 2, 4 percent = high-quality, grade 2, maximum of 4 percent broken rice.

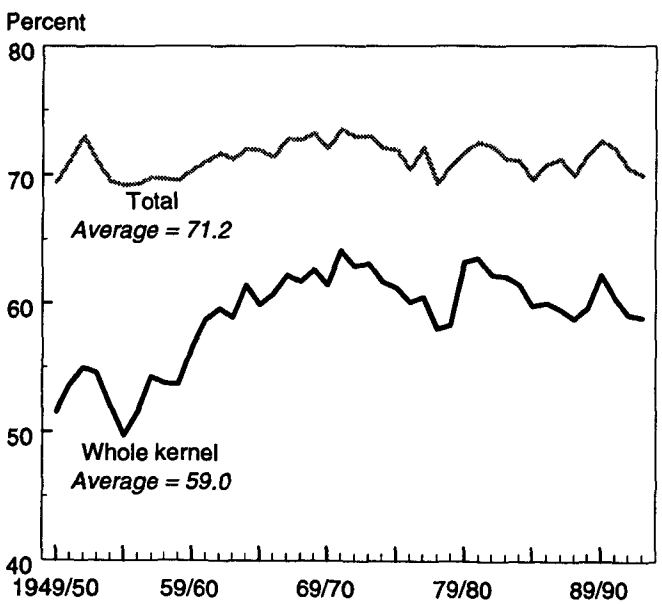
Source: USDA.

Figure 18
Ratio of f.o.b. export to farm price, monthly, January 1960 to January 1995



[1] No. 2, 4 percent = high quality, grade 2, maximum of 4 percent broken rice.
Source: USDA.

Figure 19
U.S. rice milling yields



Source: Rice Millers Association.

whole kernels. On average, the whole kernel yield from milling is 58-63 percent, although it was lower before 1960 (fig. 19). The rest will be hulls, bran, and broken pieces. On average, at least 140 pounds of rough rice must be processed to obtain about 100 pounds of milled, edible rice. If the milled rice is to be all whole kernels, about 165 pounds of rough rice would be required. Thus, if rough rice costs $6.00 per cwt, about $10 worth of such rice is needed to produce a cwt of edible, whole-kernel rice. To that cost must be added the cost of milling, packaging, and shipment. These costs vary but generally add $4 to $5 per cwt to the price of milled rice.

The farm-value share of the retail price of rice averaged 19 percent from 1985 to 1993, compared with 58 percent for eggs and only 7 percent for bread in 1992 (table 10). The more highly processed table-ready foods are, the more they cost overall, and generally the smaller the farm share. Cereal products start at a grain elevator, continue through cleaning, milling, and manufacturing into the desired shape and variety, and go on through packaging and distribution. Also, the highly competitive cereal makers engage in expensive advertising and promotion of cereal products.

For most foods, the marketing spread, the difference between the farm value and retail price of food, consistently contributes more to price increases than do volatile farm prices. This is clearly the case for rice where the farm value actually decreased by 27 percent between 1985 and 1993, while the retail price rose 9 percent, resulting from 17 percent growth in the marketing margin. Increases in the marketing margin mainly reflect rising costs incurred by the food industry.

Table 10—Rice, long grain: Retail price, farm values, farm-to-retail price spread, and farm value share of retail price

Item	Retail price per pound	Farm value[1]	Farm-to-retail margin	Farm value share
	Dollars			*Percent*
1985	0.47	0.11	0.36	23
1986	0.45	0.07	0.38	16
1987	0.40	0.06	0.34	15
1988	0.48	0.11	0.37	23
1989	0.50	0.10	0.40	20
1990	0.50	0.10	0.40	20
1991	0.50	0.10	0.40	20
1992	0.53	0.10	0.40	19
1993	0.51	0.08	0.43	16
Average, 1985-93	0.48	0.09	0.39	19
Percent change, 1985-93	9	-27	19	-33
Other foods:[2]				
Eggs, Grade A large, 1 dozen	0.91	0.53	0.38	58
Beef, choice, 1 lb	2.93	1.64	1.29	56
Pork, 1 lb	1.98	0.73	1.25	37
Chicken, broiler, 1 lb	0.89	0.48	0.41	54
Potatoes, 10 lbs	3.48	0.81	2.67	23
Sugar, 1 lb	0.39	0.14	0.25	36
Flour wheat, 5 lbs	1.17	0.33	0.84	28
Bread, 1 lb	0.75	0.05	0.70	7

[1]Payment to farmers for 1.53 lbs of rice, minus the value of rice-mill products accounted for by the byproducts of table rice. [2]Calculated using 1993 data.

Source: Denis Dunham (1994) and working notes from Denis Dunham.

Trends in Domestic Use

Domestic use of rice is small compared with other grains. Very little rough and no milled rice is used as a livestock or poultry feed. Instead, U.S. rice consumption is divided into three principal categories: direct food use, processed food, and beer. Domestic use of rice (rough-equivalent basis), including brewers' use, has increased dramatically from 28 million cwt in 1970/71 to an estimated 84 million cwt in 1994/95 (table 11). With this expansion in demand, domestic use has now eclipsed the once-dominant export market.

During the 1950's, domestic consumption (food and brewers' use combined) grew at a 1.6-percent annual pace before accelerating to a 2.9-percent rate in the 1960's (fig. 20). The rate of consumption further grew in the 1970's and 1980's to 3.9 and 5.8 percent, respectively, before slowing to an estimated 3.2 percent in the first 4 years of the 1990's. The growth of the 1990's comes despite a decline in both the per capita consumption rate and the absolute level of brewers' use since 1988/89.

Brewers' use appears to be slowing for a number of reasons, including the aging of the baby boom population, increasing health consciousness, and the growth

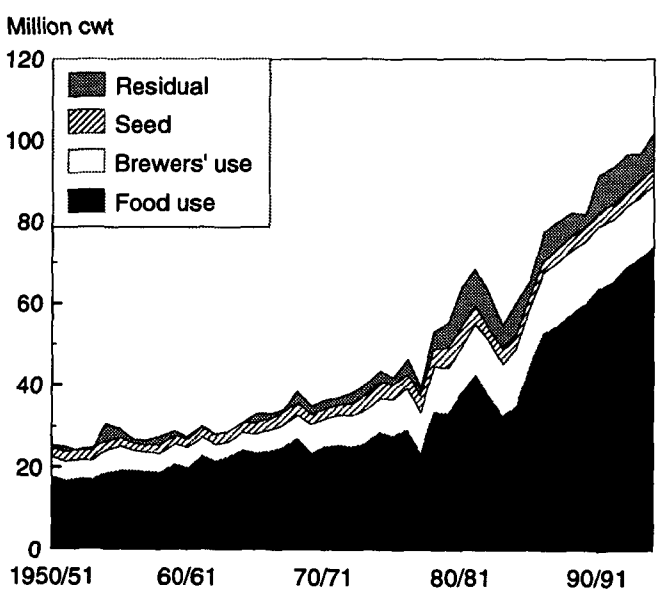
Table 11—Domestic food use, brewers' use, and per capita consumption (PCC) rates[1]

Item	Food[2]	PCC[3]	Brewers'	Total	PCC[4]
	Million cwt	*Pounds*	----------*Million cwt*----------		*Pounds*
Selected years:					
1950/51	12.8	5.9	4.9	17.6	8.2
1955/56	13.9	5.8	6.0	19.9	8.3
1960/61	15.9	6.2	4.9	20.8	8.1
1965/66	19.7	7.2	4.7	24.4	8.9
1970/71	21.5	7.6	6.8	28.3	10.0
1975/76	21.8	7.1	9.1	30.9	10.0
1980/81	34.5	10.9	11.0	45.5	14.4
1985/86	39.1	11.6	14.1	53.2	15.7
1990/91	58.7	16.8	15.3	74.0	21.2
1994/95	69.0	18.8	15.0	84.0	22.9
Averages:					
1950/51-1959/60	13.1	5.6	5.0	18.1	7.7
1960/61-1969/70	19.4	7.2	5.0	24.4	9.1
1970/71-1979/80	22.8	7.6	9.0	31.9	10.5
1980/81-1989/90	40.8	12.1	13.9	54.7	16.3
1990/91-1994/95	63.9	17.6	15.2	79.1	21.8
			Percent		
Growth rates:[5]					
1950/51-1959/60	2.0	-0.1	0.5	1.6	-0.5
1960/61-1969/70	2.5	1.4	4.5	2.9	1.9
1970/71-1979/80	3.1	1.7	5.9	3.9	2.5
1980/81-1989/90	6.6	5.5	3.5	5.8	4.7
1990/91-1994/95	4.2	2.9	-0.7	3.2	1.9

[1]All numbers are on a rough basis, except per capita consumption which is on a milled basis. [2]Excludes shipments to overseas territories. [3]PCC excluding brewers' use. [4]PCC including brewers' use. [5]Growth rates are calculated using trend regression for the relevant period.

Source: USDA database.

Figure 20
U.S. total domestic rice use



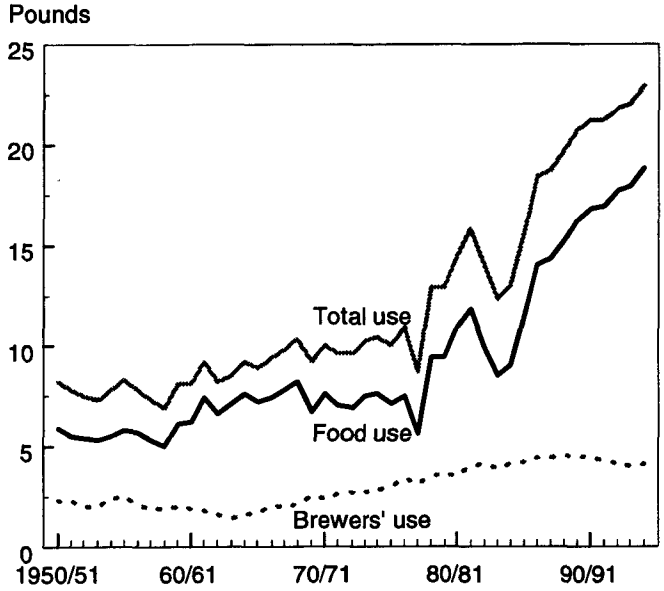
Source: USDA.

in demand for "lite" beers that require less rice in their brewing process.

Per capita consumption rates have paralleled the growth in total consumption (fig. 21). Domestic per capita consumption, including brewers' use, has grown from only 10 pounds in 1970/71 to nearly 23 pounds in 1994/95. After no growth in the 1950's, per capita consumption achieved a steady rate of growth in the 1960's and 1970's (1.9 and 2.5 percent, respectively) before accelerating at a 4.7-percent clip in the 1980's. So far in the 1990's domestic growth in per capita consumption has slowed to a 1.9-percent rate as declining brewers'-use demand partially offsets continued strong growth in domestic food-use demand.

Several factors point to continued expanding U.S. consumption of rice during the rest of the 1990's. These factors include favorable demographics, the growing perception of rice as a low-fat, highly nutritious food, greater convenience in preparing rice, an expanding selection of prepared rice dishes and flavored rice

Figure 21
U.S. rice per capita consumption rates



Source: USDA.

Table 12—Per capita consumption of selected foods, selected years[1]

Year	Rice[2]	Wheat flour[3]	Potatoes[4] Fresh	Potatoes[4] Frozen	Corn products[5]
			Pounds		
1970	6.7	110.9	12.8	59.3	11.1
1975	7.6	114.5	18.6	50.5	10.8
1980	9.4	116.9	17.7	49.1	12.9
1985	9.0	124.6	22.7	44.5	17.1
1990	16.2	135.6	25.1	43.9	21.7
1991	16.8	136.6	25.6	44.6	21.9
1992	16.9	138.1	25.5	47.0	21.9
1993	17.5	139.4	25.7	49.8	22.1

[1]Calculations used in this source differ slightly from those of table 11, but are retained for consistency in comparison across foods. [2]Milled basis, excluding brewers' use. [3]White, whole, and durum flour. [4]Retail-level consumption. [5]Flour and meal, hominy and grits, and starch.

Source: Putnam and Allshouse (1994).

mixes, and adaptation of rice byproducts, such as brokens, bran, and rice-bran oil, to new consumer uses.

Despite tremendous growth in domestic consumption of rice for food use during the past two decades, rice's average per capita consumption remains low relative to other staples, suggesting room for further growth. In 1993, the average American consumed 139.4 pounds of wheat flour, 25.7 pounds of fresh potatoes, 49.8 pounds of frozen potatoes, 22.1 pounds of corn products, and only 17.5 pounds of rice for food use (table 12).

Direct food use is the largest single domestic outlet, averaging 58 to 64 percent of total domestic disappearance since the late 1950's (table 13). Beer and processed foods account for the balance. Beer's share has been falling steadily since the mid-1970's, while processed foods' share has risen. Processed foods include soups, cereals, pet foods, rice cakes, and baby foods. Most of the direct food use is long-grain rice. Processors and brewers usually use medium-grain, short-grain, and brokens. However, all rice used in soups and about one-third of rice used in cereals is long-grain rice. Because the rice will be processed further and starch content is an important factor to many food processors, these groups tend to use the shorter, stickier grains. Processors are also more price-sensitive than direct food users because substitution among classes is feasible in some processed products such as candy and cereals, and the shorter grains tend to be cheaper than the long grains.[16]

The predominant consumption of rice is still table use, often called direct food use. This category excludes all products for which rice is used as an ingredient in the manufacture of another product. Direct food use of milled rice has more than doubled since 1975/76, growing to over 31 million cwt in 1990/91, the last year of available distribution data.

With numerous new products and effective marketing, processed foods are the fastest growing domestic market for U.S. rice. Processed food use accounted for 21 percent of total domestic demand for milled rice in 1990/91, up sharply from 14 percent in 1984/85.

Domestic rice demand is generally insensitive to changes in farm and retail rice prices. Statistical analysis indicates that a 10-percent change in the retail rice price is associated with a 1.8-percent change

[16]Based on preliminary results of USDA's 1990/91 milled rice distribution survey. Although medium-grain has moved to a substantial premium over long grain since 1991, little information is available concerning any consequent shifts in the composition of domestic use.

Table 13—U.S. rice domestic use by outlet (milled basis), selected years[1]

Market year	Direct food	Processed food	Beer	Total	Direct food	Processed food	Beer
	Million cwt				*Share as a percentage*		
1955/56	8.1	1.5	3.2	12.8	63	12	25
1966/67	11.1	3.0	3.1	17.2	64	17	18
1969/70	13.1	3.0	5.1	21.2	62	14	24
1971/72	13.6	3.5	5.4	22.5	60	16	24
1973/74	13.3	3.4	5.9	22.6	59	15	26
1975/76	13.0	2.9	6.4	22.2	59	13	29
1978/79	15.3	3.7	7.9	26.9	57	14	29
1980/81	18.9	4.5	8.0	31.4	60	14	25
1982/83	19.7	3.3	9.6	32.6	60	10	29
1984/85	22.3	5.4	9.7	37.4	60	14	26
1986/87	24.7	7.6	10.7	43.0	57	18	25
1988/89	27.7	8.6	11.2	47.5	58	18	24
1990/91	31.5	11.5	11.0	54.0	58	21	20

[1]Totals may not add due to rounding.

Source: Childs (1993).

in the opposite direction in food use (Grant, Beach, Lin, 1984). The demand response to changes in farm prices is also very low. Changes in prices of potatoes, corn, and wheat products have been estimated to have almost no effect on domestic rice demand.

Population and income are more important than price in determining food demand for rice. A 5-percent increase in U.S. per capita income has been estimated to cause per capita food use to rise by about 3 percent (Grant, Beach, Lin, 1984). Rice consumption is very much influenced by ethnic demographics. An increase in the Asian, and to a lesser extent Hispanic, population in the United States has been a factor in the upward trend of rice consumption.

Rice is consumed at a much higher rate by Asian-Americans and Hispanic-Americans than by the U.S. population as a whole. Some consumer surveys indicate Asian-Americans eat about 150 pounds of rice a year, compared with the national average estimated at 19 pounds in 1994/95. Asian-Americans currently are the fastest growing ethnic group in the United States, and this has contributed to increasing per capita rice consumption. Similarly, Hispanic-American and African-American ethnic groups are fast-growing populations that consume rice at rates above the national average.

Health benefits associated with increased consumption of rice and effective marketing are also considered important factors increasing per capita consumption of rice in the United States. Moreover, slowly changing tastes and preferences probably have more influence on the demand for rice than do price or availability.

Two other reasons for this stable domestic rice market are a simple marketing process and the lack of much exposure to volatile feed markets. Only rice millfeed—a mill byproduct consisting of bran and hulls—is fed to animals.

Domestic use is forecast to remain above exports due to continued strong growth in the domestic market. The U.S. rice industry will be challenged in the future to continue to produce adequate supplies for this rapidly growing domestic market.

Imports

U.S. rice imports have increased with the overall increase in the domestic rice market. Between 1975/76 and 1979/80, U.S. rice imports averaged a meager 0.1 million cwt (rough basis) and were less than 1 percent

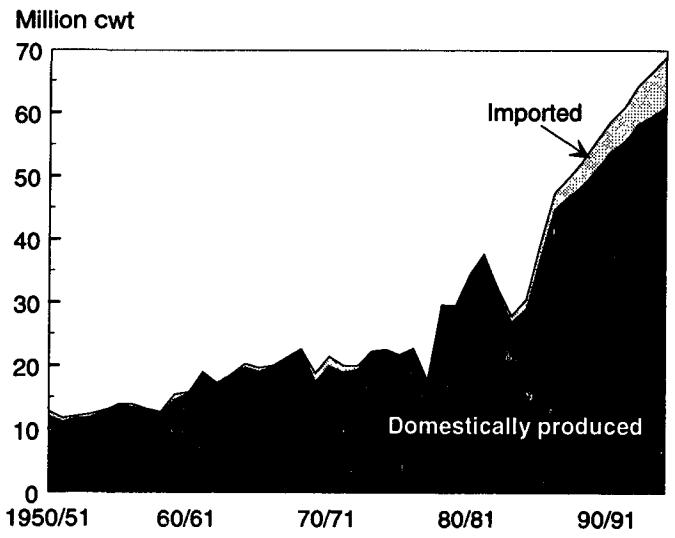
of the U.S. domestic food market. However, since 1980/81, U.S. rice imports have risen rapidly to an estimated 6.9 million cwt (or a 10-percent share of the U.S. domestic food market) in 1993/94 (fig. 22).

The principal factor behind this dramatic rise in import demand has been a strong preference for aromatic varieties (particularly jasmine from Thailand and basmati from India and Pakistan) from the rapidly growing Asian-American ethnic group. The demand for foreign, especially Asian, food and meals has also increased as Americans have developed a more sophisticated awareness of alternative rice types. These factors have given rise to a growing market niche, which U.S. production generally has not supplied.

Varieties with special characteristics, which are not produced domestically, such as Indian basmati and Thai jasmine, have distinctive cooking features (taste, aroma, grain separateness, grain length) that make them identifiably different products from U.S. long-grain rice. Despite much research, U.S. varietal development programs have shown only limited success at reproducing all of the distinctive features; however, the market potential for a consumer-acceptable, U.S.-grown aromatic variety is huge.

Regular milled rice, including Thai jasmine, has accounted for over 90 percent of imports since 1982. However, jasmine rice is not identified by U.S. Census trade data. Thus, its actual share of imports is indistinguishable from nonaromatic rice. However, most of Thailand's exports to the United States, which are identified simply as milled rice, are likely jasmine. This is an important distinction because imports of specialty varieties, including aromatic varieties, contribute to market growth, whereas imports of nonaromatic high-quality milled rice, which is produced domestically, are competitive and reflect the likelihood that lower priced imports have displaced domestic supplies.

Figure 22
U.S. domestic rice food use, by source



Source: USDA.

Since 1991, domestic and international market forces have increased the price gap between relatively expensive U.S. rice and less expensive foreign rice, making the U.S. high-quality rice market an attractive target for low-cost foreign producers like Thailand and Vietnam (fig. 23). As imports increase, such countries can be expected to play an arbitrage role in keeping U.S. prices more in line with world prices.

U.S. Exports and the International Rice Market

The United States depends on exports for over 40 percent of total annual rice disappearance. However, U.S. rice traditionally trades at a significantly higher price than foreign rice. As a result, some rice importing countries view the United States as a residual supplier, implying that international trading patterns and prices strongly affect the U.S. supply and use situation.

International Rice Market Characteristics

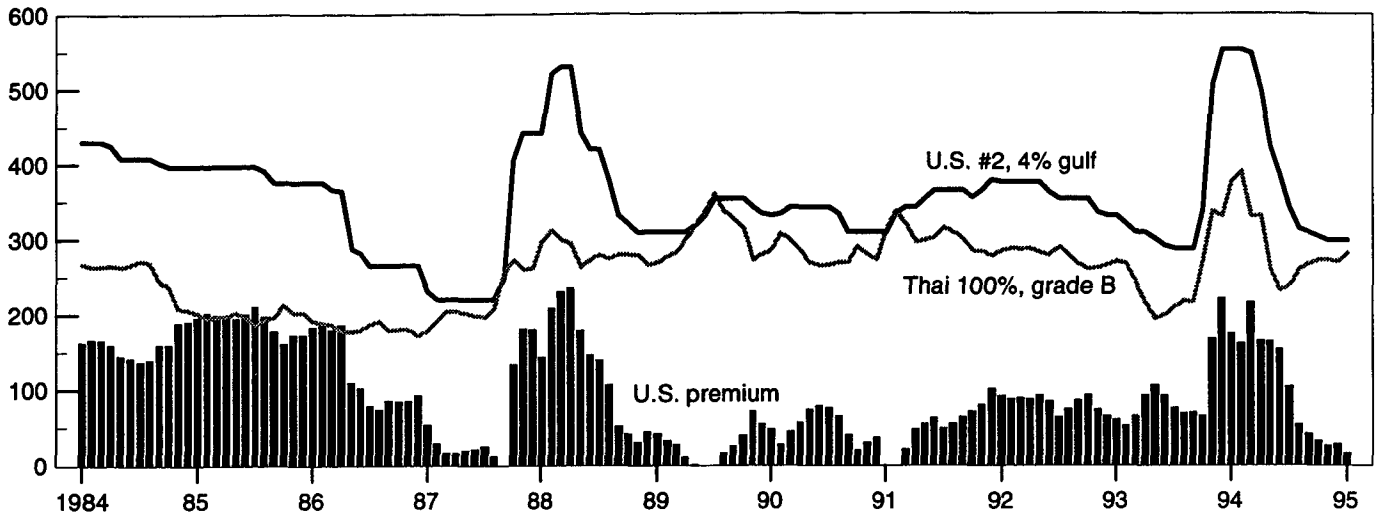
The international rice market has several characteristics that set it apart from other cereal markets. These characteristics influence price formation, trading patterns, and ultimately U.S. exports and prices.[17]

High Price and Trade Variability

World rice trade volume and prices generally fluctuate more from year to year than those of other grains for several reasons. First, a low volume of world production, less than 5 percent, is traded. Second, while rice is grown in many countries, over 90 percent of the world's rice is grown and consumed in Asia.. This concentration of production in Asia makes the rice market highly vulnerable to weather shocks. Third, in the major consuming countries, rice consumption exhibits a very low responsiveness to prices (much lower than for other cereals) due, in part, to a lack of acceptable substitutes and to the limited use of rice for feed. Fourth, the inter-

[17]For more detail concerning international rice market characteristics and their effect on trade, refer to Barker, Herdt, and Rose (1985), Childs and Lin (1989), Jayne (1993), and Schnepf (1994).

Figure 23
Monthly f.o.b. high-quality price quotes, January 1994 to January 1995[1]



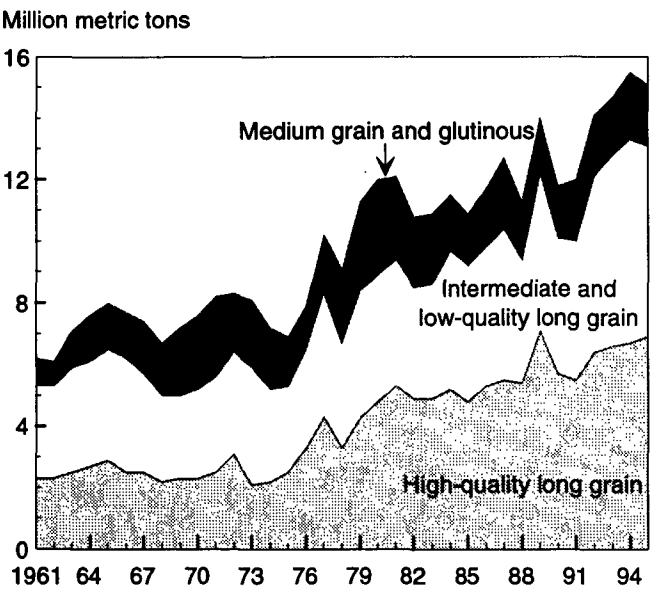
[1]Thai 100 percent, grade B and U.S. no. 2, 4 percent are comparable high-quality long grain.
Source: USDA.

national rice market has no major stockholder, a price-stabilizing function the United States performs for corn and wheat (with the European Union). Finally, price formation is generally not transparent because there exists no internationally accepted marketplace or set of standards for grading rice entering the world market.[18]

Market Segmentation by Type and Quality

The international rice market is highly segmented according to well-defined preferences in consumption. International trade in rice can be differentiated by both quality (high, intermediate, and low) and type (long-grain, medium-grain, glutinous, and aromatic). Rice quality is generally defined by its degree of milling and the percent of brokens which, in turn, is a function of a country's milling capability, grading and standardization procedures, and varietal development.

Figure 24
World rice trade, by type



Source: USDA.

[18]First-tier exporters such as Argentina, Australia, the EU, Pakistan, Thailand, Uruguay, and the United States are reliable suppliers in terms of quality and grade. However, second-tier exporters such as Burma, China, Guyana, India, and Surinam are less reliable. As a result, an international buyer of rice assumes a greater search cost and a higher degree of product risk than is the case for other grains, particularly when buying from a second-tier or nontraditional exporter.

In recent years world rice trade has been predominantly long-grain rice (indica and aromatic varieties) (fig. 24). A rough estimate suggests that during 1991-1993, total trade in rice was about 40 percent high-quality long-grain (10 percent or fewer brokens), 23 percent intermediate-quality long-grain (10 to 20 percent brokens), and 22 percent low-quality long-grain (more than 20 percent brokens). Medium-grain trade (principally japonica) has only been about 13 percent, although it gains in importance with occasional import surges by South Korea and Japan. Specialty rices, predominantly glutinous, are the remainder.

The United States competes primarily with Thailand and Vietnam for high-quality long-grain markets. Thailand also is a strong competitor in intermediate- and low-quality long-grain markets where its major competitors are Burma, China, Pakistan, and Vietnam.

Medium-grain rice is preferred in the East Asian regions of north China, the Korean peninsula, Japan, and Taiwan, along with several of the countries bordering the Mediterranean Sea (Algeria, Egypt, Israel, Jordan, Syria, and Turkey). The United States, Australia, Spain, Italy, and more recently China compete for the medium-grain markets.

The United States and China are the only two major rice-producing countries that grow significant amounts of both medium- and long-grain rice. The European Union (EU) imports high-quality long-grain, while exporting medium-grain.

Rice importers can be grouped into two fundamental categories. First are the regular, steady importing countries that lack sufficient domestic production capacity to meet internal consumption needs. Major importing regions in this group include the Middle East, the Western Hemisphere (excluding the United States, Argentina, Guyana, Surinam, and Uruguay), Eastern and Western Europe, sub-Saharan Africa, as well as Hong Kong, Malaysia, and Papua New Guinea from Asia.

Canada, Western Europe, Saudi Arabia, the Republic of South Africa, and the United States almost exclusively import high-quality (often aromatic) long-grain varieties. Latin America, the Caribbean, and the rest of the Middle East are more price-sensitive markets taking high-quality long grain when the price permits, but often buying intermediate grades of rice when funds are limited. The Mediterranean countries are emerging as strong growth markets for medium-grain rice. Eastern Europe appears to consume either medium- or long-grain varieties, depending on price and availability. The slow economic growth in sub-Saharan Africa usually restricts these countries' rice imports to low-quality long-grain.

The second group of importers includes the major consuming countries that import rice only when domestic production shortfalls produce consumption deficits. Major participants in this group include Indonesia, India, Japan, the Philippines, and South Korea. This second group transmits most of the price shock to the international rice marketplace.

Under the recently completed Uruguay Round of the GATT, Japan and South Korea have agreed to gradually open their markets to rice imports through a market access provision. As a result, medium-grain rice market share and price are expected to increase substantially beginning in 1995.

World long-grain rice trade (all qualities) is projected to show strong, steady growth through the year 2005 driven by population and income growth, particularly in Africa, Latin America, and the Middle East, but also in the industrialized countries of Canada, the United States, and Western Europe.[19] Trade volume is projected to grow 2.4 percent per year through the remainder of the 1990's, and 2.9 percent for 2000 through 2005, compared with only 1.1 percent for the 1980's.

This represents strong growth in commercial import demand for rice over the coming decade, and suggests the potential for higher prices if production is unable to expand as rapidly as demand. Sub-Saharan Africa's rapid population growth is projected to maintain its status as the world's leading source of import demand for low-quality long-grain rice. However, exporter government assistance may be needed for sub-Saharan African markets for several more years.

In light of the expected growth in world import demand, nominal world rice prices will increase throughout the next decade. Thailand, Burma, and China are expected to be the primary beneficiaries of the expanding trade. Other major exporters are expected to show only limited responses to higher world prices due to constraints on production (Australia and the United States) or to rapid increases in domestic demand (India and the United States).

[19]World Agricultural Outlook Board (1995).

Market Segmentation by Processing and Packaging

Long-grain preferences already defined by quality can be further distinguished by degree of processing as most of the rice importing and exporting countries want to perform as much as possible of the "value-added" milling stage in-country, while certain countries have strong preferences for parboiled rice, rather than white milled rice.

The most important examples include the following: (1) the EU imports predominantly parboiled, brown long-grain rice from the United States; (2) the Republic of South Africa, Nigeria, and Saudi Arabia prefer high-quality parboiled, milled long-grain rice; (3) Mexico and Brazil prefer to import rough rice to meet domestic milling capacity; and (4) Bangladesh, India, and Sri Lanka prefer to import intermediate- to low-quality parboiled long-grain rice. Argentina, the United States, and Uruguay appear to be the only countries willing to export rough rice to satisfy international demand. Thailand, Vietnam, and many other major rice exporters have laws expressly forbidding the export of rough rice.

Packaging distinctions are also an extremely important aspect of rice marketing as importers often have highly varying specifications for the type of packaging and shipping required for their import markets ranging from plastic, weather-proof packages in small sizes to 100-kilogram hemp bags to bulk shipment.

An exporting country's inability to adequately grade and mill its rice represents an important obstacle to gaining market share in high-value rice importing markets such as the EU, Japan, and Saudi Arabia. Among major exporters, Burma and India still have inadequate milling facilities, thus limiting their ability to compete in the high-quality long-grain (nonaromatic) markets. Vietnam has recently shown marked progress in improving its milling capabilities and is beginning to compete aggressively in the intermediate- and high-quality rice markets.

The U.S. Position in the World Rice Market

The United States has a reputation as an exporter of high-quality long- and medium-grain rice. From 1989 to 1992, the United States supplied nearly 19 percent of all rice traded internationally. During this period, U.S. exports were 70 percent long-grain, 13 percent medium- and short-grain rice, and the remainder rough, mixed, and brokens (table 14).

Table 14—U.S. census rice exports by type, by product weight, by value, and by unit-value

Item	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94
						1,000 metric tons						
Total volume	2,274	2,358	2,025	1,938	2,857	2,330	2,881	2,596	2,422	2,241	2,555	2,626
Rough	26	147	145	75	372	53	179	72	221	296	233	165
Long	1,542	1,429	1,291	1,366	1,952	1,568	2,052	1,872	1,693	1,374	1,679	1,487
Medium/short	627	641	443	313	385	463	406	337	321	351	298	657
Mixed	73	104	99	104	143	93	162	249	144	146	197	188
Broken	6	38	47	80	6	153	81	65	43	74	147	128
						Million dollars						
Total value	868	917	716	612	622	723	912	869	746	751	754	925
Rough	6	28	18	9	51	8	34	14	42	63	39	31
Long	654	652	545	484	470	546	698	658	555	500	536	509
Medium/short	187	197	115	80	70	121	121	114	97	123	95	293
Mixed	21	32	30	30	30	23	40	68	43	49	54	65
Broken	1	8	8	9	1	25	19	15	10	17	30	27
						Dollars/metric ton						
Unit-value	382	389	354	315	218	310	316	335	308	335	295	352
Rough	218	193	126	117	136	151	188	195	189	212	168	190
Long	424	456	422	354	241	348	340	351	328	364	319	446
Medium/short	297	308	259	256	182	260	298	338	303	350	319	446
Mixed	283	302	300	283	214	248	244	275	296	335	275	343
Broken	236	204	165	113	186	165	236	227	225	225	201	210

[1]Data are presented on a U.S. marketing year (August-July) basis.

Source: U.S. Department of Commerce, Bureau of the Census.

Three principal factors influence the ability of the United States to export rice in the international rice market: price competitiveness, U.S. Government export programs, and international nonprice factors.

U.S. Price Competitiveness

Unlike most other rice exporting countries, the United States has a rice industry that services a large, high-valued domestic market that generally tends to bid the U.S. price well above competitors' prices. This price premium is most often measured by monitoring the difference between the United States' No. 2, 4 percent, milled long-grain rice, f.o.b. Houston, and Thailand's 100 percent grade B, milled long-grain white rice, f.o.b. Bangkok (fig. 23).[20]

U.S. rice exports traditionally compete very well with a $30 to $50 premium per ton. As the premium rises above $50 per ton, price-sensitive markets, particularly in the Middle East, Latin America, and the Caribbean, begin to search for alternate sources of supply.

The 1985 farm act's rice marketing loan provision, initiated in April 1986, was designed to restore competitiveness to U.S. rice exports after several years of high U.S. prices and large stock accumulations. Although the marketing loan helped to eliminate the staggering $200 plus premium that existed from 1982 until 1986, several factors have since combined to again drive U.S. prices significantly above foreign prices.

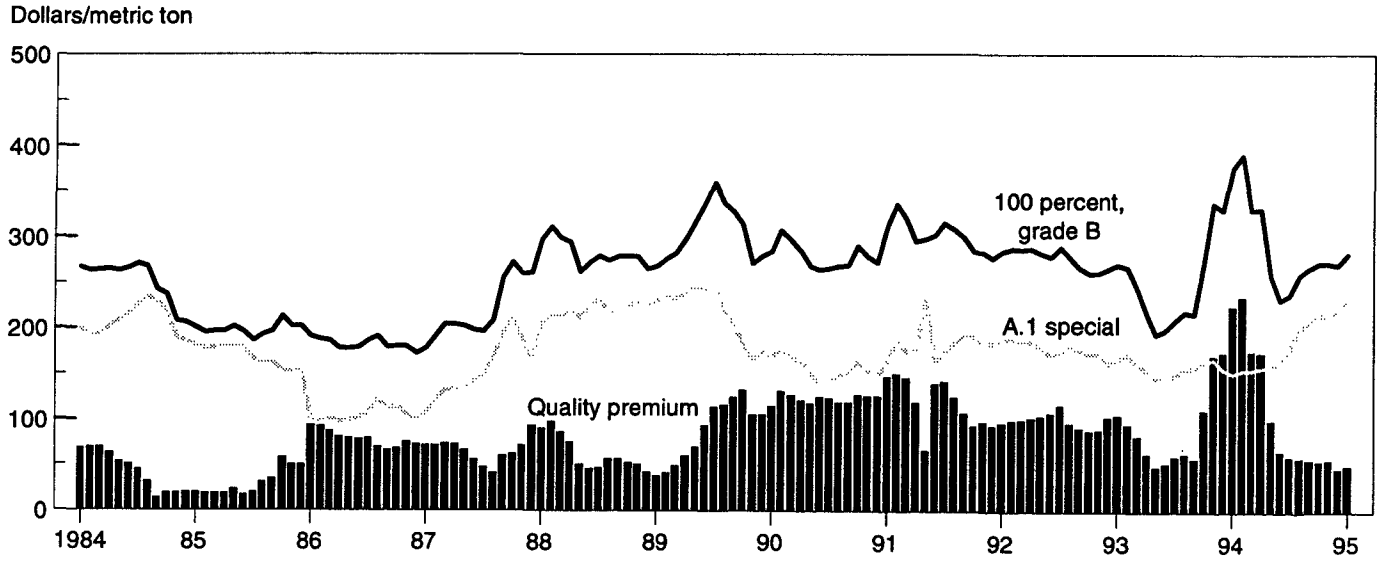
First, high quality standards and strict grading procedures for U.S. rice reduce buyer risk frequently found in foreign markets. U.S. exports are generally all of high-quality and dependable delivery, factors meriting a price premium from buyers.

Second, the U.S. rice industry has demonstrated an ability to meet the most sophisticated and varying specifications of an importer. The U.S. rice industry can export both long- and medium-grain rice at any stage of processing (rough, brown, milled, or parboiled), at any level of quality (as a percent of brokens), and in practically any form of packaging or shipping. This flexibility further enhances product acceptability.

Third, the entrance of Vietnam as a major player in the world rice market has generated a surge in foreign lower quality rice exports since 1989 which, in turn, has pressured Thailand's high-quality rice prices. Thailand competes actively in high-, intermediate- and low-qual-

[20]These are high-quality rice grades containing 4 percent or less broken rice.

Figure 25
Thai f.o.b. monthly price quotes[1]



[1]100 percent, grade B is a high-quality long grain; A.1 special is low-quality all-broken rice.
Source: USDA.

ity markets. As a result, its prices are closely linked and tend to run parallel to each other (fig. 25). The United States, on the other hand, exports very little low-quality rice and generally does not attempt to compete in low-priced markets because the United States generally does not produce low-quality milled rice.

Fourth, there is a general reluctance on the part of U.S. trading companies and mills to import large amounts of nonaromatic, high-quality foreign rice, thus preventing imports from performing the role of arbitrage.

Under perfectly functioning markets, only the first and second factors (lower buyer-risk and enhanced marketability) could be expected to generate any price premium in excess of transportation costs. With the U.S. price premium for high-quality long-grain rice often near $100 per ton, there is a significant profit opportunity for an importer of foreign rice.

U.S. Government Programs

The U.S. Government relies on three principal export programs for assisting rice exports: the Export Enhancement Program (EEP), Commodity Credit Corporation (CCC) credit programs, and Public Law-480 (PL-480) sales and donations.[21] U.S. government export programs, particularly the PL-480 program, have provided an additional outlet for U.S. rice production during periods of slack demand and large stocks.

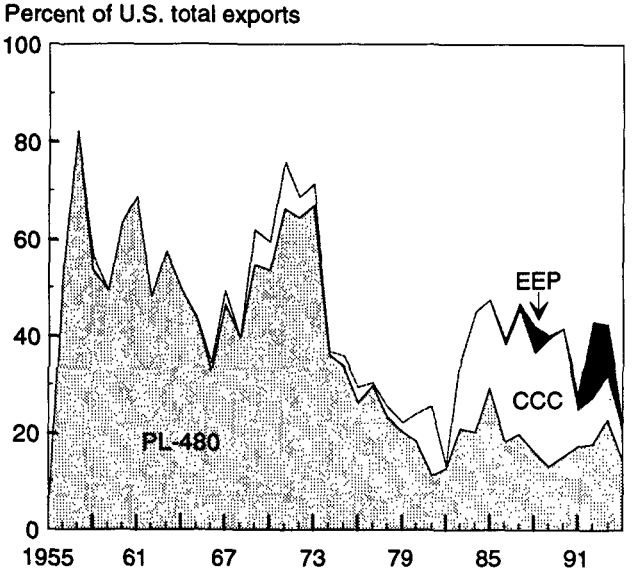
EEP sales are used to permit U.S. rice to compete with the subsidized rice exports of the EU. The use of EEP is restricted to countries importing subsidized EU rice (usually medium-grain markets). These markets include Eastern Europe, the former Soviet Union, and countries bordering the Mediterranean Sea (Algeria, Israel, Jordan, Lebanon, Morocco, and Turkey).

During the 1960's and 1970's, U.S. government export programs were a factor in nearly 50 percent of all U.S. rice exports. This share fell to 36 percent during the 1980's. Since 1990, the program-assisted share has fluctuated between 22 and 43 percent (fig. 26 and appendix table 10).

This variability is partly attributable to changing market conditions. During a period of rising international prices, U.S. program exports decline due to higher domestic prices under fixed budget amounts.

[21]For details, refer to Ackerman and Smith (1990).

Figure 26
U.S. government program-assisted share of total rice exports, fiscal years 1955-94



Source: USDA.

International Nonprice Factors: Policy and Politics

Under free market conditions, the principal factor in determining any country's international competitiveness is its comparative advantage in production. The key components in determining comparative advantage in rice production are agronomic conditions (such as climate, soil, and water) and input availability and cost (labor, fertilizers, and pesticides). The best indicator of comparative advantage is cost of production. Reliable cost-of-production data are lacking for most rice-growing countries.

However, the Southeast Asian countries of Burma, Thailand, Cambodia, and Vietnam encompassing the three major river systems of the Irrawady, the Chao Phraya, and the Mekong have tremendous comparative agronomic advantages over the rest of the world for rice production (with the sole exception of China whose huge population has prevented signficant expansion of its rice exports). Each of these countries has an abundant labor supply, but small domestic markets relative to its production potential. Excluding Cambodia, whose geopolitical barriers prevent normal rice production activity, these countries set the standard for other rice exporting countries' ability to compete in international markets.

However, over the past three decades, the United States has witnessed three other factors not directly related to comparative advantage in production dramatically affect its international rice trading patterns. These three factors include (1) changing agricultural and trade policy by major rice consuming countries; (2) geopolitical forces; and (3) international trade agreements, in particular, the GATT.

As a result of frequent policy-induced trade shocks and resultant shifting trade patterns, the U.S. rice industry has had to constantly re-orient its export initiatives.[22]

Agriculture and Trade Policy of Major Rice Consuming Countries

In many Asian countries, rice is more than just a food, it is a way of life encompassing cultural and religious mores that transcend the marketplace. During the 1960's and 1970's, as populations expanded and demand grew, many of the major Asian rice consuming countries were forced to import large quantities to meet domestic needs. These imports were politically very unpopular and led to the evolution of rice "self-sufficiency" policies in many Asian countries. The pervasiveness of these "self-sufficiency" policies in the international marketplace has created an artificial environment within which most of the world's rice is traded.

International prices are kept artificially low by rigid trade and production policies, including restrictive trade barriers, high domestic support prices, input subsidies, and export subsidies in a significant number of major rice consuming countries. These policies have combined to decrease import demand from the EU, India, Indonesia, Japan, Malaysia, the Philippines, South Korea, and Taiwan while increasing exportable supplies from Australia, Burma, the EU, Thailand, and Vietnam.

In the EU, Japan, South Korea, Taiwan, China, India, Malaysia, the Philippines, Indonesia, Thailand, and Vietnam, trade is either strictly controlled by state authorities or is regulated by highly restrictive import-control mechanisms set in place by state authorities. Japan, South Korea, Taiwan, Thailand, and Vietnam have strict bans on the import of foreign rice with exceptions made only in time of crisis. Japan and South Korea have agreed to minor market minimum access criteria under the UR-GATT of 4 percent growing to 8 percent over 5 years, and 1 percent growing to 4 percent over 10 years, respectively. The EU applies a highly restrictive variable import levy (VIL) on foreign rice imports. In China, India, and Indonesia, the government rigidly controls external trade in food grains, particularly rice, through a variety of mechanisms, including import licenses, quotas, and minimum import and export prices.

The development of these market-interfering policies has been sporadic, rendering the international trade environment volatile and often unstable, particularly for countries that depend on trade for determining prices, absorbing surplus production, or meeting domestic needs.

During the 1960's and 1970's, Indonesia was the world's top rice destination, importing over 23 million tons between 1961 and 1984. U.S. rice exports accounted for 18 percent, or 4.2 million tons, of the total. However, by 1985 Indonesia attained self-sufficiency under a policy of high domestic support prices and input subsidies, accompanied by strict import controls. From 1985 through 1993, U.S. rice exports to Indonesia were only 94,000 tons.

In Japan, limited area and a rapidly growing population led to significant rice imports during the mid-1960's. This was countered by setting in place a policy of rice self-sufficiency that included a virtual ban on imports accompanied by the most extreme commodity price support program in the world. By 1994, Japan's state-controlled farm support price for rice had risen to over $2,730 per ton, more than 19 times higher than the U.S. loan rate (table 15).

From 1967 to 1982, South Korea imported nearly 8 million tons of rice. U.S. rice exports accounted for 5.2 million tons, 65 percent of all rice entering South Korean markets during this period. Then, in 1983 the South Korean government implemented agricultural policies designed to attain rice self-sufficiency. As in Japan, a strict ban on imports was combined with high producer support prices which, by 1993, were over 14 times higher than the U.S. loan rate. In the 11 years since South Korea implemented its rice self-sufficiency policy, only 28,000 tons of rice have been imported (of which 13,000 tons were from the United States).

The European Union's Common Agricultural Policy (CAP) supports the rice production of its member nations through a system of support prices, production subsidies, and export subsidies. The CAP protects its domestic rice industry through variable import levies (VIL's) imposed at the border to enforce minimum import prices. Over the past 5 years, the VIL for brown, parboiled long-grain rice (the principal type of U.S. rice exported to the EU) has averaged $536 per

[22]More prominent instances include the following lost markets: Cuba in 1959, Japan in 1967, Iran in 1981, South Korea in 1982, Indonesia in 1985, and Iraq in 1990.

Table 15—Comparison of U.S. loan rate for rice to foreign government producer support prices from Japan, South Korea, and the European Union

Market year	Japan[1]	South Korea[2]	EU[3]	U.S. loan rate[4]	Support prices to U.S. loan rate		
					Japan	S.K.	EU
	U.S. dollars/metric ton				*Ratio*		
1988/89	2,218	1,519	399	146	14.9	10.4	2.7
1989/90	2,023	1,885	428	143	14.1	13.2	3.0
1990/91	1,899	1,968	459	143	13.3	13.7	3.2
1991/92	2,028	2,032	459	143	14.2	14.2	3.2
1992/93	2,157	2,024	456	143	15.1	14.1	3.2
1993/94	2,457	2,068	439	143	17.1	14.4	3.1
1994/95	2,677	2,065	466	143	18.7	14.4	3.3
						1,000 metric tons	
Average annual consumption from 1988/89-1993/94:					9,564	5,463	1,691

[1]Source: Japan country reports (various issues), USDA, FAS. [2]Source: South Korea country reports (various issues), USDA, FAS. [3]Source: Europe Situation and Outlook Series, WRS-94-5, Economic Research Service, USDA, Sept. 1994. [4]USDA, Consolidated Farm Service Agency. The U.S. support price (or loan rate) excludes the income-support deficiency payments, which are based on the target price (currently $10.71 per cwt or $236 per metric ton).

ton, pushing the average Rotterdam price to over $900 per ton for equivalent grade U.S. rice, while the VIL for milled white long-grain rice has been prohibitive at greater than $800 per ton. The EU intervention price (guaranteed purchase price) has averaged over three times higher than the U.S. loan rate.

Between 1970 and 1985, EU rice imports showed strong growth. Traditionally, the EU has been a net importer of rice. However, by type the EU has been a small net exporter of medium-grain and a big net importer of long-grain varieties. To reduce overall net imports, the EU established a long-grain production subsidy in 1987 to increase the acreage planted to long-grain rice. The subsidy was initially set at $444 per planted hectare with the subsidy declining over time until its expiration in 1992. However, the subsidy has never been allowed to expire and was still in effect for the 1993/94 crop at $141 per hectare. The subsidy has had the effect of increasing EU long-grain production from negligible amounts prior to 1987, to over 400,000 tons by 1992, while effectively reducing EU long-grain imports by an equivalent amount.

Given the policy-dominated international trade environment, the U.S. rice industry is in a "holding" position, enabled by government subsidies to financially "hang on" while waiting for the international marketplace to liberalize.

Under conditions of open markets and universal free and fair trade, the import demand coming from the high-income East Asian countries of Japan, South Korea, and Taiwan alone could range from 3 to 8 million tons, Indonesian demand could range from 1 to 3 million tons, while the EU could add 500,000 tons or more of high-valued demand. World trade in 1995 is estimated at 15.5 million tons.[23] An infusion of added import demand ranging from 4.5 to 11 million tons would be sufficient to drive international prices considerably above current levels, significantly lowering the cost of U.S. government program activities, and increasing the role of the marketplace in pricing U.S. rice.

Geopolitical Forces

The United States has been shut out of important rice importing countries due to geopolitical events completely beyond the control or influence of the U.S.

[23]USDA, Foreign Agricultural Service (1995).

rice industry. The two most prominent examples of this are Iran and Iraq. Iran's Islamic revolution of 1979 branded the United States as the "great Satan" and ended a history of important rice trade between the two countries. Iran was the top value and volume importer of U.S. rice from the mid-1970's up to the rupture in diplomatic relations in 1979, averaging 383,000 tons and $142.3 million in annual sales between 1976/77 and 1978/79. Likewise, Iraq's invasion of Kuwait in August 1990 and the subsequent Gulf War of 1991 closed what had been the United States' largest market since 1984/85. From 1981/82 through 1989/90, Iraq imported over 3.4 million tons of rice from the United States for a value of $1.2 billion.

Uruguay Round Agreement[24]

The principal effect of the Uruguay Round Agreement of the General Agreement on Tariffs and Trade (UR-GATT) on world trade is the opening of the previously closed East Asian high-income markets of Japan and South Korea.[25] These two countries have strong preferences for japonica rice. As a result, the dominant UR-GATT-related price effect occurs in the medium-grain rice market.

Minimum access import quotas are established for both Japan and South Korea under the UR-GATT. The combined market openings represent an initial 436,000 tons of new imports, but grow to nearly 1 million tons by 2005, thus, challenging the world's ability to produce such a large surplus of high-quality japonica.

As a major exporter of medium-grain rice, the United States will benefit significantly as U.S. prices and export values rise, but the full extent of the gain depends on U.S. capacity to expand production and exports on a sustainable basis. California, the most efficient U.S. producer of japonica rice, faces perhaps the strictest environmental restrictions on expanding acreage and yields.

Higher U.S. farm prices under UR-GATT are projected to reduce program costs as U.S. domestic prices rise well above the loan rate. Also, higher international prices, projected to rise near the U.S. loan rate by 2000, imply marketing loan payment gains falling to modest levels.

Besides lower U.S. program costs, the UR-GATT agreement implies potential shifts in U.S. domestic use and export composition as both processors and traders adjust their usage rates to reflect a rising price premium of medium-grain over long-grain rice.

World rice trade is expected to remain predominantly long grain under UR-GATT. Despite significant export gains made in East Asian markets (particularly Japan) under UR-GATT, the overall level of U.S. exports will not rise by the same amount due to a widening export price premium which implies that the United States will lose some of its long-grain exports in the more "price-sensitive" markets and lower program-assisted exports resulting from higher domestic prices under fixed budget amounts.

Recent Trends and Developments in the U.S. Export Market

Since the entrance of Vietnam as a major rice exporter in 1989, the world market has shown increased price sensitivity. This heightened price sensitivity has forced high-priced U.S. exporters to aggressively seek out and develop new markets, resulting in important changes in U.S. rice export patterns.

Heightened Price Sensitivity Since 1989

Since 1990, world trade in rice has been expanding 7 percent per year. However, much of the expanded trade has been in lower-priced, low-quality rice from China, Pakistan, and Vietnam destined for sub-Saharan Africa and Latin American markets.

This growth in trade has taken place in a setting of expanding global supplies and heightened price competitiveness. Stagnant global economies have made pricing the dominant factor in shifting trade patterns. The United States will lose market share in this new environment if U.S. prices exceed competitors' prices.

Thailand and Vietnam, the United States' major competitors in the world market for long-grain rice, have low costs of production. In the medium-grain market, the United States' principal competitors include Australia (with high costs of production) and China with perhaps the world's lowest costs of production.

Since the entrance of Vietnam as a major exporter in the international rice market in 1989, the international market has shown a tendency for excess supply, strong

[24]For further details see USDA, Office of Economics, and Economic Research Service (1994) and Cramer, Wailes, Goroski, and Phillips (1991).

[25]Taiwan is not a member of the World Trade Organization (WTO) created by the UR-GATT, but is expected to join during 1995 (contingent on WTO membership by the People's Republic of China). Once a member, Taiwan will also be subject to minimum access criteria. If Taiwan's minimum access criteria are similar to Japan's, they would involve rice imports of about 70,000 tons initially, growing to 135,000 tons by 2000.

competition, and low prices. Expanding supplies in Burma and Pakistan (both low-cost producers) have further added to supplies. The principal exception to this pattern is 1994's bull market generated by Japan's record imports of 2.3 million tons following a weather- related crop failure.

Aggressive export pricing in the early 1990's from China and Vietnam in the low-quality market has undercut Thailand's traditional share of low-quality rice exports. Subsequently, Thailand has been forced to reorient its export initiatives more aggressively towards the intermediate- and high-quality rice markets where it competes directly with the United States. As part of its campaign to increase high-quality market share, Thailand has expanded government-to-government sales involving easy credit terms and soft prices. These actions imitate export subsidies and clearly place the U.S. rice industry at a competitive disadvantage.

A large U.S. price premium again developed in the 1990's, despite the marketing loan, hurting the United States' competitive position and dampening both exports and market share since 1989 (fig. 23).

In 1991 and 1992, U.S. rice exports averaged only slightly above 2.1 million tons each year compared with 2.5 million tons the previous 5 years. U.S. market share fell from 21 percent in 1989 to only 15 percent in 1992, its lowest level in 30 years. Aggressive use of EEP and large U.S. supplies in 1992/93 closed the price premium and helped exports recover in 1993, while Japan's unexpected record imports aided U.S. market share in 1994. But future cuts under GATT in the U.S. export-assistance budgets are projected to begin eroding U.S. competitiveness.

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Appendix table 1--U.S. rice acreage, yield, and production

Market year[1]	Planted	Harvested	Yield	Production
	1,000 acres		Cwt/acre	Million cwt
1960/61	1,614	1,595	34.2	54.6
1961/62	1,618	1,589	34.1	54.2
1962/63	1,789	1,773	37.3	66.0
1963/64	1,785	1,771	39.7	70.3
1964/65	1,797	1,786	41.0	73.2
1965/66	1,804	1,793	42.6	76.3
1966/67	1,890	1,967	43.2	85.0
1967/68	1,982	1,970	45.4	89.4
1968/69	2,367	2,353	44.3	104.1
1969/70	2,141	2,128	43.2	90.9
1970/71	1,826	1,815	46.2	83.8
1971/72	1,826	1,818	47.2	85.8
1972/73	1,824	1,818	47.0	85.4
1973/74	2,181	2,170	42.7	92.8
1974/75	2,550	2,531	44.4	112.4
1975/76	2,833	2,818	45.6	128.4
1976/77	2,489	2,480	46.6	115.6
1977/78	2,261	2,249	44.1	99.2
1978/79	2,993	2,970	44.8	133.2
1979/80	2,890	2,869	46.0	131.9
1980/81	3,380	3,312	44.1	146.2
1981/82	3,827	3,792	48.2	182.7
1982/83	3,295	3,262	47.1	153.6
1983/84	2,190	2,169	46.0	99.7
1984/85	2,830	2,802	49.5	138.8
1985/86	2,512	2,492	54.1	134.9
1986/87	2,381	2,360	56.5	133.4
1987/88	2,356	2,333	55.6	129.6
1988/89	2,933	2,900	55.1	159.9
1989/90	2,731	2,687	54.5	154.5
1990/91	2,897	2,823	55.3	156.1
1991/92	2,878	2,775	56.7	157.5
1992/93	3,176	3,132	57.4	179.7
1993/94	2,920	2,833	55.1	156.1
1994/95[2]	3,355	3,300	59.5	196.5

[1]The marketing year runs August 1 through July 31. [2]Preliminary.
Source: National Agricultural Statistics Service, USDA.

Appendix table 2--State and U.S. average rice yields per harvested acre

Crop year[1]	AR	CA	LA	MS	MO	TX	U.S.
			Pounds per harvested acre				
1972/73	4,975	5,700	3,825	4,559	4,449	4,727	4,700
1973/74	4,770	5,616	6,451	4,306	4,346	3,740	4,274
1974/75	4,614	5,287	3,650	4,179	3,779	4,497	4,440
1975/76	4,541	5,748	3,809	3,921	4,211	4,561	4,558
1976/77	4,765	5,518	3,909	4,200	4,200	4,809	4,663
1977/78	4,229	5,816	3,673	4,000	3,700	4,671	4,412
1978/79	4,450	5,220	3,820	4,250	4,327	4,700	4,484
1979/80	4,320	6,521	3,910	4,050	3,809	4,216	4,599
1980/81	4,111	6,440	3,550	3,844	4,180	4,234	4,413
1981/82	4,520	6,901	4,060	4,389	4,078	4,704	4,819
1982/83	4,288	6,701	4,158	4,120	4,478	4,686	4,710
1983/84	4,280	7,039	3,816	4,000	4,087	4,341	4,598
1984/85	4,600	7,124	4,154	4,350	4,596	4,941	4,957
1985/86	5,200	7,299	4,375	5,350	4,810	5,493	5,414
1986/87	5,300	7,702	4,549	5,400	5,125	6,250	5,651
1987/88	5,250	7,550	4,550	5,100	5,400	5,900	5,555
1988/89	5,350	7,021	4,501	5,300	5,100	6,000	5,514
1989/90	5,600	7,900	4,431	5,700	5,200	5,700	5,749
1990/91	5,000	7,704	4,857	5,700	4,700	6,000	5,529
1991/92	5,300	8,100	4,850	5,600	5,100	6,000	5,674
1992/93	5,501	8,500	4,653	5,700	4,800	5,800	5,736
1993/94	5,048	8,300	4,549	5,300	4,900	5,401	5,510
1994/95 [2]	5,700	8,500	4,850	5,900	4,900	5,800	5,954

[1] The marketing year runs August 1 through July 31. [2] Preliminary.
Source: National Agricultural Statistics Service, USDA.

Appendix table 3--U.S. rice program base acreage in compliance and planted, and total diverted acreage

Market year [1]	Base acres			Diverted base acres						
	Total	Complying	Part. rate [2]	Total	ARP[3]	CRP [4]	Other [5]	NFA[6]	OFA [7]	50/85 [8]
	------ 1,000 acres ------		Percent	---------- 1,000 acres ----------						
1982/83	3,969	3,093	78	422	422	---	0	---	---	---
1983/84	3,946	3,857	98	739	547	---	192	---	---	---
1984/85	4,160	3,517	85	785	785	---	0	---	---	---
1985/86	4,234	3,814	90	1,241	682	---	559	---	---	---
1986/87	4,249	3,978	94	1,480	1,305	1	0	---	---	174
1987/88	4,183	3,998	96	1,569	1,325	3	0	---	---	241
1988/89	4,155	3,918	94	1,092	950	4	0	---	---	138
1989/90	4,168	3,906	94	1,192	939	9	0	---	---	245
1990/91	4,154	3,890	94	1,035	735	13	0	---	---	287
1991/92	4,155	3,947	95	1,317	196	13	0	437	18	654
1992/93	4,139	3,989	96	907	0	13	0	425	24	446
1993/94	4,143	4,000	97	1,164	200	13	0	449	21	481
1994/95 [9]	4,171	3,922	94	661	0	13	0	373	29	247

--- = Not applicable.

[1] The marketing year runs August 1 through July 31. [2] Participation rate. [3] Acreage reduction program. [4] Conservation reserve program. [5] Paid diversion. [6] Idled or flexed under normal flex acres. [7] Idled or flexed under optional flex acres. [8] Idled under the 50/85 program. [9] Preliminary.

Source: USDA, Consolidated Farm Service Agency.

Appendix table 4--U.S. rice program base acres: total and enrolled, by State

Crop year[1]	AR	CA	LA	MS	MO	TX	U.S.[2]
				1,000 acres			
Total base:							
1982/83	1,551	609	716	359	88	632	3,969
1983/84	1,535	624	717	356	98	610	3,946
1984/85	1,638	642	749	378	101	636	4,160
1985/86	1,622	647	794	375	107	639	4,234
1986/87	1,705	648	761	378	110	630	4,249
1987/88	1,674	635	746	374	110	602	4,160
1988/89	1,666	634	743	368	110	614	4,155
1989/80	1,665	629	753	372	114	613	4,168
1990/91	1,664	625	749	371	114	610	4,154
1991/92	1,659	619	752	369	122	612	4,155
1992/93	1,655	610	751	370	125	608	4,139
1993/94	1,657	605	756	371	130	600	4,143
1994/95[3]	1,666	598	759	372	134	603	4,158
Enrolled base:							
1982/83	1,312	589	668	315	79	560	3,536
1983/84	1,526	611	704	359	85	612	3,912
1984/85	1,449	576	651	305	90	563	3,517
1985/86	1,574	585	669	338	99	590	3,866
1986/87	1,680	607	720	360	107	580	4,068
1987/88	1,651	610	715	362	109	568	4,026
1988/89	1,553	594	703	338	97	548	3,841
1989/90	1,612	599	704	355	108	569	3,949
1990/91	1,608	592	713	357	111	568	3,952
1991/92	1,540	548	703	347	106	555	3,808
1992/93	1,580	576	694	315	116	568	3,858
1993/94	1,619	588	708	357	119	566	3,962
1994/95[3]	1,409	484	606	297	105	352	3,257

[1] The marketing year runs August 1 through July 31. [2] The U.S. total includes other minor acreage from Florida and Tennessee.
[3] Preliminary.
Source: USDA, National Agricultural Statistics Service.

Appendix table 5--U.S. rice program base acres: Complying and complying base acres as a percent of total base, by State

Item[1]	AR	CA	LA	MS	MO	TX	U.S.[2]
Complying base:				1,000 acres			
1982/83	1,216	439	564	278	58	530	3,093
1983/84	1,499	611	700	352	84	598	3,857
1984/85	1,415	561	614	286	85	547	3,517
1985/86	1,553	576	653	333	100	589	3,814
1986/87	1,648	596	687	354	407	570	3,978
1987/88	1,640	596	712	360	108	570	3,998
1988/89	1,605	596	692	349	104	562	3,918
1989/80	1,600	586	697	351	108	562	3,906
1990/91	1,598	587	698	329	108	569	3,890
1991/92	1,609	585	697	355	119	574	3,947
1992/93	1,623	589	720	358	122	576	3,996
1993/94	1,626	600	721	357	126	569	3,996
1994/95[3]	1,627	579	710	352	127	564	3,964
Complying base as a percent of total base:				Percent			
1982/83	78	72	79	78	66	84	78
1983/84	98	98	98	99	86	98	98
1984/85	86	87	82	76	84	86	85
1985/86	96	89	82	89	94	92	90
1986/87	97	92	90	94	98	91	94
1987/88	98	94	96	96	98	95	96
1988/89	96	94	93	95	95	92	94
1989/90	96	93	93	94	94	92	94
1990/91	96	94	93	89	95	93	94
1991/92	97	96	93	96	97	94	95
1992/93	98	97	96	97	98	95	97
1993/94	98	99	95	96	96	95	96
1994/95[3]	98	97	94	95	95	94	95

[1] The marketing year runs August 1 through July 31. [2] The U.S. total includes other minor acreage from Florida and Tennessee.
[3] Preliminary.
Source: USDA, National Agricultural Statistics Service.

Appendix table 6--U.S. rice normal flex acres (NFA) and optional flex acres (OFA), by State

Item[1]	AR	CA	LA	MS	MO	TX	U.S.[2]
				1,000 acres			
NFA: eligible acres--							
1991/92	241	88	105	53	18	86	592
1992/93	242	88	108	54	18	86	598
1993/94	244	88	108	54	19	85	600
1994/95	244	87	106	53	19	85	595
NFA: acres planted to rice--							
1991/92	88	13	33	12	5	3	155
1992/93	94	16	40	15	6	3	174
1993/94	82	24	27	12	4	2	151
1994/95	103	32	38	20	7	4	205
NFA: acres flexed out of rice--							
1991/92	148	20	26	38	13	18	262
1992/93	145	24	38	38	12	18	276
1993/94	159	23	49	41	14	16	301
1994/95	138	30	34	32	12	16	262
NFA: idled acres--							
1991/92	5	55	46	3	0	65	175
1992/93	3	48	31	1	0	65	149
1993/94	3	41	33	1	0	68	147
1994/95	3	25	34	1	0	64	127
OFA: eligible acres--							
1991/92	161	59	70	36	12	57	395
1992/93	161	59	72	36	12	58	399
1993/94	163	59	72	36	13	57	400
1994/95	163	59	71	35	13	56	396
OFA: acres planted to rice--							
1991/92	150	56	68	34	11	58	377
1992/93	148	57	69	33	10	57	375
1993/94	151	57	70	33	11	57	379
1994/95	138	53	67	30	9	56	354
OFA: acres flexed out of rice--							
1991/92	11	2	2	1	0	0	18
1992/93	13	2	3	2	2	1	24
1993/94	12	2	2	3	2	0	21
1994/95[3]	24	5	4	5	3	1	43

[1] The marketing year runs August 1 through July 31. [2] The U.S. total includes other minor acreage from Florida and Tennessee.
[3] Preliminary.
Source: USDA, National Agricultural Statistics Service

Appendix table 7--Proportional distribution of U.S. rice production, by type

Market year[1]	Long grain	Medium grain	Short grain	Total production
	Percent			Million cwt
1960/61	48.2	35.2	16.6	54,591
1961/62	45.3	38.4	16.3	54,198
1962/63	43.7	41.8	14.5	66,045
1963/64	36.8	48.7	14.5	70,269
1964/65	37.5	50.2	12.3	73,166
1965/66	43.0	45.6	11.4	76,281
1966/67	41.6	46.5	11.9	85,020
1967/68	48.5	42.3	9.2	89,379
1968/69	46.8	42.1	11.1	104,142
1969/70	49.0	40.3	10.7	91,904
1970/71	49.3	40.4	10.3	83,805
1971/72	52.6	37.2	10.2	85,768
1972/73	50.2	39.7	10.1	85,439
1973/74	46.2	42.9	10.9	92,765
1974/75	49.8	41.0	9.2	112,386
1975/76	52.9	38.4	8.7	128,437
1976/77	60.6	31.8	7.6	115,648
1977/78	62.7	26.5	10.8	99,223
1978/79	63.7	27.4	8.9	133,170
1979/80	61.2	30.6	8.2	131,947
1980/81	59.4	35.2	5.4	146,150
1981/82	60.4	33.7	5.9	182,742
1982/83	60.8	33.4	5.8	153,637
1983/84	65.2	26.7	8.1	99,720
1984/85	69.2	25.4	5.4	138,810
1985/86	74.4	21.1	4.5	134,913
1986/87	72.8	24.0	3.2	133,356
1987/88	68.7	29.0	2.3	129,603
1988/89	74.6	23.1	2.3	159,897
1989/90	70.7	26.8	2.5	154,487
1990/91	69.1	30.3	0.6	156,088
1991/92	69.3	30.2	0.5	157,457
1992/93	71.3	28.2	0.6	179,658
1993/94	66.0	33.2	0.8	156,110
1994/95 [2]	67.5	32.1	0.0	197,779

[1] The marketing year runs August 1 through July 31. [2] Preliminary.
Source: USDA, National Agricultural Statistics Service.

Appendix table 8--Use and ending stocks for rice

Market year [1]	Food	Seed	Brew-ers'	Resid-ual	Exports	Total use	Ending stocks	Stocks-to-use
	Million cwt							Percent
1960/61	19.9	2.1	4.9	0.5	29.5	56.9	10.0	17.6
1961/62	22.6	2.4	4.7	0.4	29.2	59.3	5.3	8.9
1962/63	21.5	2.4	4.1	0.2	35.5	63.7	7.7	12.1
1963/64	22.5	2.4	3.8	0.0	41.8	70.5	7.5	10.6
1964/65	24.2	2.5	4.3	0.0	42.5	73.5	7.7	10.5
1965/66	23.5	2.7	4.7	2.2	43.3	76.4	8.2	10.7
1966/67	23.9	2.7	5.3	1.2	51.6	84.8	8.5	10.0
1967/68	25.0	3.2	5.4	0.6	56.9	91.1	6.8	7.5
1968/69	27.0	2.9	5.8	2.9	56.1	94.7	16.2	17.1
1969/70	23.5	2.5	7.1	1.9	56.9	91.9	16.4	17.8
1970/71	25.1	2.5	3.8	2.2	46.5	83.1	18.6	22.4
1971/72	25.5	2.5	7.4	1.8	56.9	94.1	11.4	12.1
1972/73	25.1	3.0	7.7	2.5	54.0	92.3	5.1	5.5
1973/74	26.1	3.6	8.1	2.7	49.7	90.2	7.8	8.6
1974/75	28.6	4.0	8.4	2.7	69.5	113.2	7.1	6.3
1975/76	27.7	3.5	9.1	1.8	56.5	98.6	36.9	37.4
1976/77	29.2	3.2	10.3	3.8	65.6	112.1	40.5	36.1
1977/78	23.5	4.3	9.9	1.9	72.8	112.4	27.4	24.4
1978/79	33.7	4.3	11.2	4.2	75.7	129.1	31.6	24.5
1979/80	33.2	4.8	11.2	6.1	82.6	137.9	25.7	18.6
1980/81	38.4	5.1	11.0	9.7	91.4	155.6	16.5	10.6
1981/82	42.5	4.4	12.7	9.0	82.0	150.6	49.0	32.5
1982/83	37.6	2.9	13.5	8.9	68.9	131.8	71.5	54.2
1983/84	32.7	3.8	12.8	5.6	70.3	125.2	46.9	37.5
1984/85	35.2	3.4	13.9	8.0	62.1	122.6	64.7	52.8
1985/86	45.2	3.0	14.1	3.5	58.7	124.5	77.3	62.1
1986/87	52.8	2.9	15.0	7.0	84.2	161.9	51.4	31.7
1987/88	54.9	3.6	15.4	6.5	72.2	152.6	31.4	20.6
1988/89	57.4	3.4	15.6	6.0	85.9	168.4	26.7	15.9
1989/90	60.0	3.6	15.4	3.0	77.2	159.2	26.4	16.6
1990/91	63.8	3.6	15.3	9.0	70.9	162.7	24.6	15.1
1991/92	65.2	3.9	15.4	9.0	66.4	159.9	27.4	17.1
1992/93	69.0	3.8	15.1	9.0	77.0	173.7	39.4	22.7
1993/94	71.3	4.2	15.0	6.5	79.4	176.4	26.0	14.8
1994/95[2]	74.0	4.0	15.0	9.0	89.0	191.0	40.8	21.4

[1] The marketing year runs August 1 through July 31. [2] Preliminary.
Source: USDA, National Agricultural Statistics Service.

Appendix table 9--Prices and ending stocks for rice

Market year[1]	Ending stocks			Farm price	Loan rate	Target price	Direct payment
	CCC	Free	Total				
	Million cwt			Dollars per cwt			
1960/61	4.1	5.9	10.0	4.55	4.42	---	---
1961/62	0.3	5.0	5.3	5.14	4.71	---	---
1962/63	1.9	5.9	7.7	5.04	4.71	---	---
1963/64	1.4	6.1	7.5	5.01	4.71	---	---
1964/65	1.0	6.6	7.7	4.90	4.71	---	---
1965/66	0.6	7.6	8.2	4.93	4.50	---	---
1966/67	0.2	8.3	8.5	4.77	4.50	---	---
1967/68	0.0	6.7	6.8	4.97	4.55	---	---
1968/69	6.3	9.9	16.2	5.00	4.60	---	---
1969/70	6.4	10.0	16.4	4.95	4.72	---	---
1970/71	9.5	9.2	18.6	5.17	4.86	---	---
1971/72	2.7	8.7	11.4	5.34	5.07	---	---
1972/73	0.1	5.0	5.1	6.73	5.27	---	---
1973/74	0.0	7.8	7.8	13.80	6.07	---	---
1974/75	0.0	7.1	7.1	11.20	7.54	---	---
1975/76	19.2	17.7	36.9	8.35	8.52	---	---
1976/77	18.7	21.8	40.5	7.02	6.19	8.25	0.00
1977/78	10.8	16.6	27.4	9.49	6.19	8.25	0.00
1978/79	8.3	23.2	31.6	8.16	6.40	8.53	0.78
1979/80	1.7	24.0	25.7	10.50	6.79	9.05	0.00
1980/81	0.0	16.5	16.5	12.80	7.12	9.49	0.00
1981/82	17.5	31.5	49.0	9.05	8.01	10.68	0.28
1982/83	22.3	49.2	71.5	7.91	8.14	10.85	2.71
1983/84	25.0	21.9	46.9	8.57	8.14	11.40	2.77
1984/85	44.3	20.4	64.7	8.04	8.00	11.90	3.76
1985/86	43.6	33.7	77.3	6.53	8.00	11.90	3.90
1986/87	8.7	42.7	51.4	3.75	7.20	11.90	4.70
1987/88	0.2	31.2	31.4	7.27	6.84	11.66	4.82
1988/89	0.1	26.6	26.7	6.83	6.63	11.15	4.31
1989/90	0.0	26.4	26.4	7.35	6.50	10.80	3.56
1990/91	0.1	24.5	24.6	6.70	6.50	10.71	4.16
1991/92	0.4	27.0	27.4	7.58	6.50	10.71	3.07
1992/93	0.1	39.3	39.4	5.89	6.50	10.71	4.21
1993/94	0.1	25.9	26.0	8.09	6.50	10.71	3.98
1994/95[2]	0.1	40.7	40.8	6.75[3]	6.50	10.71	3.81

--- = Not applicable. [1] The marketing year runs August 1 through July 31. [2] Preliminary. [3] Midpoint of USDA projected range of $6.50 to $7.00.

Source: USDA, Consolidated Farm Service Agency and National Agricultural Statistics Service.

Appendix table 10--Farm-related program costs for rice[1]

Fiscal year	Direct income and price support[2]	Disaster	Diversion	Commodity export payments	Loan operations		Miscellaneous[5]	Net outlays[6]	PL-480 outlays	Total
					Outlays[3]	Repayments[4]				
					Million dollars					
1961	---	---	---	19	67	27	-29	30	101	131
1962	---	---	---	30	42	22	-23	28	83	111
1963	---	---	---	24	40	21	1	44	113	157
1964	---	---	---	39	43	26	-4	52	117	169
1965	---	---	---	38	51	35	-5	50	95	145
1966	---	---	---	42	62	47	-5	52	61	112
1967	---	---	---	22	80	70	-3	30	140	170
1968	---	---	---	2	90	81	-0	11	134	145
1969	---	---	---	3	128	86	-0	46	171	217
1970	---	---	---	14	133	107	-0	39	168	206
1971	---	---	---	18	110	91	5	42	168	209
1972	---	---	---	25	190	159	-50	5	215	220
1973	---	---	---	22	138	127	-11	22	244	266
1974	---	---	---	[7]	137	122	0	15	317	332
1975	---	---	---	---	76	73	-3	-0	285	285
1976	0	0	---	---	226	36	16	206	242	448
1977[8]	128	1	---	---	157	146	5	145	164	309
1978	0	4	---	---	128	122	-75	-66	149	83
1979	58	1	---	---	177	172	-15	50	136	186
1980	0	1	---	---	169	180	-67	-76	194	118
1981	0	2	---	---	253	175	-57	24	169	193
1982	22	0	---	---	360	210	-8	164	117	280
1983	397	0	12	---	525	289	20	664	130	794
1984	103	0	11	---	387	150	-18	333	129	462
1985	572	0	78	---	547	205	-2	990	172	1,162
1986	324	0	14	---	806	244	47	947	86	1,033
1987	376	0	0	---	890	388	29	906	84	990
1988	45	0	1	---	730	602	-45	128	101	229
1989	614	0	0	---	1,137	1,040	-79	631	150	781
1990	475	0	0	---	944	698	-54	667	105	772
1991	543	0	0	---	1,034	647	-63	867	105	971
1992	492	0	0	---	833	511	-98	715	131	846
1993	669	0	0	---	842	582	-42	887	87	974

--- = Not applicable.
[1] Totals may not add due to rounding. [2] Cash payments only, excludes certificate settlements and loan deficiency payments. [3] Loans, loan purchases, loan collateral settlements, and loan deficiency payments. [4] Loan repayments. [5] Government expenditures for storage and handling, transportation, processing, and packaging, sales proceeds, and other receipts. [6] The sum of columns (2)-(5), (8), plus the net of columns (6) and (7). [7] Less than $50,000. [8] Includes July-September 1976 to allow for shift from a July-June to October-September fiscal year.
Source: USDA, Consolidated Farm Service Agency

Appendix table 11--U.S. government program-assisted rice exports

Fiscal year	U.S. government export assistance programs				Commercial exports[4]	Total U.S. exports
	PL 480[1]	CCC[2]	EEP[3]	Total		
			1,000 metric tons			
1965	567	3	---	570	722	1,292
1966	450	23	---	473	902	1,375
1967	828	50	---	878	903	1,780
1968	759	0	---	759	1,160	1,919
1969	999	130	---	1,129	699	1,828
1970	950	104	---	1,054	721	1,775
1971	1,075	155	---	1,230	391	1,621
1972	1,204	81	---	1,285	583	1,868
1973	1,120	76	---	1,196	479	1,675
1974	612	12	---	624	1,070	1,694
1975	747	48	---	795	1,419	2,214
1976	514	60	---	574	1,376	1,950
1977	691	15	---	706	1,613	2,319
1978	530	50	---	580	1,696	2,276
1979	486	42	---	528	1,868	2,396
1980	540	168	---	709	2,246	2,955
1981	360	452	---	811	2,391	3,172
1982	374	14	---	388	2,523	2,911
1983	475	328	---	803	1,473	2,276
1984	464	571	---	1,035	1,258	2,293
1985	577	359	---	936	1,036	1,972
1986	436	476	23	935	1,447	2,382
1987	486	636	28	1,150	1,304	2,454
1988	350	433	120	914	1,253	2,167
1989	408	826	20	1,254	1,862	3,116
1990[5]	375	663	0	1,038	1,459	2,497
1991[5]	411	183	76	669	1,726	2,395
1992[5]	404	220	358	982	1,297	2,279
1993[5]	594	235	278	1,108	1,499	2,607
1994[6]	375	164	46	586	2,064	2,650

--- = Not applicable.
[1]PL-480 includes titles I, II, and III, plus section 416 and Food for Peace. [2]Commodity Credit Cooperation's General Sales Manager credit guarantees. [3]Export Enhancement Program subsidized exports. [4]Nongovernment-assisted exports. [5]Preliminary PL-480 and CCC activity. [6]Economic Research Service, USDA, projections.
Source: USDA, Economic Research Service, concessional export database and various Foreign Agricultural Service export credit reports.

Appendix table 12--World milled rice production, consumption, exports, and exports as a share of production

Calendar year	Production	Total use	Exports[1]	Exports as a share of use
	---------- 1,000 metric tons ----------			Percent
1960	150.8	156.6	6.5	4
1961	147.3	149.2	6.3	4
1962	155.1	151.2	7.3	5
1963	169.0	165.2	7.7	5
1964	180.7	179.7	8.2	5
1965	172.9	172.2	7.9	5
1966	179.0	178.5	7.8	4
1967	188.9	186.1	7.2	4
1968	194.9	191.6	7.5	4
1969	201.1	199.2	8.2	4
1970	213.0	210.6	8.6	4
1971	215.8	216.5	8.7	4
1972	208.9	213.2	8.4	4
1973	227.6	222.6	7.7	3
1974	225.7	226.5	7.3	3
1975	243.1	232.3	8.4	3
1976	235.8	236.8	10.6	4
1977	250.6	244.2	9.6	4
1978	262.4	252.5	11.9	5
1979	256.8	258.2	12.5	5
1980	267.8	273.1	12.0	5
1981	277.4	282.4	10.8	4
1982	283.6	283.5	11.0	4
1983	305.3	300.6	11.5	4
1984	315.9	308.3	10.7	4
1985	317.5	318.6	11.7	4
1986	317.2	320.7	12.8	4
1987	313.5	319.6	11.2	4
1988	329.7	325.4	13.9	4
1989	343.1	338.2	11.7	4
1990	350.7	345.9	12.1	4
1991	349.5	351.5	14.1	4
1992	352.6	355.1	14.8	4
1993[2]	352.2	356.9	16.1	5
1994[3]	354.8	356.4	15.7	4

[1]Based on the aggregate of differing local marketing years. [2]Estimated. [3]Projected, March 1995.
Source: USDA, Foreign Agricultural Service.

Appendix table 13--Value of U.S. rice exports, by region[1]

Region	1982/ 83	1983/ 84	1984/ 85	1985/ 86	1986/ 87	1987/ 88	1988/ 89	1989/ 90	1990/ 91	1991/ 92	1992/ 93	1993/ 94
						Million dollars						
World	868	917	716	611	622	722	912	869	746	751	754	925
Western Hemisphere	119	149	103	109	177	115	202	264	285	279	218	223
Canada	44	44	43	35	23	37	34	42	52	57	54	59
Latin America	76	105	60	74	154	78	168	222	234	221	164	164
Mexico	0	0	0	0	0	1	20	75	26	37	53	56
Caribbean	37	43	44	52	59	63	85	90	101	88	75	58
South America	29	54	13	18	91	5	48	53	84	64	15	24
Europe	126	176	141	87	102	112	180	159	152	155	153	158
European Union	87	132	107	62	76	78	137	112	99	81	86	94
Other West Europe	35	41	33	25	25	34	40	45	47	48	35	42
Asia and Oceania	399	401	338	306	256	379	394	303	185	178	249	414
Japan	1	1	0	0	0	0	0	0	1	1	1	250
Middle East	297	316	296	263	231	307	353	273	163	164	234	153
Iraq	110	115	147	156	113	167	174	111	0	0	0	0
Saudi Arabia	143	159	127	84	78	98	87	76	87	83	110	92
Turkey	9	3	5	9	12	18	34	48	40	50	58	13
Africa	224	190	134	109	87	117	136	143	124	140	134	129
Sub-Saharan	221	184	131	106	83	116	130	125	110	138	127	123

[1]Data are presented on a U.S. marketing year (August-July) basis.
Source: U.S. Department of Commerce, Bureau of the Census.

Appendix table 14--Milled-equivalent volume of U.S. rice exports, by region[1]

Region	1982/ 83	1983/ 84	1984/ 85	1985/ 86	1986/ 87	1987/ 88	1988/ 89	1989/ 90	1990/ 91	1991/ 92	1992/ 93	1993/ 94
						1,000 metric tons						
World	2,218	2,270	1,960	1,880	2,715	2,291	2,786	2,532	2,300	2,113	2,442	2,523
Western Hemisphere	296	373	240	351	772	317	593	759	864	800	716	650
Canada	101	94	98	83	64	83	89	108	125	132	138	137
Latin America	195	279	142	269	708	234	504	650	739	668	578	513
Mexico	0	0	0	1	1	1	57	215	86	119	199	172
Caribbean	76	90	97	150	241	177	234	250	281	235	245	183
South America	88	166	38	104	450	25	159	170	299	211	55	75
Europe	314	461	409	221	456	362	567	466	469	447	544	487
European Union	224	363	331	158	361	264	437	335	312	238	317	284
Other West Europe	12	12	3	3	3	0	10	8	23	35	49	32
Asia and Oceania	991	926	802	858	1,068	1,084	1,132	809	519	425	677	934
Japan	2	1	1	1	0	1	1	1	1	2	1	508
Middle East	659	658	676	715	945	824	995	723	450	392	941	398
Iraq	279	275	380	456	527	433	521	319	0	0	0	0
Saudi Arabia	279	286	241	174	215	220	182	160	200	170	233	181
Turkey	23	10	12	33	71	77	116	138	136	142	189	57
Africa	617	511	509	449	420	528	494	499	447	440	505	452
Sub-Saharan	607	492	497	440	398	518	474	438	405	434	481	433

[1]Data are presented on a U.S. marketing year (August-July) basis.
Source: U.S. Department of Commerce, Bureau of the Census.

Appendix table 15--Unit-value of U.S. rice exports, by region[1]

Region	1982/ 83	1983/ 84	1984/ 85	1985/ 86	1986/ 87	1987/ 88	1988/ 89	1989/ 90	1990/ 91	1991/ 92	1992/ 93	1993/ 94
						Dollars per cwt (of product weight)						
World	382	389	354	315	218	310	316	335	308	335	295	352
	390	394	413	286	201	345	317	337	302	306	277	311
Western Hemisphere												
Canada	411	444	416	395	340	421	367	371	392	416	375	412
Latin America	378	377	411	253	189	318	308	331	288	287	255	286
Mexico	516	483	466	258	314	384	349	333	271	257	220	267
Caribbean	487	475	443	338	237	335	344	344	343	362	299	304
South America	323	327	350	145	166	203	284	310	240	243	246	295
Europe	379	336	305	377	211	291	296	324	309	336	265	312
European Union	362	311	280	365	196	274	288	315	299	323	247	310
Other West Europe	442	460	431	404	270	340	327	351	339	387	335	358
Asia and Oceania	392	426	421	350	239	349	346	373	349	416	364	437
Japan	417	425	370	393	433	345	464	421	441	546	924	481
Middle East	449	480	437	368	244	372	352	375	359	417	363	381
Iraq	392	418	384	343	215	385	332	350	---	---	---	---
Saudi Arabia	514	557	526	480	364	445	476	474	435	489	475	505
Turkey	414	338	398	281	163	230	289	337	291	351	302	225
Africa	362	369	263	242	206	222	274	281	271	315	264	285
Sub-Saharan	363	373	264	241	207	223	273	281	269	315	262	282

-- Not available.
[1]Data are presented on a U.S. marketing year (August-July) basis. Unit-values are calculated using product weight, not milled-equivalent weight.
Source: U.S. Department of Commerce, Bureau of the Census.

U.S. Department of Agriculture
Economic Research Service

SUMMARY OF REPORT #AER-706

The 1995 Farm Bill

Cotton Program Has Been Successful, but Costly for the Taxpayers

April 1995

Contact: Edward H. Glade, Jr., (202) 501-8551

The current government program for cotton has worked well in encouraging production and consumption and stabilizing farm income, but at a relatively high cost to the taxpayers. This is one of the conclusions found in ***Cotton: Background for 1995 Farm Legislation***, a new report from USDA's Economic Research Service.

Direct government payments to producers totaled only $260 million in 1994/95, a boom year for cotton, but averaged about $1.1 billion annually during 1986-93. Direct payments accounted for 21 percent of cotton gross farm income during the 1986-93 period. Gains from marketing loans are not included in direct payments.

Of major concern during the farm legislation debate this year will be budget considerations and how to most effectively target programs with declining appropriations. Conservation and environmental requirements also will most likely be incorporated into the legislation. And the anticipated benefits of the North American Free Trade Agreement (NAFTA) and the Uruguay Round agreement of the General Agreement on Tariffs and Trade (GATT) on the U.S. cotton sector will also affect policy proposals.

The U.S. cotton economy is highly dependent on domestic and foreign policies and programs, many of which are beyond the control of U.S. producers.

The cotton provisions of the 1990 Farm Act were designed to keep U.S. cotton competitive in world and domestic markets, and to maintain a better balance between production and total use by giving producers more flexibility to respond to market prices. The 1985 Farm Act originated most of the guiding principles and provisions of the current cotton program. The marketing loan program, introduced in the 1985 act, and the competitive adjustment procedures to make the marketing loan more effective, have supported the significant turnaround in the overall health of the U.S. cotton economy.

The U.S. Cotton Industry. Cotton production and offtake (mill use and exports) have increased sharply. Since 1980, total cotton production has varied from a low of 7.8 million bales in 1983 to a new record of about 19.5 million bales in 1994. Since 1991/92, annual cotton production has exceeded 15 million bales, the most in over 40 years. Total offtake has exceeded 15 million bales, representing a growth of over 50 percent in market demand. Also, large carryover stocks of cotton have been eliminated, and the specified carryover target has not been surpassed since 1988/89.

Cotton acreage has fluctuated since the early 1980's as acreage reduction programs were used to help balance supplies from year to year. Yields also have varied, but have trended upward during this period.

To Order This Report...

The information presented here is excerpted from ***Cotton: Background for 1995 Farm Legislation,*** AER-706, by Edward H. Glade, Jr., Leslie A. Meyer, and Stephen MacDonald. The cost is $9.00.

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