

# ARKANSAS GLOBAL RICE MODEL



## International Baseline Projections For 1997 – 2010

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Eddie C. Chavez and James M. Hansen

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## PREFACE

**T**his report on the world rice economy discusses recent and projected trends in consumption, production, trade, stocks and prices. The Arkansas Global Rice Model (AGRM) baseline projections have been developed in collaboration with the Food and Agricultural Policy Research Institute (FAPRI) at the University of Missouri-Columbia and Iowa State University. The rice baseline model results presented in this report were developed with FAPRI in January 1997. The AGRM baseline is generated within an international multi-market framework that includes wheat, feed grains, oilseeds, livestock, fiber, fruits and vegetable models. Revisions in production, consumption, trade and price data since January 1997 have been included in the

projections of this report. Updates of this report can be found at the web site <http://www.uark.edu/depts/agriecon/>.

The Arkansas Global Rice Model is subject to constant development and refinement. This research has benefitted from previous discussions with colleagues throughout the world and in workshops on the global rice economy conducted in the United States, Japan, South Korea, China, Philippines, Taiwan and Spain. The research presented in this report has been funded by the U.S. Department of Agriculture, Economic Research Service, Agreement No. 96-34351-2537, "Rice Modeling Project-Marketing and Policy."

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Rest of World Rice

# International Baseline Projections For 1997–2010

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## INTRODUCTION

**R**ice accounts for over 22 percent of global caloric intake. While production and consumption is concentrated in Asia, rice is an important crop in specific regions in North and South America, Africa and Europe. The international rice economy is becoming more market oriented due to many changes over the past several years. Foremost among these changes is the implementation of the General Agreement on Tariffs and Trade (GATT) accord. The agreement requires 1) market access, the opening of markets to imports in Japan, South Korea and other countries, 2) reductions in aggregate support levels and 3) reduction in export subsidies notably in the European Union (EU) and the United States (U.S.). A regional initiative, which is already changing global rice trade, is the free trade agreement in South America, the MERCOSUR, which includes Argentina, Brazil, Paraguay and Uruguay (Bierlen et al., 1997).

The Federal Agriculture Improvement and Reform (FAIR) Act of 1996 of the United States is another important policy initiative. This new legislation changes U.S. rice industry policy significantly by 1) eliminating supply control mechanisms, 2) decoupling farm income support (deficiency) payments from production decisions and 3) reducing export subsidies more quickly than the bound rate in the Uruguay Round agreement. Unilateral actions in other countries include adjustments in rice production infrastructure such as in Japan, Korea and Taiwan. National policy programs resulting in the diversification of cropping patterns in traditional rice production countries in Southeast Asia are responding to changes in consumer demand and dietary patterns. Prospects for higher resource productivity for rice based on research and extension programs are being led by the International Rice Research Institute (IRRI) and its linkage to national rice research

programs such as CORRA, Council for Partnership on Rice Research in Asia. Finally, fundamental demand-determining factors of income and population growth, as well as dietary changes, continue to influence the world rice economy.

The baseline projections of consumption, production, trade, stocks and prices presented in this paper reflect the latest developments in the international rice industry. The current baseline projections include substantial changes relative to previous projection reports (Wailes et al., 1995, 1996a, 1996b). The following changes have been incorporated:

- revised macroeconomic data and population forecasts (Wharton Econometrics Forecasting Associates and Project LINK),
- current rice supply and utilization data (USDA, 1997a, 1997b),
- provisions of the Federal Agriculture Improvement and Reform Act of 1996 of the United States,
- revised model structure for U.S. rice supply, demand, and prices with disaggregation into long grain (indica) and medium grain (japonica),
- addition of individual country models for three MERCOSUR countries, Argentina, Brazil and Uruguay,
- revised models for Vietnam, China, and the rest-of-the-world (ROW) rice supply and demand estimates.

The Arkansas Global Rice Model (AGRM) projections are based on a multi-country econometric model framework that provides projections for a set of 20 major rice producing and/or trading countries and one aggregate ROW region. Projections include national levels of production (area harvested and yields), utilization, net trade (exports less imports), stocks and prices. Historical data for these variables are from the Economic Research Service, U.S. Department of Agriculture (Gudmunds, 1997). Estimates for these variables are based on a set of explanatory variables including exogenous macroeconomic factors such as income, population, inflation rate, technology development and, especially, government-determined policy variables that reflect the various mechanisms by which countries intervene

in their rice sector economy. Macroeconomic data are based on forecasts from the Wharton Econometrics Forecasting Associates (WEFA) and Project LINK (Appendix Tables 1-5).

An updated baseline projection for the world rice economy is valuable as it provides a benchmark against which it is possible to evaluate the impacts of policy reforms on rice and changes in supply and/or demand on world rice prices. The set of countries or regions explicitly included in the model are the United States, Thailand, Pakistan, China, India, Myanmar, Vietnam, Australia, Egypt, Argentina, Uruguay, Japan, South Korea, Indonesia, the European Union, Iran, Iraq, Saudi Arabia, Taiwan and Brazil. Projections for the United States are separated by state and rice type (i.e., long grain and medium grain). EU's rice supply is divided among Italy, Spain and Other EU. All other countries not listed above are included in the ROW region. All data on rice quantities in the following discussion and tables are on a white milled basis except where noted.

## **WORLD RICE CONSUMPTION, PRODUCTION, TRADE AND PRICES**

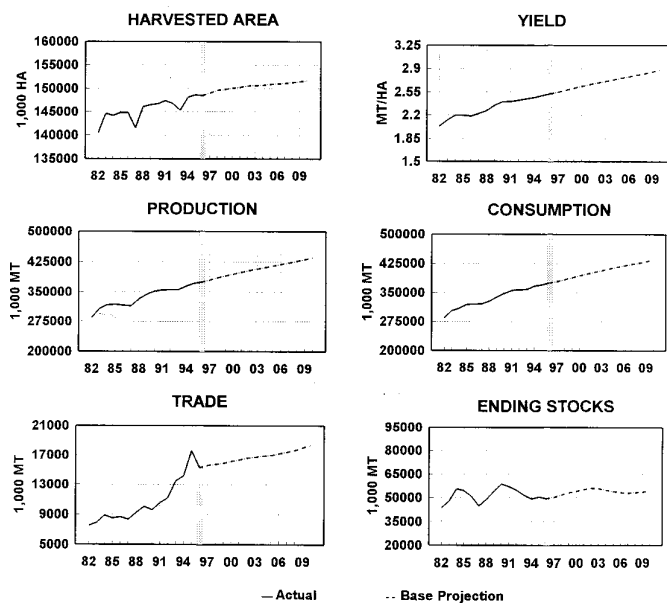
### **Consumption**

Changes in world rice consumption are determined primarily by population and income growth, and relative food grain prices. Total utilization of rice is projected to increase from 376 mmt in 1996 to 435 mmt by 2010 (Table 1 and Figure 1) at a rate of only 1.05 percent annually. This growth rate is slightly less than the 1.09 annual percent growth rate experienced over the 1990-95 period but is much lower than the growth in rice consumption over the previous 20 years at 2.27 percent (Figure 2).

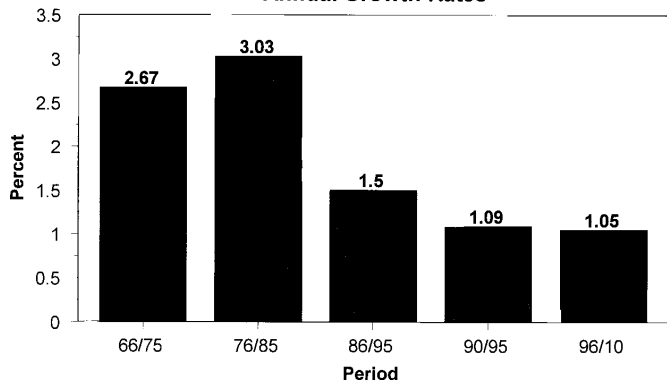
The rapid slowdown in world rice consumption is a result of 1) projected reductions in population growth rates in many Asian countries (Appendix Table 1) and 2) a diversification in the food consumption patterns as a result of changing lifestyles and spending patterns, especially in Asian countries that have experienced rapid industrialization. For some Asian countries, rice has become an inferior good (i.e., rice consumption declines as incomes rise, implying negative income elasticities. In less industri-



**Fig. 1. AGRM 1997 Projections: World Rice**



**Fig. 2. World Rice Consumption Annual Growth Rates**

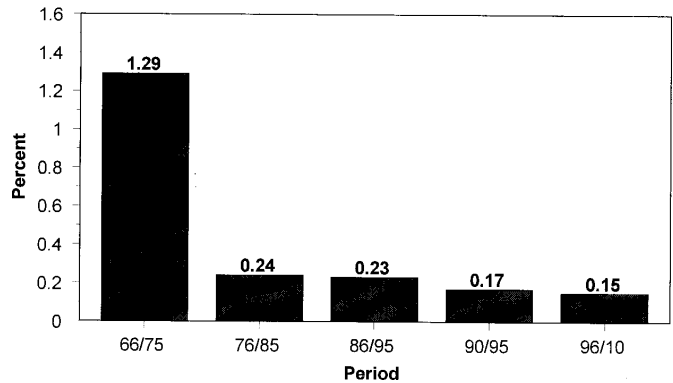


alized Asian nations and a few non-Asian industrialized market economies, such as the United States, rice consumption increases with income growth.

**Production**

The growth in world rice production necessary to satisfy the projected consumption levels over the next 15 years (1996-2010) will mainly come from yield increases, as it has for the past 20 years (Figure 3 through Figure 5). Area harvested is projected to increase only slightly to 151.6 million hectares (ha) by 2010 from 148.5 million in 1996 (Table 1). This increase is equivalent to an annual growth rate of only 0.15 percent. Projected area expansion is comparable to the annual growth rate observed for the past six years (1990-95) at 0.17 percent but lower than the 0.23 percent seen for the past 20 years (Figure 3). World rice area harvested has increased by approximately 300 thousand ha per year since 1975, consid-

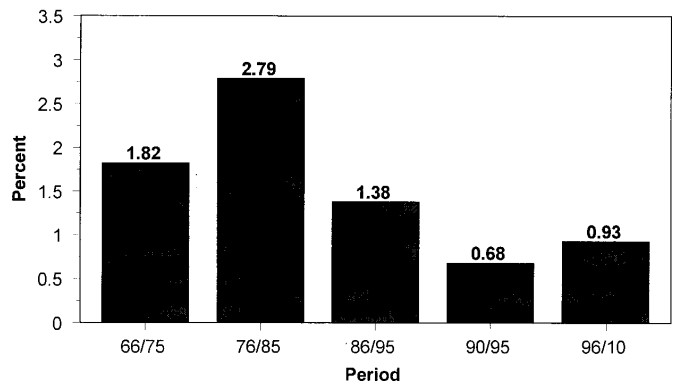
**Fig. 3. World Rice Area Annual Growth Rates**



erably less than the 1.9 million ha increase per year during the 1966-75 period. World rice area harvested is expected to increase to 149 million ha in 1997 as a result of relatively high current rice prices.

The world average rice yield was 2.52 metric tons (mt) per ha in 1996. Yield is projected to increase to 2.87 mt by 2010, a 0.93 percent increase per year. This represents a more optimistic yield growth scenario than that which has been experienced for the past six years at a 0.68 percent growth rate. The basis for this more optimistic yield projection is primarily due to the development and increased use of improved varieties. This projection, however, is much lower than the 2.04 rate observed for the past 20 years (Figure 4). IRRI research reports on the potential of new “super” rice varieties suggest that farmers will be able to increase yields by 20-25 percent, with release of these varieties beginning at the end of the 1990s (New York Times, 1997). Therefore, the projected annual yield growth projection of 0.93 percent is realistic. To the extent that yield growth exceeds the 0.93 percent growth rate, less land resources will be needed to accommodate the consumption projections.

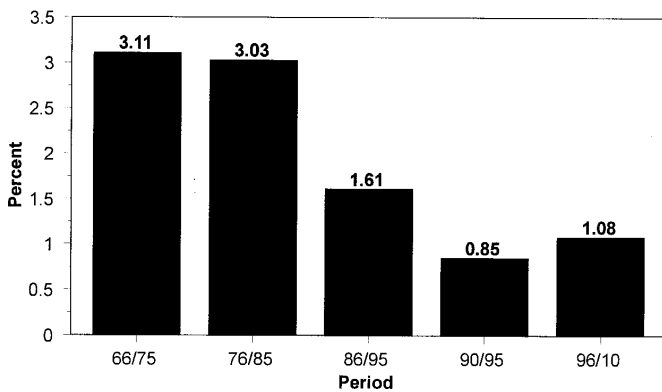
**Fig. 4. World Rice Average Yield Annual Growth Rates**



Our yield projections do not include weather variables and therefore reflect, implicitly, an assumption of normal weather. However, we recognize that a major source of volatility in world rice prices, production and trade is the monsoon climate of many Asian countries. As such, the year-to-year accuracy of our projections is not expected to be high. However, the long-term estimates are clearly consistent with the historical trends.

Total production is projected to increase from 375 mmt in 1996 to 436 mmt by 2010 (Table 1). This increase represents an annual growth rate of 1.08 percent (Figure 5). Since it is slightly higher than the consumption growth rate, a gradual recovery of global stock levels is expected. World rice production has increased by only 0.84 percent per year since 1990, well below the 2.28 percent annual growth for the 1976-95 period.

**Fig. 5. World Rice Production Annual Growth Rates**

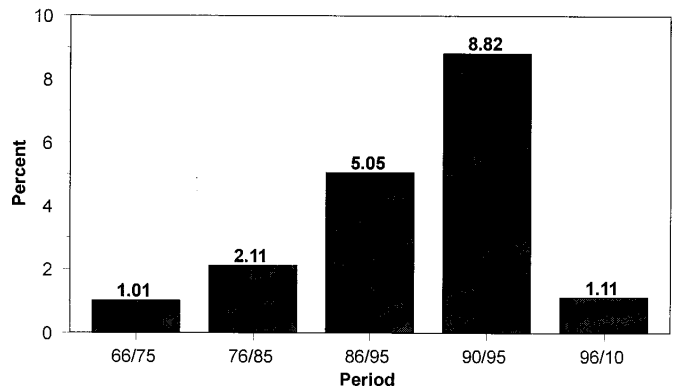


**Trade**

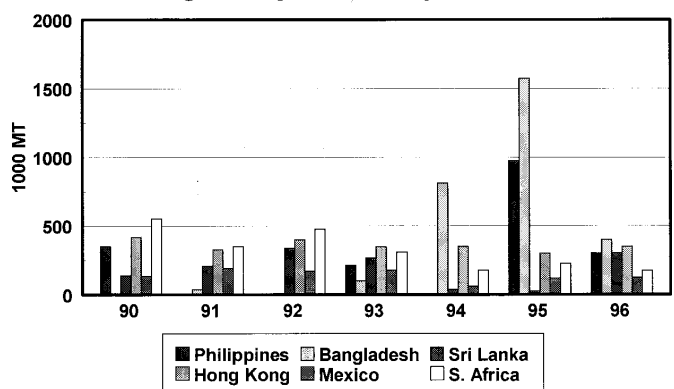
World rice trade has expanded at an annual growth rate of 8.82 percent over the past six years. This expansion has been the result of 1) weather-related production shortfalls (e.g., in Indonesia, China, Philippines and Bangladesh), 2) improving political stability in some rice-consuming countries (e.g., Iraq and Iran) and 3) growth in population and incomes. Total world rice trade is projected to grow by 1.11 percent per year from 18 million metric tons (mmt) in 1996 to 21 mmt by 2010 (Table 2). This projection reflects a significant decline in the growth of rice trade compared to an average annual increase in trade of 1.45 mmt or a 8.82 percent growth over the past six years (Figure 6). The trade projection reflects

a situation in which the major effects of unilateral, regional and multilateral rice trade liberalization, have been substantially realized. Increased political stability, especially in the Middle East, has meant a return to more normal trade volumes in that region. The rapid growth in world rice trade over the past six years has also been the result of production shortfalls in consecutive years in a number of major Asian rice-consuming nations (Figure 7). Obviously, yield shocks have dramatically influenced trade volume and variability from year-to-year such as in 1993, 1994 and 1995.

**Fig. 6. World Rice Trade Annual Growth Rates**



**Fig. 7. Major ROW Importers, 1990-96**



The total world rice trade forecast for 1997 is 17.9 mmt (Table 2). Rice trade will remain thin (i.e., a small percent of world consumption). Trade accounted for only 4.7 percent of consumption in 1996. This is projected to range from 4.6 to 4.8 percent over the forecast period. Major exporters in 1996 were Thailand, Vietnam, United States, India and Pakistan. Major importers in 1996 were the EU, Iran, Brazil, Indonesia, and China. A number of countries, like the Philippines and Bangladesh, occasionally

make substantial purchases due to weather-related shortfalls in domestic production such as in 1995. Beginning in 1997, Brazil is projected to be the largest importer, followed by Indonesia, EU, China and Saudi Arabia. By 2008, however, Indonesia’s imports will surpass those of Brazil and the EU.

World net rice trade (exports less imports, or vice versa) is projected to increase from 15.3 mmt in 1996 to 15.6 mmt in 1997, and increase steadily to 18.4 mmt in 2010 (Table 3). In the case of the EU, for example, total imports in 1996 were 1.368 mmt and total exports were 1.070 mmt, resulting in a net trade (imports) of 298 thousand mt. For the United States, on the other hand, exports (2.5 mmt) substantially exceeded imports (0.3 mmt) in 1996.

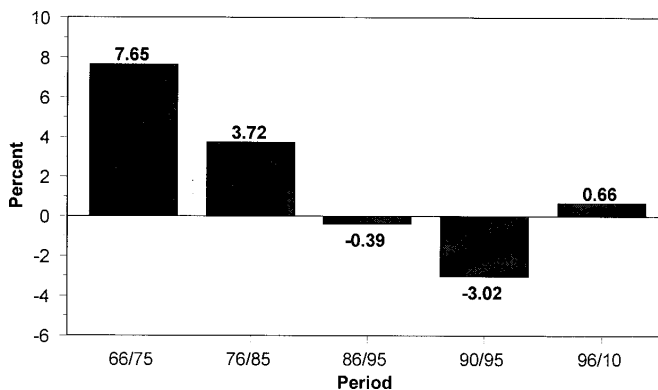
**Long Grain (Indica) Markets.** Indica (long grain) rice trade is given in Table 4. Nearly 90 percent of total trade is long grain and aromatic types, such as jasmine and basmati. Major exporters are Thailand, Vietnam, India, United States and Pakistan. The United States is projected to lose market share in the long grain export market over time because of reduced production. Major long grain rice importers are Indonesia, the EU, Middle East countries and Brazil. The United States is a rapidly growing market for aromatic rice imports, which are projected to increase continuously over the projection period. The ROW accounts for nearly 51 percent of imports in 1996, but this share is projected to decline to 46 percent in 1997 and ranges from 44 to 48 percent over the projection period. The decline in world imports in 1996 is primarily a result of reduced imports by the Philippines, Bangladesh, North Korea, Syria and Turkey.

**Medium Grain (Japonica) Markets.** The approximate world medium grain (japonica) rice trade is presented in Table 5. These japonica trade numbers are overstated because not all trade from China, Italy, Australia and Japan is japonica. The major sources of japonica rice exports are Australia, China, United States, and Italy. Although China is the world’s largest producer of japonica rice, it is not expected to dominate this export market as the country’s domestic demand for japonica rice expands with production. Other sources of japonica rice exports include Japan, Taiwan and Egypt. The major

importers of japonica are Japan and South Korea due to market access requirements of the GATT accord. The projection for Taiwan assumes that a minimum access requirement will apply once the country is admitted into the World Trade Organization (WTO). Total japonica trade is expected to account for only 13 percent of total world rice trade if market access rules are not increased for the years beyond 2002 for Japan and 2005 for South Korea. While indica rice trade is projected to grow annually at 1.3 percent over the 1997-2010 period, japonica rice trade only increases by 0.5 percent per year over the same period.

**Stocks.** World ending stocks are projected to range from 49 to 56 mmt over the projection period (Table 1). After having declined by an annual average of nearly 2 mmt (or 3 percent per year) for the past six years from 58.6 mmt in 1990 to 49.4 mmt in 1996 (Figure 8), a modest recovery in global rice stocks is projected, increasing to 56 mmt by 2002 before declining to 54 mmt by 2010. Relative to consumption, world stocks are projected to decline slightly, with the stocks-to-use ratio decreasing from 13 percent to 12 percent over the projection period (equivalent to only 1.5 months of global rice consumption).

**Fig. 8. World Rice Stocks Annual Growth Rates**

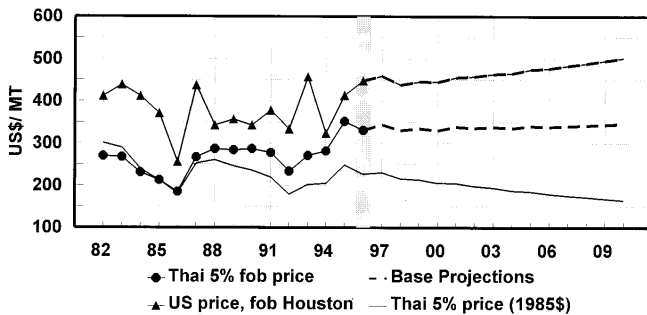


**Prices**

The international reference price for indica rice (Thai 5% NPQ fob) is expected to increase, in nominal terms, to US\$344 per mt in the 1997 marketing year from \$331 in 1996 (Table 6). The Thai prices have strengthened in the early part of 1997 due to a number of factors, which include the Iraq oil-for-food

deal, tight long grain rice stocks, strong demand for Asian fragrant (jasmine) rice, growing demand from Central and South American countries for U.S. rice, and a strong U.S. domestic market. In general, a higher U.S. price premium over Thai export prices has been a result of competitive export pressures on Thailand from both Vietnam and India. The world indica price is projected to average within the range of \$331 to \$346 per mt from the period 1998 through 2010, depending on the dynamics of world supply and demand. In real terms (1985 dollars), however, the world price is projected to decline steadily from \$227 per mt in 1996 to \$165 by 2010 (Figure 9).

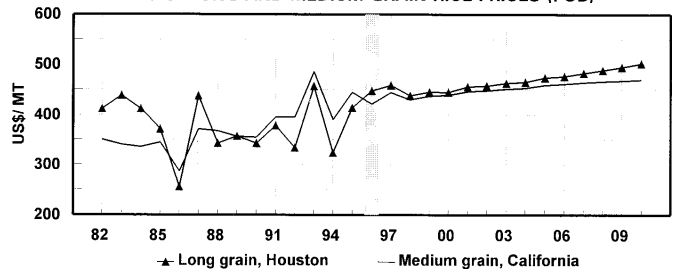
**Fig. 9. AGRM 1997 Projections: World Rice Price**  
THAI AND U.S. EXPORT PRICES (FOB)



The reference price for japonica rice is the No. 2 California FOB price. It is projected to increase to US\$445 per mt in 1997 from \$422 in 1996 then decline to \$430 per mt in 1998 before increasing steadily to \$470 by the end of the forecast period. The relationship between the indica and japonica rice prices is important where substitution in production is possible. A comparison of the Houston U.S. #2 long grain FOB price to the California medium grain price gives an indication of the relationship. Medium grain enjoyed a price premium of 8 percent in 1995 over long grain, but the situation reversed in 1996 with strong long grain prices. The long grain price is projected to maintain a premium over the medium grain. The long grain premium, however, declines from 5.8 percent in 1996 to 1.3 percent in 2000 before gradually increasing to 6.5 percent in 2010 (Figure 10).

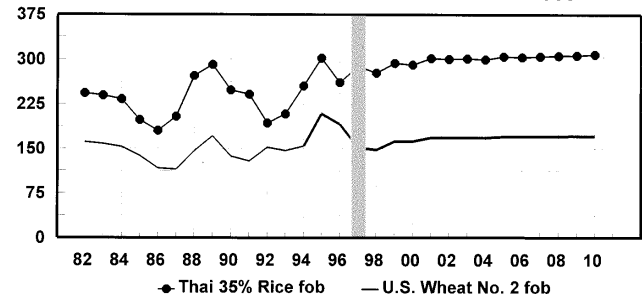
The other important price projected is the Thai FOB 35% broken long grain. Its relationships with the Thai FOB 5% rice and the U.S. wheat No. 2 FOB price are important (Table 6 and Figure 11). This relationship is relatively important in explaining potential substitution of wheat for rice in the ROW

**Fig. 10. AGRM 1997 Projections: Rice Prices**  
U.S. LONG AND MEDIUM GRAIN RICE PRICES (FOB)



projection, which has an elasticity of demand with respect to the price ratio of rice to wheat of -0.27. High wheat prices in 1996 resulted in an unusually high ratio to the Thai 35% price of 73 percent. The resulting strength in rice demand pushed rice prices in the same direction as wheat. Because wheat supply response to own price is generally believed to be more elastic than rice supply to prices, the rice to wheat price ratio is expected to decline to the more typical range of 53 to 56 percent throughout the projection period.

**Fig. 11. AGRM 1997 Projections: Rice and Wheat Prices**  
Thai 35% Rice and U.S. Wheat No.2 fob Prices

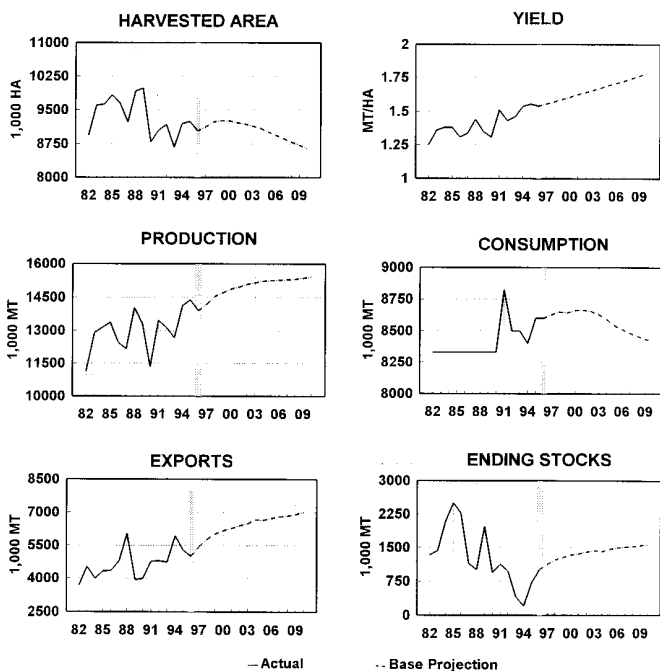


**MAJOR EXPORTING COUNTRIES**

**Thailand**

Thailand harvested 9.03 million ha of rice in 1996, lower than the 9.25 million ha in 1995 partly due to unfavorable weather late in 1996. Projected harvested area for crop year 1997 is 9.12 million ha (Table 7 and Figure 12). The harvested area is expected to decline slightly to 8.66 million by the end of the projection period. Yields in the long term for Thailand will be determined by further adoption of high-yielding varieties, relative costs of production and weather factors. Under the assumption of normal weather, yields are projected to increase from 1.54 mt per ha in 1996 to 1.78 mt per ha in 2010. The

**Fig. 12. AGRM 1997 Projections: Thailand Rice**



1996/97 second crop (which is mainly irrigated) yield is expected to be sharply higher than last year because of improved water supply. As a result of changes in area harvested and yield, rice production is projected to increase gradually from 13.9 mmt in 1996 to 15.4 mmt by 2010.

Rice demand in Thailand is price inelastic. Per capita rice use in Thailand is projected to decrease slightly to 139.8 kilograms in 1997 from 141 kilograms in 1996 and declines steadily to 127.7 kilograms by 2010. Per capita incomes maintain strong growth (8.3 percent in 1996 and stabilizing around 7 percent by 2005—the third highest among the major rice economies). Based on a negative relationship with income, per capita rice consumption declines as dietary habits change. Reflecting the country’s relatively low population growth (1.2 percent in 1996 and declining to 0.2 percent by 2005), the total rice consumption only increases from 8.6 mmt in 1996 to 8.7 mmt by 2001 and then declines gradually to 8.4 mmt by 2010.

Thailand’s economic development policies are based on a competitive, export-oriented, free market philosophy. The government of Thailand ratified the Uruguay Round agreements in December 1994. Thailand, however, maintains several programs that benefit manufactured products or processed agricultural products and may constitute export subsidies. These programs include subsidized credit on some govern-

ment-to-government sales of Thai rice; preferential financing for exporters in the form of packing credits; tax certificates for rebates of packing credits and tax certificates for rebates of taxes and import duties on inputs for products made for export (Department of State).

Thailand is the world’s largest rice exporter. The country’s rice industry is becoming more market-oriented. Export taxes and quotas were eliminated in 1986, boosting its exports. The government also provides discounted credit to exporters. Thailand is projected to maintain its status as the largest rice-exporting country over the projection period. The country expects to increase its share of the Japanese rice imports as a result of World Trade Organization agreements. Thailand, however, is expected to experience increasing competition from Vietnam and Pakistan. Projected total exports in the 1997 marketing year increase to 5.7 mmt from 5.0 mmt in 1996, and increase steadily to 7.3 mmt by 2010. Under the GATT accord, Thailand is supposed to import 239 thousand mt of rice in 1996, increasing to 250 thousand mt in 2004, and remaining at that level over the rest of the projection period. USDA Foreign Agricultural Service, however, reported that actual imports in 1996 were only 107 mt of rice from the United States. Ending stocks are expected to increase steadily to 1.6 mmt 2010 from 1.0 mmt in 1996.

**United States**

Long-term projections of the U.S. rice economy presented in this study include the provisions of the FAIR Act starting in the 1996 crop year. This program radically changed the nature of government intervention in the rice sector. Specifically, it decouples the linkage of farm income support from production decisions using a new concept: contract acreage and payments. Under this system, rice producers are provided complete flexibility in planting decisions. They will receive a rice contract payment whether they produce rice or not. The production decision will be primarily determined by relative market returns. To be eligible, a producer should have participated in the government program for at least one of the past five years.

The U.S. rice farm program for the period of 1974 through 1995 included three sets of policy instruments to support prices and incomes of rice produc-

ers. These included 1) supply control mechanisms through limitations on or incentives to reduce acreage planted to rice, 2) price supports through a price floor, known as the nonrecourse loan rate, and 3) income supports through deficiency payments that were coupled to the production of the rice farmers when they voluntarily participated in the government rice program. Due to relatively favorable target prices, the rice program typically attracted a high participation rate, i.e., over 94 percent of eligible production. Deficiency payments were important to rice producers, accounting for nearly 30 percent of the gross income of U.S. rice producers from 1990 to 1995. The average annual government cost of the rice program during the same period was approximately \$550 million.

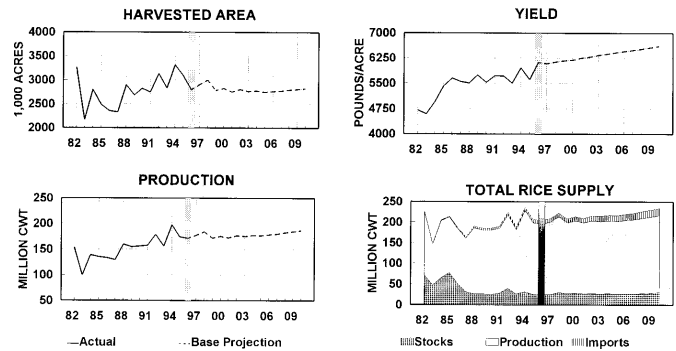
The FAIR Act significantly changes the price and income mechanisms for rice and other grains. Supply control mechanisms are essentially eliminated. Income support is decoupled from production of a specific program crop and replaced by a seven-year production flexibility contract that provides annual transition payments to producers who had participated in the commodity programs for at least one of the past five years. The FAIR Act establishes a seven-year payment contract with farmers and ranchers. Eligibility for payments is not influenced by current crop planting, production or prices. The contract payments are allocated among farmers from a fixed but declining amount by making payment on 85 percent of a calculated base acreage times program yields (Table 8). Nonrecourse loans will continue to be available to rice producers at a maximum rate of \$6.50 per hundred weight (cwt).

The FAIR Act retains export assistance programs for rice and other grains. These programs include Export Credit Guarantee programs (GSM), Market Access (promotion) Programs (MAP), P.L. 480 food aid, and the Export Enhancement Program (EEP). EEP subsidizes exports into markets as a countervailing policy to unfair export competition. Export programs have been traditionally important for the U.S. rice industry as 20 to 40 percent of annual rice exports have relied upon these government programs in the past.

Projections of rice production are based upon planted acreage and yields estimates as influenced by market returns. Acreage is generally determined

by net returns to producers, while changes in yields over time are driven by research expenditures. Total U.S. rice area harvested decreased from 3.32 million acres in 1994 to 3.09 million acres in 1995. Under the new policy reform, rice acreage declined by 10 percent, resulting in only 2.8 million acres in 1996. Acreage is expected to increase to 2.9 million acres in 1997 due to higher prices in 1996. Over the longer run, area harvested ranges between 2.8 to 3 million acres (Table 8 and Figure 13).

Fig. 13. AGRM 1997 Projections: United States Rice Supply

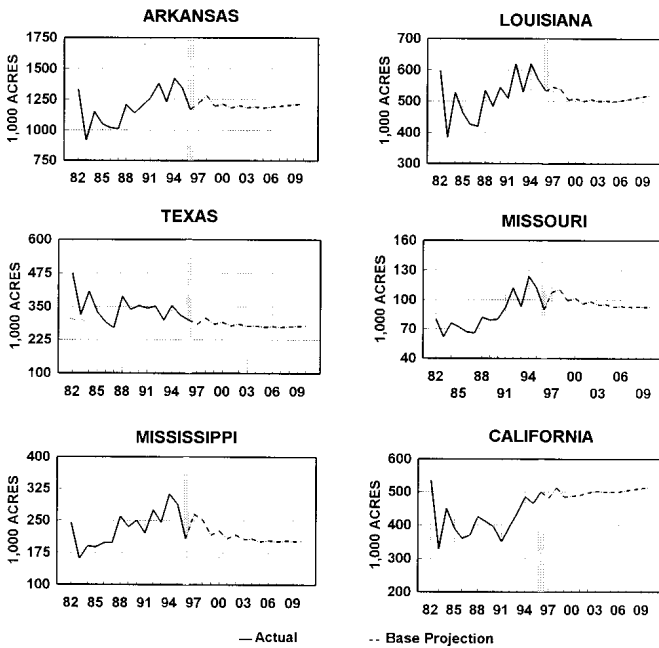


Long grain harvested acreage declined to 1.96 million acres in 1996 from 2.31 million in 1995 and gradually declines to 1.87 million in 2010 (Table 9). Medium grain acreage, on the other hand, increased to 835 thousand acres in 1996 from 781 thousand in 1995 due to area gains in California and a shift from long grain to medium grain varieties in Arkansas. Medium grain area is expected to decline to 793 thousand acres in 1997 due to the relative strength of long grain rice prices (Table 10). The medium grain acreage recovers in 1998 at 878 thousand acres, and increases steadily thereafter to 951 thousand acres. Over the projection period, long grain acreage is projected to decline by 0.3 percent per year on the average, and medium grain acreage increases by 0.9 percent per year. For purposes of comparison with other countries, Table 11 provides U.S. rice supply and utilization in metric units.

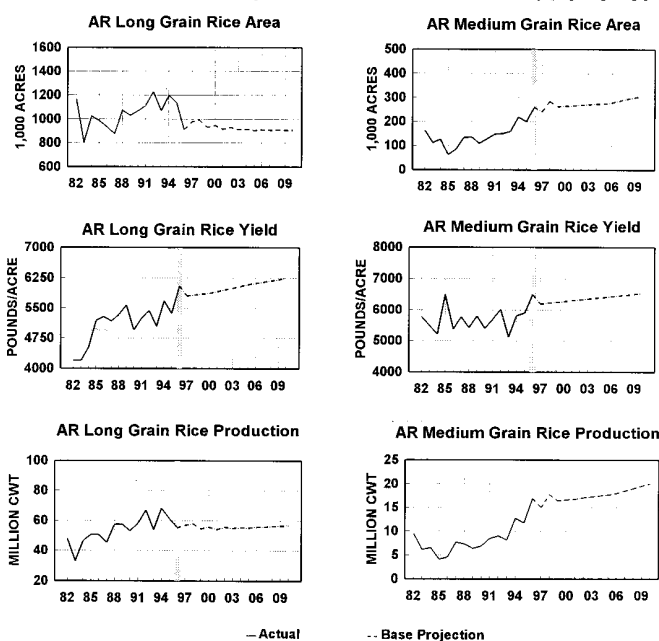
The projected reduction in U.S. rice acreage is not uniform across all states (Table 12 through Table 17 and Figure 14). Arkansas' total rice area declined to 1.17 million acres in 1996 from 1.34 million in 1995 but is expected to stabilize around 1.2 million acres over the forecast period. All the decline in the Arkansas rice area comes from long grain acreage, as medium grain area increases. Arkansas long grain

area is expected to increase to 977 thousand acres in 1997 and 994 thousand acres in 1998 before gradually declining to 908 thousand in 2010. Arkansas' medium grain area, however, increases by 1.2 percent per year over the forecast period (Table 12 and Figure 15).

**Fig. 14. AGRM 1997 Projections: Harvested Area of Select States in the United States**



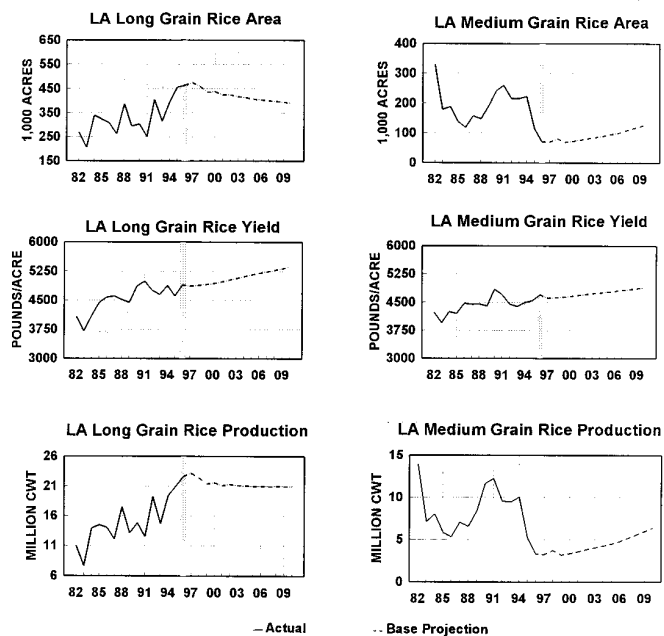
**Fig. 15. AGRM 1997 Projections: Arkansas Rice Supply by Type**



Louisiana's total rice area decreased to 533 thousand acres in 1996 from 570 thousand in 1995, with all the decline coming from medium grain area (Table

13 and Figure 16). Texas' area declined to 298 thousand acres in 1996 from 318 thousand in 1995 (Table 14). Missouri's area declined to 90 thousand acres from 112 thousand (Table 15), and Mississippi's acreage decreased by the largest percent to 208 thousand acres in 1996 from 288 thousand in 1995 (Table 16). California's acreage increased to 500 thousand acres in 1996 from 465 thousand in 1995 and is expected to range between 481 to 514 thousand acres over the projection period. The average annual changes in harvested area by state over the projection period are as follows: Arkansas, +0.3 percent; Louisiana, -0.2 percent; Texas, -0.5 percent; Missouri, +0.2 percent; and Mississippi, -0.2 percent; and California, +0.2 percent.

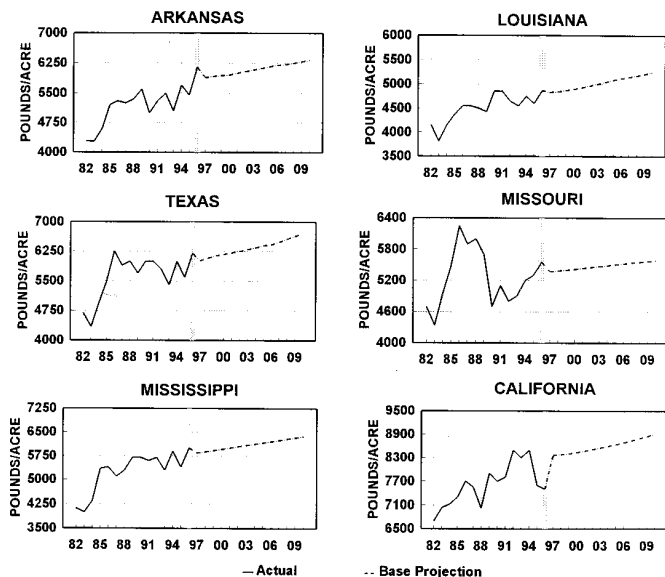
**Fig. 16. AGRM 1997 Projections: Louisiana Rice Supply by Type**



Acreage declines are expected to be offset partially by yield gains resulting from continued research expenditures for rice (Figure 17). Long grain yields would grow by 0.4 percent per year while medium grain rice yields are projected to grow faster at 0.7 percent per year. The average U.S. rice yield increased to 61.21 cwt per acre in 1996 from 56.21 cwt in 1995. Yields decrease to 60.88 cwt in 1997 before steadily increasing 66.12 cwt by 2010.

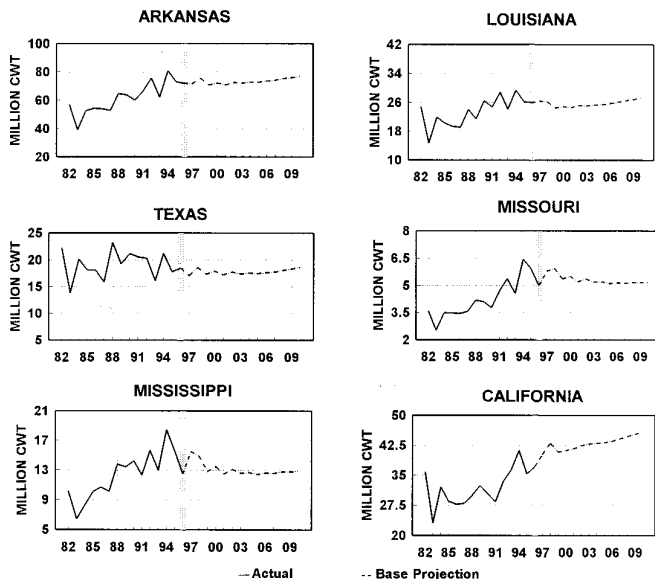
In 1996, the higher yields (8.9 percent above 1995) partially offset the substantial decline in acreage (-9.5 percent), resulting in only a slight decrease in production (1.5 percent) at 171.3 million cwt compared to 173.9 million in 1995. Unlike the previous

**Fig. 17. AGRM 1997 Projections: Yield of Select States in the United States**



U.S. baseline projections, which showed declining total U.S. output, the current baseline shows total production increasing to 186.6 million cwt in 2010 from 176.7 million cwt in 1997. On the average, long grain production would remain relatively flat, while medium grain production is projected to increase by 1.6 percent per year over the projection period. Figure 18 shows total U.S. rice production by state.

**Fig. 18. AGRM 1997 Projections: Production of Select States in the United States**

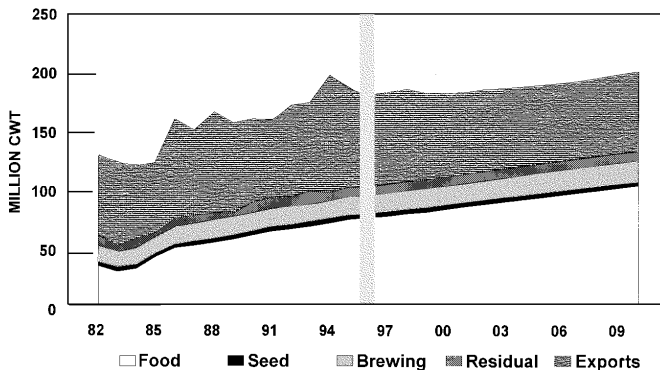


Following an initial decline in total supply to 206.7 million cwt in 1996 from 212.5 million in 1995, total supply ranges between 209 to 217 million cwt until the year 2005 and steadily increases thereafter to 233 million cwt in 2010 as imports and produc-

tion continue to increase. The increase in imports is driven by the decline in real Thai 5% fob price and the growth in domestic U.S. rice consumption.

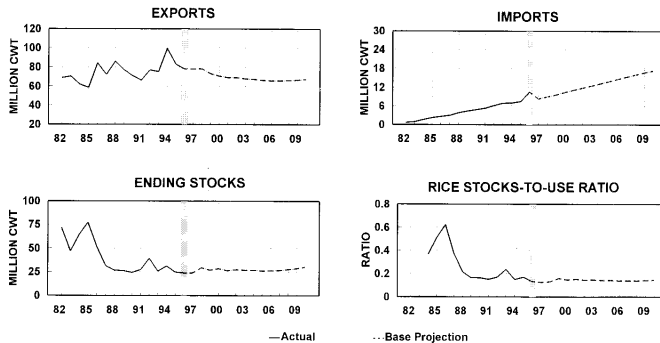
Domestic use of rice is projected to increase to 107.2 million cwt in 1997 from 104.7 million in 1996. It increases steadily to 135.2 million cwt by 2010 (Figure 19). With a stable population growth of less than one percent over the forecast period (Appendix Table 1), the expansion in rice consumption is a result of increased per capita direct and processed food consumption. The increase in food consumption is driven by growth in income and declining real retail prices, assuming low levels of inflation rates over the period (Appendix Tables 2 and 4). Seed demand declines as planted rice acreage declines. Small increases in brewing demand is driven by income growth.

**Fig. 19. AGRM 1997 Projections: Detailed U.S. Total Rice Use**



Given a relatively inelastic domestic demand for U.S. rice, the availability of domestic rice supply for exportation declined from 83.0 million cwt in 1995 to 78.0 million in 1996 and is projected to be only 67.4 million by 2010 (Figure 20). Long grain exports decrease to 42.0 million cwt in 2010 from 60.0 million in 1996 as both real Thai 5% fob price and U.S.

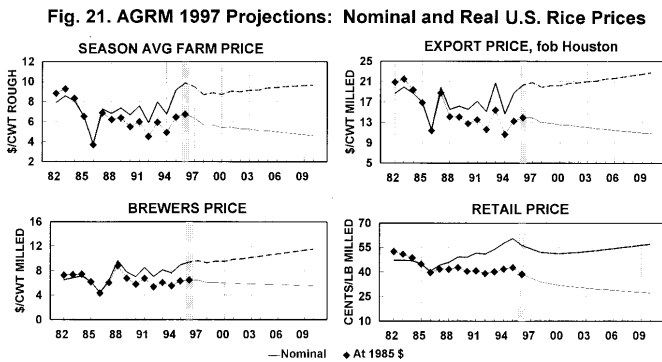
**Fig. 20. AGRM 1997 Projections: United States Rice Trade and Stocks**



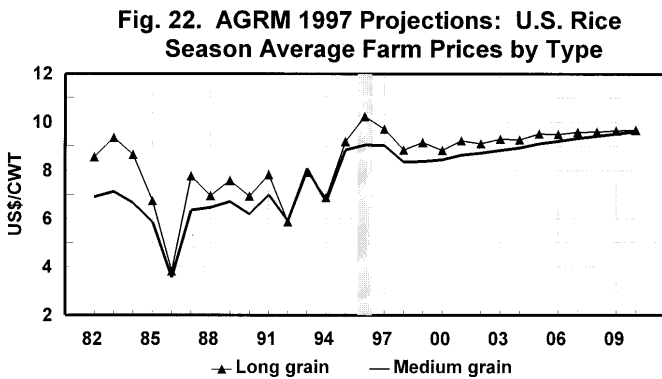


export supply decline. Medium grain exports, on the other hand, increase from 18.0 million in 1996 to 25.4 million cwt, mainly due to the increase in exportable supply, which more than compensates for the decline in real medium grain export price.

The nominal season average farm price (SAFP) increased to \$9.85 per cwt (rough basis) in 1996 from \$9.15 in 1995 and is projected to decline to \$9.50 in 1997 due to larger U.S. production and weaker international prices. Farm prices decline over the 1998 to 2000 period but increase from \$9.02 in 2001 to \$9.65 by 2010 (Figure 21). The average long grain farm price decreases to \$9.72 in 1997 from \$10.23 in 1996. It is expected to range between \$8.84 and \$9.23 for the 1998-2002 period; thereafter, the long grain price increases from \$9.31 in 2003 to \$9.68 by 2010.



The average medium grain farm price increased from \$8.86 per cwt in 1995 to \$9.06 in 1996, and remains flat in 1997. After a decrease to \$8.37 in 1998, the medium grain price converges steadily to the long grain price by the end of the projection period (Figure 22).



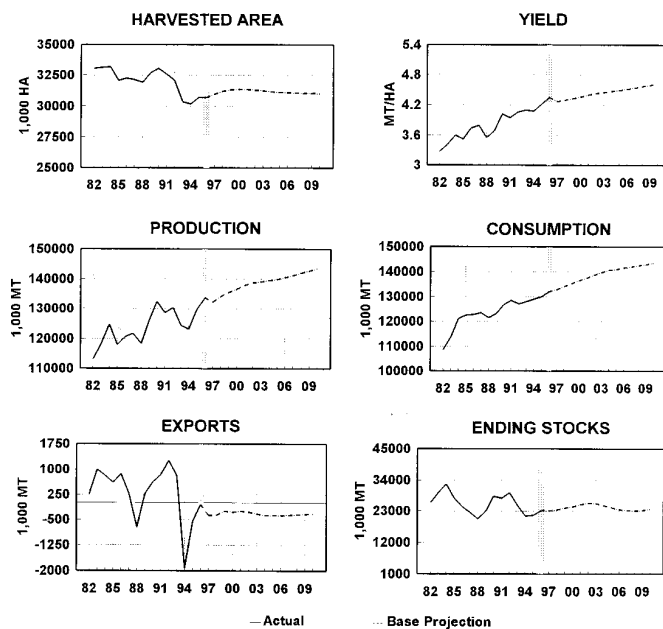
The long grain farm price maintains a premium over the medium grain farm price throughout the entire projection period. The price premium narrows from \$1.17 per cwt in 1996 to \$0.06 by 2010. The

long grain export price (FOB Houston) is projected to increase to \$20.81 per cwt (milled basis) in 1997 from \$20.32 in 1996 and decrease to \$19.88 in 1998 before steadily increasing to \$22.78 by 2010 (Table 8). The medium grain export price (FOB California) is projected to increase to \$20.17 per cwt (milled basis) in 1997 from \$19.28 in 1996, and declines to \$19.51 per cwt in 1998 before increasing steadily to \$21.31 in 2010. In real terms, both U.S. farm and export prices steadily decline over the projection period.

### China

China’s government policies significantly influence its rice economy. Economic reforms and opening of trade to the outside world are central to China’s development formula. However, the current five-year plan also reconfirms the role of state-owned enterprises, which still directly accounts for more than one-third of total industrial output (Department of State, 1995). Under the ongoing economic reforms, farmers determine their rice acreage based not only on the government procurement prices but also on expected free market prices and the adoption of new technologies.

Following two years of declining production, rice harvested area in 1995 and 1996 increased to 30.7 million ha from 30.3 million in 1994, partly due to favorable government policies and market prices. The area harvested in 1997 is projected to be nearly 31 million ha and would increase slightly to 31.3 million in 2001 before declining slightly to 31.0 million by the end of the projection period. One reason for this decrease is the decline in real procurement prices, with growth in CPI remaining at 9.8 percent over the forecast period. Nominal rice procurement price was raised in 1996 by an average of 30 percent in grain-producing provinces such as Jiangxi, Anhui and Sichuan. Real input prices remained stable. Rice yields in China are influenced by the free market price, the flow of new technologies, as well as by government price policies. Yields are projected to decrease slightly to 4.27 mt per ha in 1997 from 4.36 mt per ha in 1996 and gradually increase to 4.62 mt per ha by 2010. Total production is projected to decrease to 132.3 mmt in 1997 from 133.7 mmt in 1996 before increasing gradually to 143.5 mmt by 2010 (Table 18 and Figure 23). Off-farm employment has

**Fig. 23. AGRM 1997 Projections: China Rice**

become a problem for China's grain production as farmers find better-paying industrial jobs and rural industrial development uses an increasing amount of farm land.

Chinese annual per capita rice consumption is projected to decrease slightly to 108.2 kilograms in 1997 from 108.6 kilograms in 1996 before declining to 106.3 kilograms by 2010. With a negative income elasticity, per capita consumption declines slightly as real income grows. Real GDP is projected to grow around 9 percent per year over the projection period, the second fastest growth rate (second only to Vietnam) among the rice economies. Total consumption, however, is projected to continue to increase as population grows slightly (1.03 percent in 1996 and stabilizing at 0.65 percent by 2006). USDA Foreign Agricultural Service (1997c) reported that consumer preferences may be shifting away from the traditionally grown rice varieties in China. Consumers in Shanghai are said to prefer japonica and other high-quality short grain rice varieties compared to early rice. Early rice is fed to hogs. The area planted to japonica in Heilongjiang province, the largest producer, increased by 30 percent in 1996.

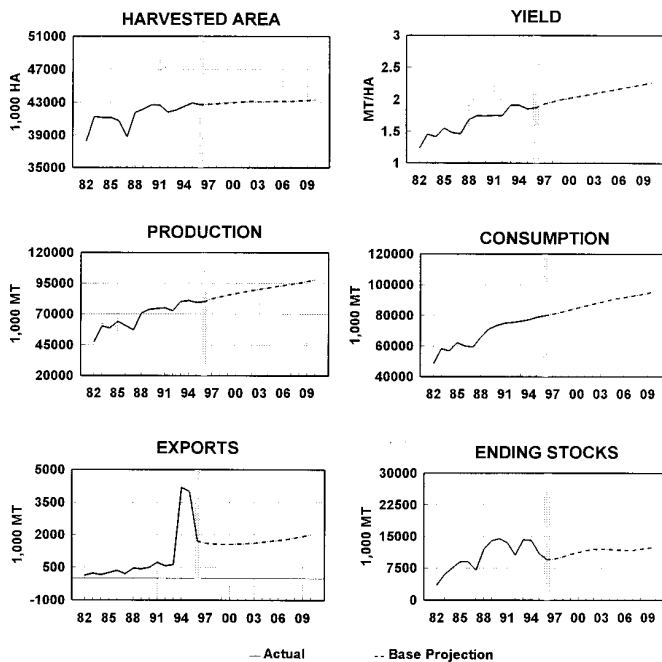
China abolished direct export subsidies on January 1, 1991. Many of China's manufactured exports, however, receive indirect subsidies through guaranteed provision of energy, raw materials or labor supplies (Department of State, 1995). In 1994, rice exports were banned, and local governments were

given authority to set ceiling prices. The country was a net importer of 1.97 mmt rice in 1994 due to a weather-related production shortfall. Annual net rice imports declined substantially to 550 thousand mt in 1995. Thailand dominates China's official rice imports, and Vietnam, which borders China, dominates unofficial trade. China is expected to remain a net importer of rice during the entire forecast period, with net imports projected to increase to 325 thousand mt by 2010 from 50 thousand in 1996. Ending stocks are projected to range from 23 to 26 mmt over the projection period.

## India

India is experiencing a trend of diverting area from food grains to commercial crops, which underlies the sharp decline by more than 3 percent in India's food grain production in the 1995 marketing year. While wheat area declined by over half a million ha, and coarse cereals by nearly half a million ha, oilseed area is estimated to have increased by nearly a million ha. Other dampening factors included delays in crop sowing due to belated monsoon and skewed distribution of rainfall, causing floods in some parts of the country. Reduction in the use of fertilizers and the cumulative effect of unbalanced nutrient use over the years have also caused a decline in productivity.

India harvests more rice area than any other country, and it has the second largest production of any country following China. The area harvested is projected to increase from 42.7 million in 1996 and to 43.3 million ha by 2010 (Table 19 and Figure 24). This increase is driven by technology and infrastructure development, which is partly offset by the decline in real farm harvest price. The use of hybrid rice is gaining popularity in India. Several research institutions have successfully developed highly promising hybrids, which augur well for the country's rice industry. The Indian Council of Agricultural Research (ICAR) projects that the area under hybrid rice will expand from the current 50 thousand ha to over 2.0 million ha in 4 years—or nearly 5 percent of total rice area. Hybrid rice is increasingly being planted in Punjab, Haryana and Western Uttar Pradesh in North India, and in Andhra Pradesh, Karnataka and Tamil Nadu in the South. ICAR has developed seven location-specific hybrid rice varieties, in addition to the six being marketed by private companies. The In-

**Fig. 24. AGRM 1997 Projections: India Rice**


dian Agricultural Research Institute (IARI) in New Delhi has also developed the first nuclease-bred variety (PNR 381) for the upland areas of the country. The early maturing, semi-dwarf rice gives superior grain quality and is resistant to multiple pests and diseases of rice. PNR 381, which is widely used in Uttar Pradesh, is found suitable both as a direct-seeded crop in rain-fed upland areas and as a transplanted crop in irrigated areas. The Central Rice Research Institute (CRRI) of Cuttack has also released four new high-yielding rice varieties suitable for different areas in Orissa. Lastly, India plans, through its national rice biotechnology network (NRBN), to develop hybrid rice using biotechnology to improve yields. These developments indicate that technology can provide the competitive edge for India's rice industry in the long run.

India's rice crop is mostly rain fed. Hence, it is highly dependent on monsoon rains. The country has experienced favorable weather over the last eight years, boosting its production. Rice yields are responsive to changes in fertilizer prices and the adoption of high-yielding varieties. Yields are projected to increase at an average annual rate of 1.4 percent, from 1.87 mt per ha in 1996 to 2.27 mt by 2010. Total production is projected to increase to 82.5 mmt in 1997 from 80 mmt in 1996, and increases steadily to 98 mmt by 2010.

While per capita rice consumption in India is pro-

jected to decline from 83.7 kilograms in 1996 to 81.5 kilograms in 2010, total consumption is projected to grow steadily due to population growth (1.7 percent in 1996 and stabilizing to 1.4 percent by 2005) and income growth (6.7 percent in 1996 and increasing to over 7 percent by 2002). Total consumption in 1997 increases to 80.7 mmt from 79.8 mmt in 1996 and increases steadily to 95.9 mmt by 2010.

The food processing industry is one of the major growth sectors in India. REI Agro Ltd of Calcutta has built a Rs 218-million, 72-thousand mt per year basmati rice processing plant at Bewal in Haryana. The company plans to export 90 percent of its production to the United States, Korea, Europe, Japan and Australia.

Central and state governments still regulate the prices of most essential products, including food grains, sugar, edible oils, basic medicines, energy, fertilizers, water, and many industrial inputs (U.S. Department of State, 1995). India uses procurement prices and open market sales program to stabilize prices. The government sets fixed procurement prices, which serve as a price floor for producers. A procurement price prevents substantial declines in the rice price while open market sales program prevents significant increases in price. The minimum export price was eliminated both for basmati and non-basmati rice in 1994. In 1995, the government fixed the sales price of rice exports at the open market price. India has devalued its exchange rate to improve its export competitiveness (U.S. Department of State, 1995). The heavy demand for Indian basmati rice in Europe, West Asia and America resulted in higher prices in the 1996 marketing year. The Food Corporation of India proposed to increase the rice levy to a uniform 75 percent in all major producing states, an action that is likely to disrupt India's rice export prospects and depress paddy prices.

India was the world's fourth largest exporter of rice in 1996. Its primary rice export destinations are Saudi Arabia, UAE, UK, Kuwait, USA, Bahrain, Sri Lanka and Oman. Rice exports increased dramatically in 1994, amounting to 4.2 mmt, as the country relaxed its export quota in response to substantial production and stock build-up. Net exports decreased slightly to 4.0 mmt in 1995 and substantially to 1.7 mmt in 1996. In the 1995 marketing year, India exported basmati rice valued at Rs 8.5 billion, and non-

basmati rice worth Rs 37.2 billion. The declining trend in exports is expected to continue until 2000, with net exports reaching 1.6 mmt, before increasing slightly to 2.0 mmt by 2010. Exports are driven mainly by excess rice supply. The Indian government's recent decision to fully enforce a rule that requires rice millers to sell about 75 percent of rice to state-run food agencies may have a dampening effect on the country's rice exports. The government has decided to fix exports of food grains at 2 percent of India's production every year. The allocation has been reduced for the next two years to 2 percent to give higher priority to domestic food security requirements. At present, there is no quantitative ceiling on export of rice from private stocks; but the ceiling is imposed on non-basmati rice exported from the stocks of the Food Corporation of India.

India and Pakistan have a duopoly over basmati rice exports. The two countries are the only significant producers of high quality basmati rice. Basmati rice accounts for only 1.0 mmt or 5 percent of the total world rice trade. In another development, the government of India plans to introduce futures trading in basmati rice and non-edible commodities.

Ending stocks are projected to build-up steadily to 12.5 mmt in 2010 from 9.5 mmt in 1996. The Indian government may decide to impose quantitative restrictions on stocks of non-basmati rice exported on private accounts, which are now under open general license (OGL). The relatively low level of the country's food grains stock in the central pool, which is caused by the decline in procurement, has been a cause for concern.

**Pakistan**

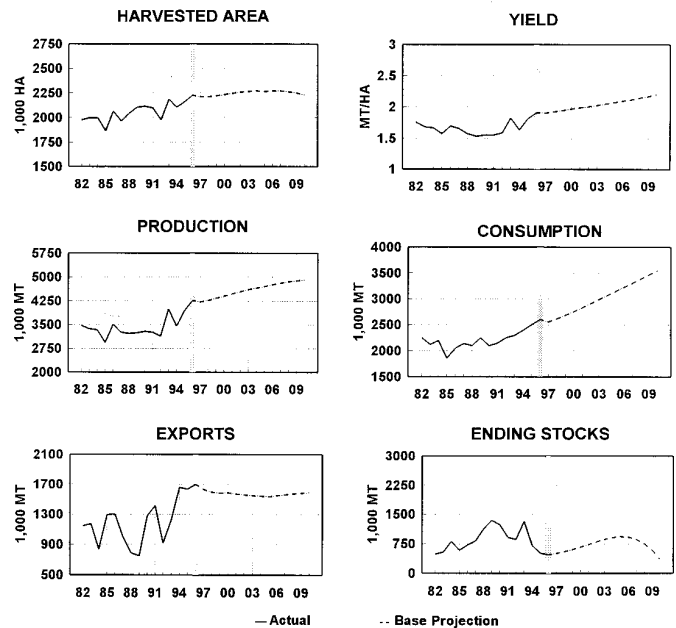
Pakistan has pursued policies aimed at private sector-led development, macroeconomic stability and structural reforms. Implementation has been uneven and received with mixed success. Import tariffs remain quite high as the government seeks to protect local industry and generate fiscal revenues.

The rice area in Pakistan is determined by government price policies. The basic policy is aimed at increasing rice production through improved yields and government support prices, which are adjusted annually to keep pace with increased costs of production. The government support price is assumed

to increase steadily over time in real terms. Increases in consumer prices are expected to stabilize at 19.2 percent by 2001 from 10.2 percent in 1996 (Appendix Table 4). In October 1996, Pakistan's cabinet raised its rice procurement price for farmers by at least 8 percent for 1996-97 (July-June) rice crop and announced that it is ready to buy large volumes of the new crop. Producers' prices are kept lower than world prices through state control of exports and government procurement.

The rice area harvested in Pakistan is projected to range from 2.2 to 2.3 million ha during the forecast period (Table 20 and Figure 25). Rice yields in Pakistan are responsive to input prices and the adoption of high-yielding varieties. Yields per ha in 1997 are expected to remain at the 1996 level of 1.91 mt and increase gradually to 2.20 mt by 2010. Following the yield trend, total production is projected to increase steadily from 4.27 mmt in 1996 to 4.91 mmt by 2010.

**Fig. 25. AGRM 1997 Projections: Pakistan Rice**



Annual per capita consumption of rice in Pakistan is lower than in other Asian countries, at 19.4 kilograms in 1996, and is projected to decrease gradually to 18.2 kilograms by the end of the projection period. However, a relatively high population growth rate results in an increase in total rice consumption from 2.6 mmt in 1996 to 3.6 mmt by 2010.

Pakistan is projected to remain as a major exporter, i.e., the fifth largest, in international rice trade. Net

rice exports in 1997 are projected to decline to 1.6 mmt from 1.7 mmt in 1996 and stabilize around 1.6 mmt thereafter. Ending stocks are projected to remain in the range of 400 to 900 thousand mt over the forecast period.

### Myanmar

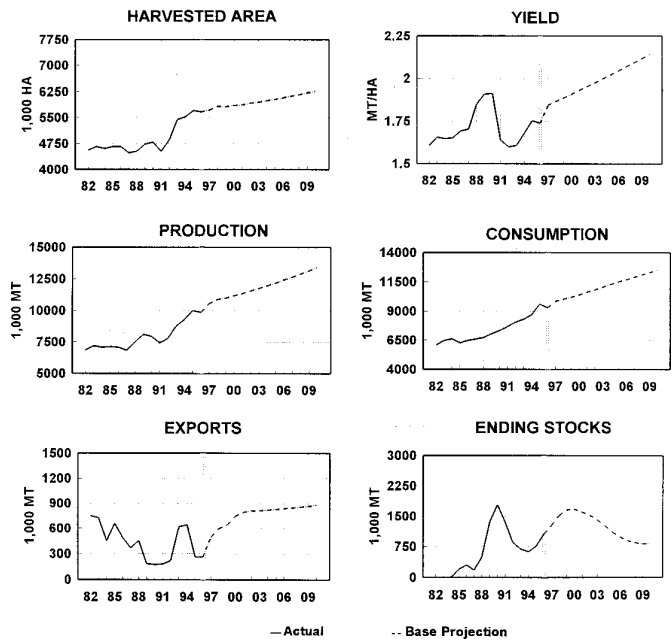
Myanmar is moving away from a centralized economy and trying to re-enter the world community after more than three decades of economic isolation. The economy has promising potential, given its rich natural resources and relatively low-wage labor. More than 50 percent of its population is within the working ages of 15 through 59. Private corporations are now permitted to participate in infrastructure development projects. More than half of Myanmar’s gross domestic product and half of its foreign exchange earnings come from agriculture, forestry, fishing and livestock.

Substantial investments are pouring into Myanmar, and many will have direct benefits to the country’s rice industry. Singapore, recognizing Myanmar’s potential, invested a total of \$584 million in the country by the end of 1995, which accounted for 22 percent of Myanmar’s total foreign investments going to 36 projects, including one which aimed at improving the output of the country’s fragrant rice varieties. Marubeni Corporation is also entering into a joint venture with the Myanmar government by spring 1997 to produce rice for animal feed. The venture is expected to produce 150 thousand mt by 2004, and is projected to reach 3.0 mmt per year eventually or about 30 percent of the country’s current level of rice production. Rice feed is planned to be exported to other Asian countries beyond the year 2000.

The rice area harvested in Myanmar is strongly influenced by government rice prices and technology. In 1995, the country implemented a policy requiring two wet-season rice crops on all designated rice land. Following the current support policies and the expansion in irrigated rice area, the total harvested area is projected to increase to 6.3 million ha by 2010 from 5.7 million ha in 1996 (Table 21 and Figure 26). The government has developed 800 thousand ha of summer (second crop) irrigated rice, with an additional 800 thousand ha planned to be brought into production over the next several years. Average

yields per ha are projected to increase steadily at 1.5 percent per year to 2.14 mt by 2010 from 1.74 mt in 1996. As a result, total production is projected to grow steadily to 13.4 mmt in 2010 from 9.9 mmt in 1996.

Fig. 26. AGRM 1997 Projections: Myanmar Rice



Total rice consumption is projected to increase to 9.8 mmt in 1997 from 9.3 mmt in 1996. Consumption will continue to steadily increase to 12.5 mmt by 2010 due to rapid population growth of 2.1 percent and income growth of 2.7 percent per year. Annual per capita consumption ranges from 203 to 209 kilograms over the forecast period. Per capita consumption, however, may be overstated because of the existence of substantial amount of unreported trade with China and different ethnic tribes bordering the country along the borders with Laos and Thailand.

While Myanmar is an emerging major exporter in the international rice market, current trade projections are revised downward relative to the previous baseline, because the government’s original targets for production are unlikely to be attained based on the evidence of the past two years. An increase in exports is driven mainly by available supply. The government of Myanmar monopolizes rice exports. Net exports are projected to increase to 497 thousand mt in 1997 from 266 thousand in 1996 and steadily increase to 881 thousand mt by 2010. Projected ending stocks increase to 1.7 mmt by 2000

from 1.05 mmt in 1996, and decrease gradually to 830 thousand mt by 2010.

### **Vietnam**

Vietnam's transition to family farming (1988-92) from the contract system (1982-87) supported the agricultural liberalization efforts and provided incentives to producers. Farmers were assigned long-term leases on their land, and the land rights were transferable. Farmers were no longer required to sell a part of their production to the state at prices below those prevailing in the market. The rice retail market was privatized. Food grain subsidies to government employees and army personnel were eliminated.

Vietnam is attracting foreign investment on several fronts—strengthening the foundation of its ongoing economic growth, especially its agricultural sector. Ciba (now called Novartis, after merging with Sandoz), one of the first major companies to invest in the country, has broken ground for a new agrochemicals and pharmaceutical complex in Dong Nai province near Ho Chi Minh City. The facility will package crop protection chemicals and pharmaceutical products to be marketed in the country. The products include Tilt, a fungicide, and Sofit, a herbicide, for rice. Tomen Corporation will provide a \$US215 million loan to the Vietnam Chemical Corporation to build the first phosphate fertilizer plant in Vietnam. The production capacity of the plant is 330 thousand mt per year of fertilizer intended for rice production. Construction is planned to start in 1997 and will take 6 to 12 months to complete. Rabobank Nederland, one of the world's top 40 banks with US\$175 billion in assets, has set up an office in Ho Chi Minh City and intends to provide finance, market analysis and other services "to help Vietnam become a major agricultural producer." There are now three Dutch banks with operations in Vietnam, helping to support 27 Dutch projects involving a total of US\$447 million. Rabobank, however, is the first Dutch bank to concentrate on agribusiness in the country.

Vietnam's rice industry is also attracting direct investments. Mitsui & Co Ltd (Japan) and two Hong Kong partners (Golden Resources Development International Ltd and the Bank of East Asia) have established a joint-venture, Vietnam Resources Rice Processing Industry, to produce refined rice for ex-

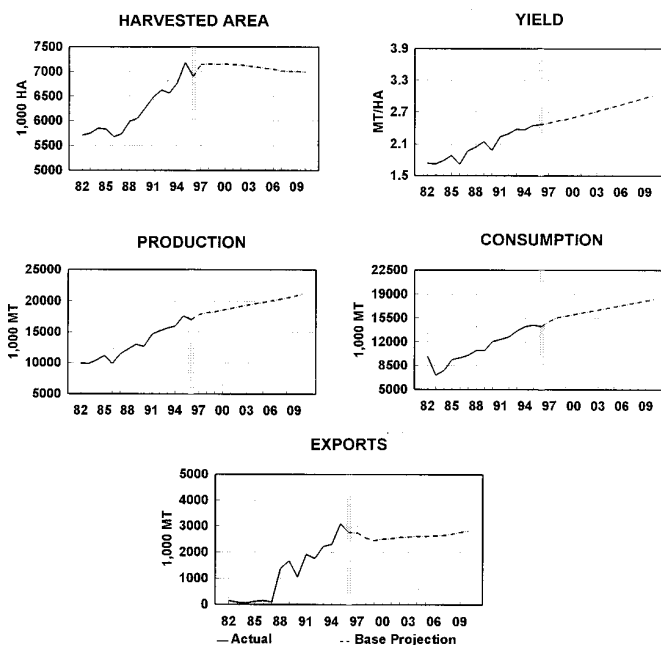
port. Golden Resources is said to have 70 percent of Hong Kong's retail rice market and initiated the joint venture to diversify its rice supplies. Equity is divided with four regional Vietnamese municipalities taking 51.5 percent and the foreign companies, 48.5 percent. The US\$10 million-project which has been established in My Tho, a major urban center in Mekong Delta, will have a full processing capacity of 90 thousand mt of rough rice initially (1997). It will expanded to 180 thousand mt per year by 2000. The Vietnamese government also has approved a US\$2 million investment project for a rice drying system with a capacity of 1 mmt. Another US\$18-million project is being undertaken by the governments of Vietnam and Denmark to develop the milling system in Thai Binh, Soc Trang and Can Tho provinces. Vietnam has 5000 rice mills, with a total annual capacity of 10 mmt of rice, and facilities that husk, sort and polish rice, with a capacity of 2.3 mmt per year.

Rice production in Vietnam has increased rapidly over the past decade due to the economic reforms instituted by the government, and expanded use and improvements in technology. One of the major catalysts of the country's march toward progress is a socio-economic development plan for the Mekong River delta which will cost US\$6 billion over the next five years and US\$28 billion over the following 10 years. The 39,600-square kilometer delta contributes 60 percent of the country's food output and half of its rice exports. Rice accounts for 70 percent of the delta's 2.6 million ha of agricultural land. The goal of the plan is to upgrade the delta's food production through intense cultivation and improve the quality of rice. The country's Ministry of Agriculture and Rural Development (MARD) has implemented a US\$120 million program to improve the quality of the country's rice for the period 1996 through 2000. The focus will be on boosting capacity and upgrading facilities for drying, husking, screening and preserving. Another aspect of the program is standardizing and integrating the collection and processing system, which is presently done by the private sector. The country's Planning and Investment Ministry is to use a \$20-million grant from the Danish government to improve rice quality and limit post-harvest losses.

Given the favorable developments on the supply

side, a high growth rate in rice production is expected to continue in Vietnam throughout the projection period. Total area harvested is projected to increase slightly to 7.1 million ha in 1997 from 6.9 million in 1996 and remain relatively steady around 7.0 million ha over the forecast period (Table 22 and Figure 27). Yields per ha are projected to continue to increase steadily from 2.46 to 3.02 mt during the same period. Total production is projected to increase slightly to 17.8 mmt in 1997 from 17.0 mmt in 1996, and grow steadily to 21.1 mmt by 2010.

**Fig. 27. AGRM 1997 Projections: Vietnam Rice**



Due to low but rising per capita incomes, per capita rice consumption is projected to increase to 196 kilograms in 1997 from 188 kilograms in 1996, and stabilize around 199 kilograms during the rest of the forecast period. Vietnam's economy is expected to have the fastest growth (10.2 percent in 1996 and stabilizing at 9.5 percent by 2000) among the major rice economies (Appendix Table 2). Total rice consumption will increase to 15.1 mmt in 1997 from 14.3 mmt in 1996 and to 18.3 mmt by 2010 due to population and income growth.

Vietnam is emerging as a major rice exporter and has overtaken India as the second largest Asian rice exporter in 1996. According to news sources, Iraq agreed to buy 300 thousand mt of Vietnamese rice per year for the next four years. Vietnam raised its export quota from 2.5 mmt to 3.0 mmt during the 1996 marketing year. The country limits rice exports

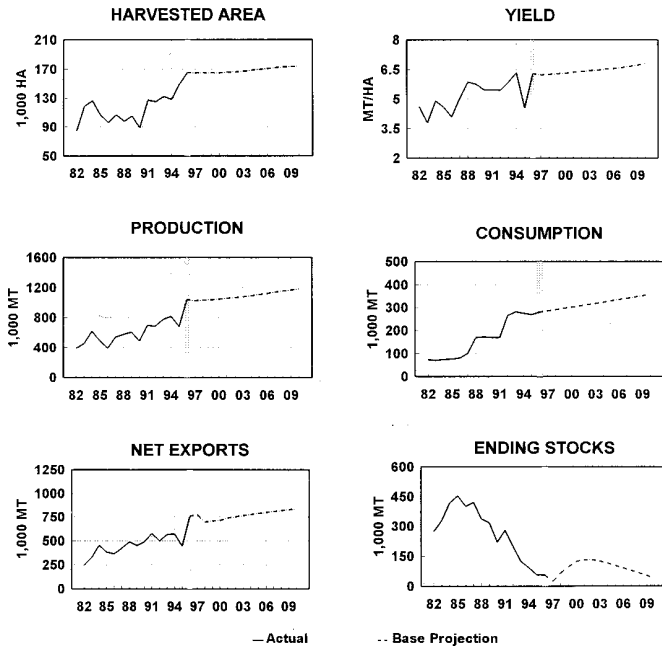
by a licensing system, but has been pressured to liberalize export trade. The country is expected to relax the state's monopoly on rice trade by allowing private companies to sell grain abroad. It is also considering replacing its rice export quotas with a system of export taxes to make the rice sector more flexible and competitive in international markets. To boost exports, the government may set aside special areas for the production of rice for export. In the Red River Delta, about 100 thousand ha will be reserved to develop improved strains of hybrid rice for export. By the year 2000, close to 1 million ha will be set aside in Dong Thap, An Giang, Soc Trang, Can Tho, Long An and Tien Giang provinces for rice production. Poor quality is identified as a major threat to the competitiveness of its exports and the reason why Vietnamese rice has a lower price compared to rice from other countries. To help improve quality, the government is also considering establishing a \$20.5 million rice exporting center in Binh Khanh commune, Can Gio province. It has a capacity of 3.7 mmt of rice per year, and would include a plant to process bran and rice husks. Currently, while the southern part of the country produces 11.0 mmt per year of rough rice, its milling facilities could only process 1.3 mmt of high quality rice per year. The rest is crudely processed by farmers, which can lead to quality problems.

Projected net rice exports in 1997 are expected to remain close to the 1996 level of 2.7 mmt and decline gradually to 2.5 mmt by 1999 before increasing steadily to 2.8 mmt by 2010. Inadequate information on rice stocks is reflected in an assumption of zero change over the forecast period.

### Australia

Australia harvested 165 thousand ha of rice in 1996. Harvested area is projected to remain stable from 1997 to 2001 at 165 thousand ha, but is expected to increase gradually to 173 thousand ha by 2010 (Table 23 and Figure 28); harvested area is driven by technology. Rice growing in Australia was recently concentrated in two main areas. The major area is located in the Murray and Murrumbidgee Valleys in New South Wales (NSW), with only minor production in the Home Hill and Mareeba areas of Northern Queensland. NSW has approximately 1,800 irrigated growers. Rice yields in Australia are

**Fig. 28. AGRM 1997 Projections: Australia Rice**



influenced by market conditions and the development of new technologies. Average yield per ha is projected to decrease slightly to 6.23 mt in 1997 from 6.3 mt in 1996 before increasing steadily to 6.82 mt by 2010. Total production in Australia is projected to increase slightly to 1.2 mmt in 2010 from 1 mmt in 1996.

Per capita consumption is projected to grow steadily at 0.8 percent per year. Total consumption is projected to increase from 280 thousand mt in 1996 to 357 thousand in 2010 due to population growth (1.28 percent in 1996 and stabilizing at 0.86 percent by 2006). The country's economy is projected to grow at 3.3 percent in 1996 and stabilize around 3.4 percent by 2004.

Australia's rice trade is driven by available supply and time. The country exports nearly 70% of its production, with Papua New Guinea as its biggest single customer. Trade with some Pacific Island nations is sometimes constrained by economic problems and lack of foreign exchange. Net exports are projected to increase to 772 thousand mt in 1997 from 760 thousand in 1996 and decline to 697 thousand mt in 1998 before increasing steadily to 839 thousand mt by the year 2010.

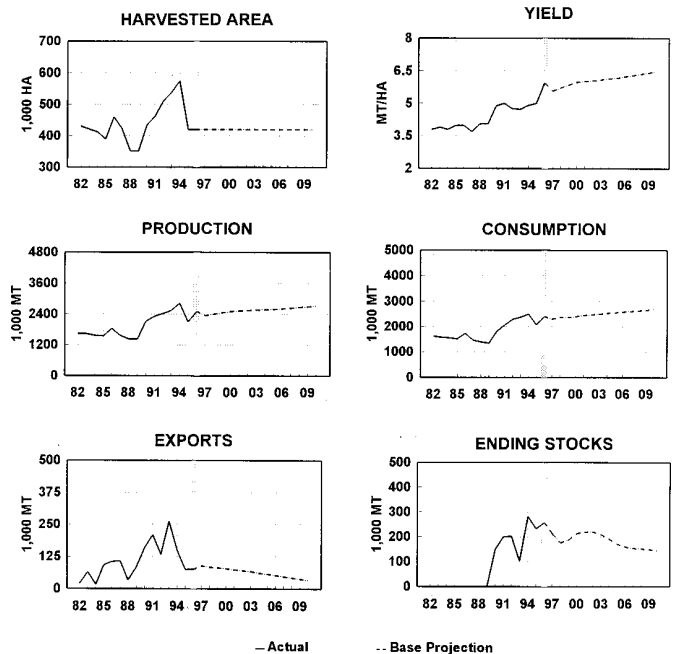
The Australian market is open to imports with zero tariff. The local industry is concerned that imports are taking an increasing share of the domestic market (currently around 20 percent). Thailand is the largest supplier at 20-25 thousand mt per year. Other

suppliers are India, Pakistan, Italy and the United States. Unlike previous baselines where zero ending stocks were assumed, the current baseline projects ending stocks ranging from 24 to 131 thousand mt.

**Egypt**

The harvested rice area in Egypt declined substantially from 575 thousand ha in 1994 to 420 thousand in 1995, a level that is maintained over the projection period (Table 24 and Figure 29) due to government policy limiting the use of water for rice. Rice yields in Egypt, which are one of the highest in the world, are projected to decline to 5.58 mt per ha in 1997 from 5.95 mt in 1996, before growing steadily to 6.47 mt in 2010. Increases in yields are mainly driven by improvements in development and extension of technology. Given a relatively fixed area for planting, total production follows the yield trend. Total production is projected to decline from 2.5 mmt in 1996 to 2.3 mmt in 1997 before steadily increasing to 2.7 mmt by 2010.

**Fig. 29. AGRM 1997 Projections: Egypt Rice**



Annual per capita consumption is projected to decrease to 35.7 kilograms in 1997 from 38.0 kilograms in 1996 and declines gradually to 33.2 kilograms by the year 2010 as income grows. The country's economy is likely to grow by 3.3 to 3.4 percent per year over the forecast period. Due to population growth (1.92 percent in 1996 and

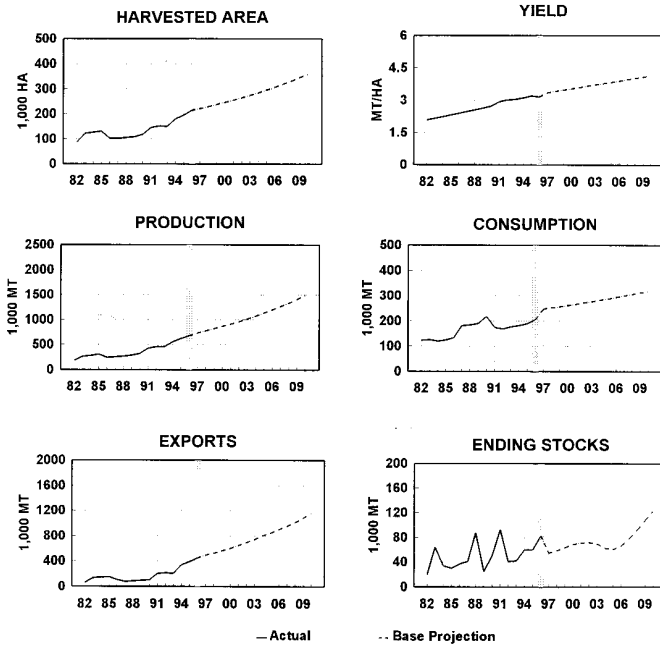


stabilizing at 1.73 percent by 2006), total consumption is projected to increase from 2.4 mmt in 1996 to 2.7 mmt by the end of the forecast period. Net exports are projected to increase to 88 thousand mt in 1997 from 75 thousand in 1996 before decreasing steadily to 33 thousand by the end of the projection period. Ending stocks are projected to decrease from 258 thousand mt in 1996 to 146 thousand by 2010.

**Argentina**

Harvested area in Argentina is projected to increase steadily to 359 thousand ha by 2010 from 215 thousand ha in 1996 (Table 25 and Figure 30). Considerable land area is available to be developed for rice production. However, some of these areas are subject to excessive flooding, such as in Corrientes. Irrigation systems also need to be developed at a reasonable cost to sustain the expansion of rice area. Gains in yield are expected due to improved varieties, technology and fertilizer use. The average yield per ha is projected to increase from 3.26 mt in 1996 to 4.15 mt by 2010. Total production is projected to double over the forecast period, increasing to 1.5 mmt in 2010 from 700 thousand mt in 1996.

**Fig. 30. AGRM 1997 Projections: Argentina Rice**



Per capita consumption is projected to decrease to 7.06 kilograms in 1997 from 7.21 kilograms in 1996 before increasing steadily to 7.95 by 2010. Total consumption is projected to increase from 250

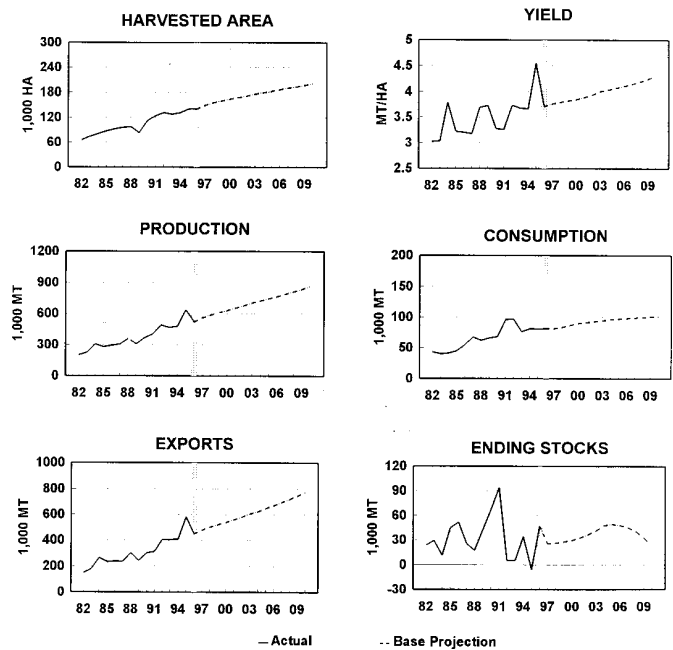
thousand mt in 1996 to 318 thousand by 2010. The country's economy is assumed to grow well over 4 percent per year over the projection period. Argentina previously maintained export taxes on rice, but starting in 1992, a subsidy of 2.5 percent was implemented. Argentina is a member of the MERCOSUR trade bloc that was created in March 1991, eliminating tariffs, and implementing common external tariffs in January 1995. The other members of the bloc are Uruguay, Brazil and Paraguay. An increase in external tariffs from 10 percent to the current level of 20 percent has made Argentine rice exports move competitively into Brazil. The country's total exports are projected to increase substantially from 450 thousand mt in 1996 to 1.2 mmt by 2010, equivalent to an annual growth of nearly 7 percent. Ending stocks will range from 60 to 123 thousand mt during the same period.

**Uruguay**

Uruguay's harvested area and yields returned to trend levels in 1996 following a record yield of 4.55 mt per ha in 1995. Harvested area is projected to expand steadily from 140 thousand ha in 1996 to 201 thousand ha by 2010 (Table 26 and Figure 31). Yields increase from 3.71 mt per ha in 1996 to 4.3 mt by 2010. Total production is projected to increase to 864 thousand mt in 2010 from 520 thousand in 1996.

Total consumption is projected to increase gradu-

**Fig. 31. AGRM 1997 Projections: Uruguay Rice**



ally from 80 thousand mt in 1996 to 101 thousand in 2010 as population grows at a decreasing rate (0.63 percent in 1996 to 0.3 percent by 2002). Per capita consumption is expected to increase steadily to 30.1 kilograms in 2010 from 25.2 kilograms in 1996 as incomes grow. The country's GDP growth is projected to range from 2 to 3 percent per year over the forecast period. Its inflation rate, which is declining, remains high at 30.1 percent in 1996. It is expected to decline and stabilize at 16.2 percent by 2001. As a member of MERCOSUR like Argentina, Uruguay is able to increase its exports to Brazil due to the favorable external tariff. Brazil has normally imported about 75 percent of Uruguay's rice. Uruguay rice exports to Brazil are usually priced at a premium of \$100 per mt above world market price. Uruguay exports high quality long grain rice to non-MERCOSUR markets. The large crop during the 1995/96 crop year enabled the country to export rice to Iran, Peru, Mexico and Senegal. The country's exports are projected to increase to 772 thousand mt by 2010 from 475 thousand in 1996. Ending stocks range from 24 to 48 thousand mt during the same period.

### MAJOR IMPORTING COUNTRIES

#### Brazil

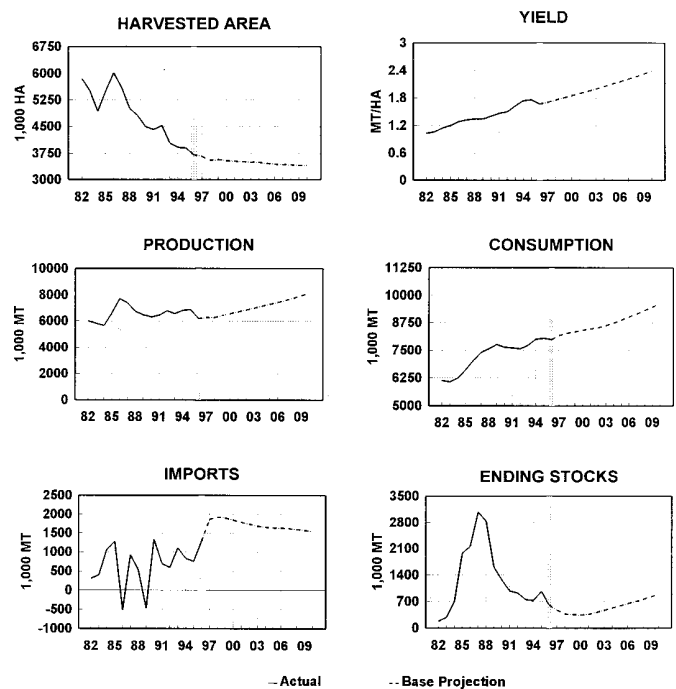
Brazil is in the midst of an ambitious economic restructuring program designed to bring inflation down, dismantle state control of the economy, reduce market barriers and encourage greater private sector (including foreign) investment to achieve sustainable long-term, non-inflationary growth. The process of trade liberalization initiated in 1990 has produced significant changes in the country's trade regime, resulting in a more open and competitive economy.

Brazil's economy grew around 2.8 percent in 1996 and is projected to grow faster in 1997 at 5.5 percent before declining to 3.9 percent by 2006. Population grew at 1.2 percent in 1996 and slows to 0.8 percent starting in 2005. The country experienced the third highest inflation rate in 1996 at 19.5 percent, which is expected to stabilize at 9.8 percent beginning in 2002.

Brazil has three rice production environments:

lowland-irrigated, lowland-rainfed and upland rice areas. Ninety percent of the lowland-irrigated area is planted to modern rice varieties, and 80 percent is planted in rotation with two years of rice and three years of pasture. There are 12,000 irrigated rice producers. The irrigated rice area is expected to grow at 3.1 percent per year over the forecast period. Upland rice, which has served as a reclamation crop in new areas that eventually convert to soybeans, has been decreasing over time and is projected to decline by 2.3 percent per year during the projection period. Total harvested rice area is projected to decrease by 0.4 percent annually from 3.6 million ha in 1996 to 3.4 million by 2010 due to a relatively larger decline in upland area compared to an increase in irrigated area (Table 27 and Figure 32). Production constraints include the prevalence of red rice, rice water weevil and low temperatures during flowering time. The average yield per ha is projected to increase from 1.8 mt in 1996 to 2.39 mt by 2010. Total rice production is projected to decrease slightly to 6.3 mmt in 1997 from 6.5 mmt in 1996 and increase steadily to 8.1 mmt by 2010.

Fig. 32. AGRM 1997 Projections: Brazil Rice



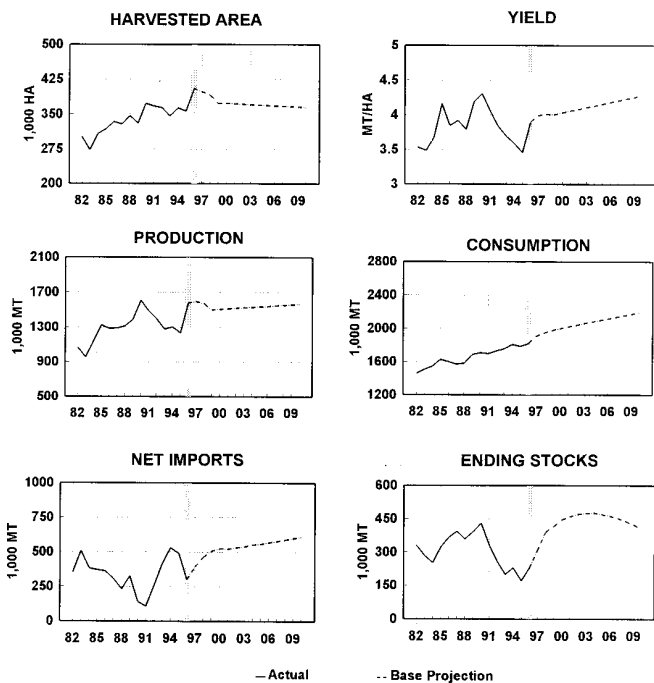
Annual per capita consumption is projected to increase gradually from 49.5 kilograms in 1996 to 52.2 kilograms by the end of the forecast period. Total rice consumption is projected to continue increasing

steadily from 8.1 mmt in 1996 to 9.6 mmt in 2010. Brazil is expected to remain a rice-importing country, with projected net imports increasing from 1 mmt in 1996 to 1.9 mmt in 1998 before declining steadily to 1.5 mmt by 2010. Ending stocks are projected to decline to 355 thousand mt in 2000 from 528 thousand in 1996 and increase steadily to 900 thousand mt by 2010.

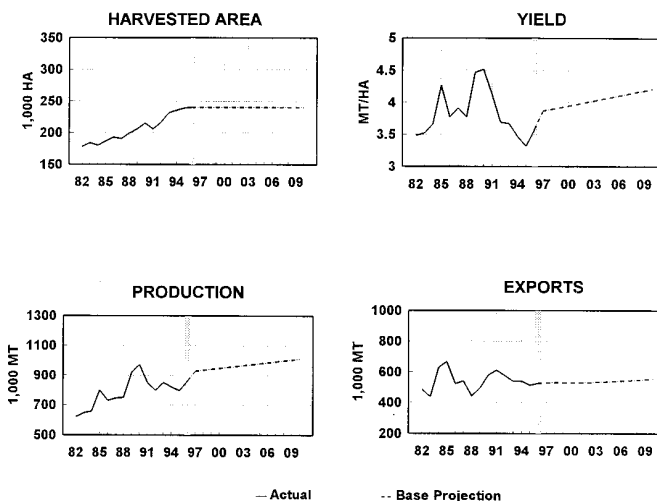
**European Union**

The EU is the world’s largest economy and the largest U.S. trade and investment partner. Its aggregate economy is assumed to grow at 2.2 to 2.5 percent per year over the projection period. The EU is important both as a rice importing and exporting region; however, it is projected as a net importing region over the forecast period. The total harvested area is projected to decrease gradually from 405 thousand ha in 1996 to 365 by 2010 (Table 28 and Figure 33). Italy, which represents over 60 percent of the EU’s rice area, is constrained from expanding its rice area beyond 240 thousand ha (Table 29 and Figure 34). Spain’s rice area fluctuates between 50 and 100 thousand ha because it is dependent on rainfed reservoirs. Rice area in Spain is projected to average between the extremes at 78 thousand (Table 30 and Figure 35). The rest of EU’s rice area (France and Greece) declines from 60 thousand ha in 1996 to 47 thousand ha by 2010 (Table 31 and Figure 36).

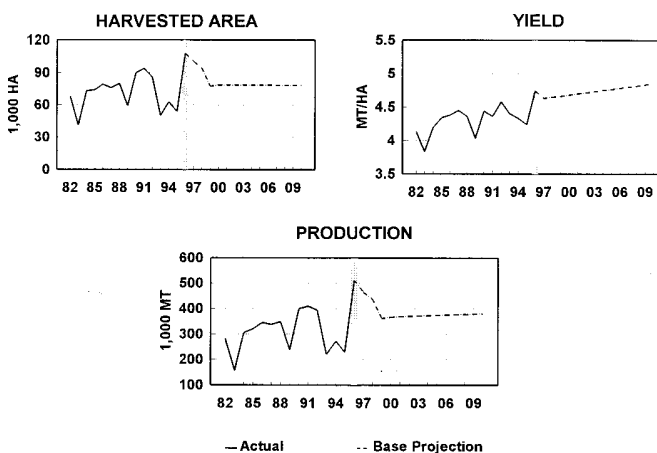
**Fig. 33. AGRM 1997 Projections: European Union Rice**



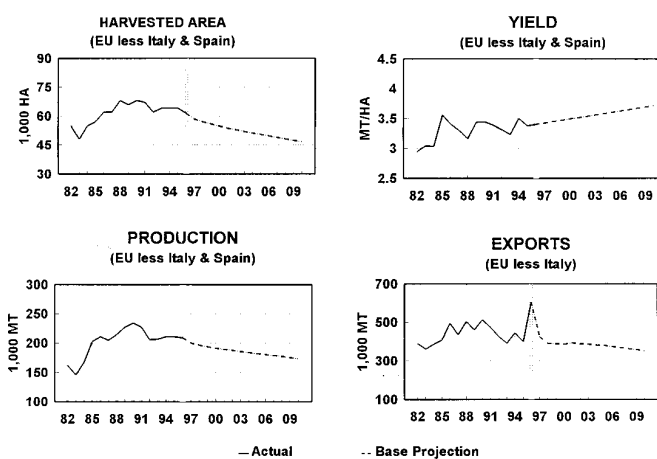
**Fig. 34. AGRM 1997 Projections: Italy Rice**



**Fig. 35. AGRM 1997 Projections: Spain Rice**



**Fig. 36. AGRM 1997 Projections: Other EU Rice**



The EU average rice yields are projected to increase from 3.99 mt per ha in 1997 to 4.28 mt per ha during the projection period. Average rice yield of Italy is projected to increase by 0.7 percent annually, and Spain’s yield is projected to increase by 0.4 per-

cent annually. Yields in other EU producing countries are expected to increase by 0.6 percent per year. Total EU production is projected to range from 1.5 to 1.6 mmt over the entire forecast period. Production of Italy increases from 850 thousand mt in 1996 to 1.0 mmt by the end of the projection period due solely to yield gains. Spain's production declines to 380 thousand mt in 2010 from 515 thousand mt in 1996. Production of the rest of EU is projected to decline from 215 thousand mt in 1996 to 174 thousand mt in 2010.

As the EU population grows slightly (0.31 percent in 1996 and declining to 0.13 by 2006), total rice consumption also is projected to continue growing marginally, i.e., from 1.8 mmt in 1996 to 2.3 mmt by 2010. Per capita consumption increases steadily from 5.2 kilograms to 6.0 kilograms over the same period. As a result of reduced import levies and export subsidies, EU's net imports are projected to increase from 298 thousand mt in 1996 to 736 thousand mt in 2010. Recently, the EU imposed a quota of 42,650 mt of rice imports from overseas countries and territories for the first four months of 1997. Italy's exports, which are driven by available supply and real average medium grain export price, are projected to increase to 554 thousand mt in 2010 from 525 thousand in 1996.

The EU has tightened up rice quality standards as part of a sweeping reform of its rice market under the Common Agricultural Policy. The regulation determining the standard quality of rice (No. 3073/95) replaces the 1976 requirements. It states that paddy rice must be of a "sound and fair marketable quality, free of odor." Moisture content is limited to 14 percent in 1996 and 1997 and 13 percent thereafter.

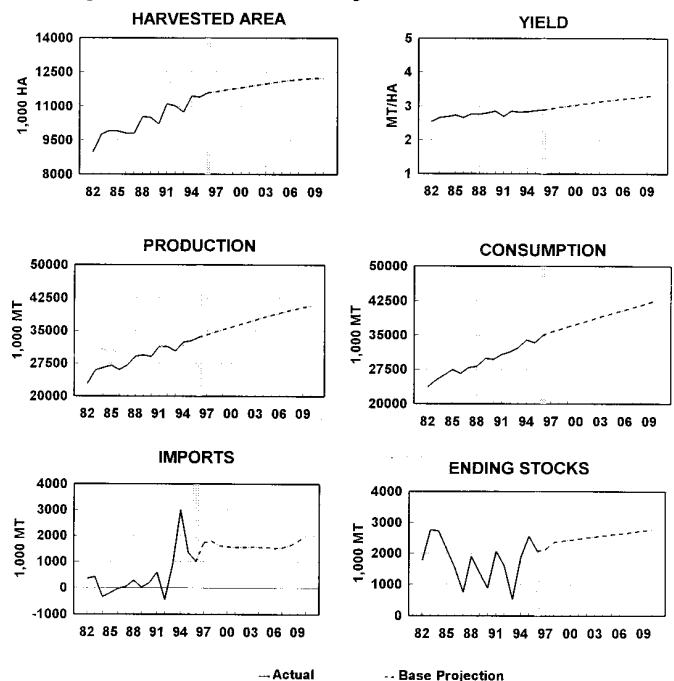
**Indonesia**

Indonesia was the fourth fastest growing rice economy in 1996, with GDP growing at 7.8 percent. This rate is projected to slow down gradually and stabilize at 5.5 percent by 2006. As the third largest rice-producing and consuming country in the world, Indonesia's participation in international rice trade is relatively small but volatile. At times it has been a major importer, at other times a significant exporter. The government has promoted a rice self-sufficiency policy for many years. Area harvested in the country is influenced by farm prices. The government is try-

ing to expand rice production by developing 1.0 million ha of new rice area out of the 4-5 million ha of bogs in Central Kalimantan. The government also plans to introduce new high-yielding varieties, expand irrigation and encourage the use of efficient types of fertilizers. However, at least 400 thousand ha of the 1.0 million new agricultural land may not be suitable for rice due to thick peat layers. The estimated cost of the project is Rp5 trillion. The country is also developing 350 thousand ha of farmland for rice over 26 provinces distributed across South Celesta, West Java, North Sumatra and West Sumatra—aimed at increasing rice production. Java accounts for over half of Indonesia's rice production.

Indonesia's rice area is a function of government support and input (fertilizer) prices. The area harvested is projected to increase slightly to 11.64 million ha in 1997 from 11.6 million in 1996, and increase steadily to 12.24 million ha by the year 2010 (Table 32 and Figure 37). Due to a strong national commitment to rice research and the adoption of International Rice Research Institute (IRRI) varieties, yields are projected to increase, from 2.89 mt in 1996 to 3.33 mt per ha by the end of the projection period. Total production is projected to increase to 34.1 mmt in 1997 from 33.5 mmt in 1996 reaching an annual output of 40.7 mmt by 2010.

**Fig. 37. AGRM 1997 Projections: Indonesia Rice**



Per capita use, which has increased over the past several decades, decreased to 163.3 kilograms in 1995 due to the rationing effect of the policy of import restriction. Per capita consumption recovered in 1996 at 169.3 kilograms and is expected to increase slightly and stabilize at the 170-kilogram level thereafter. Per capita consumption is a function of GDP and real retail prices; the positive effect of GDP is counterbalanced by the negative effect of increasing real retail prices. Total consumption is projected to increase slightly to 35.7 mmt in 1997 from 35.0 mmt in 1996. By 2010, consumption is expected to be 42.7 mmt due to population growth (1.56 percent in 1996, but projected to decline to and stabilize at 1.33 percent by 2005).

Indonesia has made considerable progress in trade and investment deregulation. In May 1995, the country unveiled a comprehensive tariff reduction package that covered roughly two-thirds of all traded goods and will reduce most tariffs to under 5 percent by 2003. In general, the government allows the market to determine price levels. A system of floor and ceiling prices, however, is enforced for certain “strategic” food products such as rice. Direct government subsidies are limited to a few goods such as fertilizers (Department of State, 1995).

While Indonesia has a policy of self-sufficiency, production shortfalls are expected to make the country a net rice importer during the projection period. Under the GATT accord, Indonesia would phase-out non-tariff barriers and reduce the bound tariff rate to 160 percent by 2004. The country’s National Logistics Agency (BULOG) announced that it will sign no rice import contracts in the 1996/97 fiscal year (April-May). Despite this pronouncement, USDA-Economic Research Service (1997b) reported that the country had net imports of 1.0 mmt in 1996. The country is expected to remain a source of volatility in the world rice trade mainly due to weather-related factors. The country’s net imports increased sharply to 3.0 mmt in 1994 from 0.73 mmt in 1993 due to a weather-related production shortfall but declined to 1.25 mmt in 1995 and 1.0 mmt in 1996. Net imports are projected to increase to 1.7 mmt in 1997 and fluctuate within the range 1.5 to 2.0 mmt thereafter. Ending stocks increase steadily from 2.0 mmt in 1996 to 2.8 mmt in 2010 (Table 30).

## Iran

Iran’s economic difficulties are an offshoot of the country’s struggle with a government program of austerity designed to cope with the excesses of the reconstruction boom of the early 1990s, the government’s failure to implement promised economic reform measures and a stagnant petroleum sector. While the country did not resort to external debt during the eight-year war with Iraq, Iran borrowed heavily during 1988 through 1992—leading to the current external debt of nearly \$30 billion. The principal of the rescheduled debts became due in 1996, and the country’s ability to make timely payments remains uncertain. To aggravate the situation, Iran is not a member of the WTO, and U.S. investments in and trade with Iran are prohibited under Executive Order 12959, which took full effect in August 1995 (Department of State, 1995).

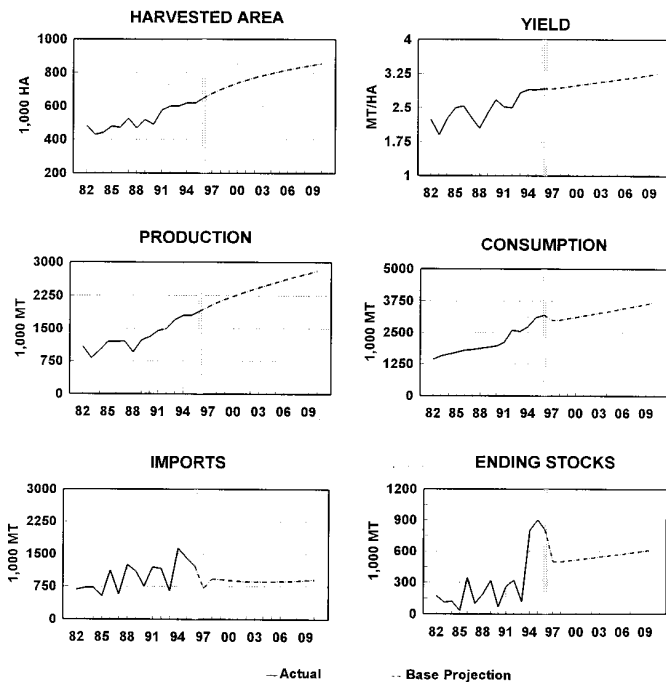
While Iran’s economy grew nearly 2 percent in 1996, it is expected to stabilize at a 3.3 percent by 2002. Iran experienced a high rate of inflation at 45.6 percent in 1996, which is assumed to decline to 30.2 percent in 1997 before stabilizing at 8.5 percent by 2001.

Harvested rice area in Iran has recently increased due to the government’s high domestic price and its support in improving the agricultural market infrastructure, e.g., farm-to-market roads, which benefit rice production. The area harvested is projected to increase from 650 thousand ha in 1996 to 677 thousand in 1997 and increase steadily to 856 thousand ha by 2010 (Table 33 and Figure 38). Yields per ha increase from 2.92 mt in 1996 to 3.27 mt by 2010. Likewise, total rice production is projected to grow steadily from 1.9 mmt in 1996 to 2.8 mmt by 2010.

Annual per capita consumption is projected to decrease gradually from 51 kilograms in 1996 to 44 kilograms by the end of the forecast period. Growth in total rice consumption is projected to continue, increasing from 3.2 mmt in 1996 to 3.7 mmt in 2010, due primarily to population growth of over 2 percent over the forecast period. Total rice consumption is also a function of real CIF rice prices and real GDP.

Iran’s government has a monopoly on rice imports. It is expected to remain a rice-importing country, with imports declining to 708 thousand mt in 1997 from 1.2 mmt in 1996. Net imports fluctuate around 900 thousand mt over the rest of the forecast period.

**Fig. 38. AGRM 1997 Projections: Iran Rice**



Sale of imported rice in Iran is controlled through issuance of ration coupons. Ending stocks decline to 501 thousand mt in 1997 from 802 thousand in 1996, and range between 500 to 600 thousand mt during the rest of the projection period.

**Iraq**

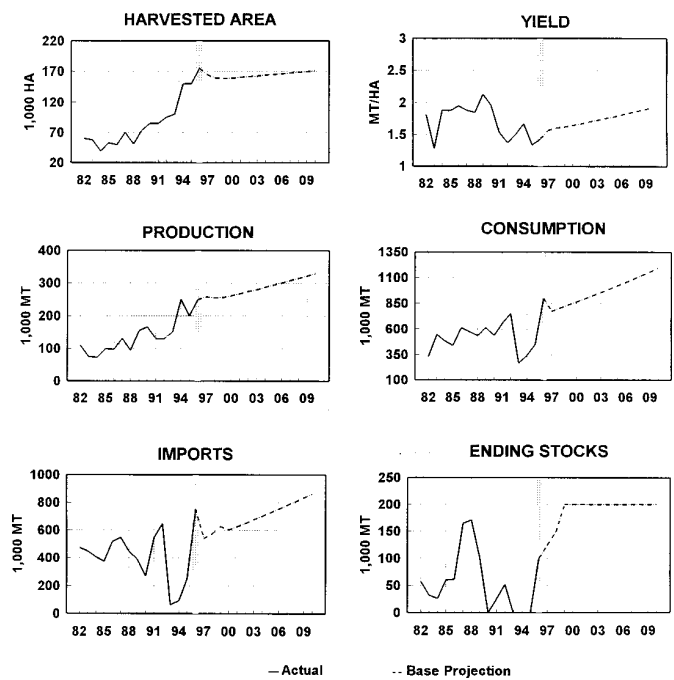
A United Nation’s near-total trade and air embargo on Iraq and freezing of the country’s overseas assets are still in effect, and the country’s economy continues to deteriorate. For humanitarian reasons, the U.N. Security Council passed Resolution 986 in April 1995 allowing Iraq to export \$1 billion worth of oil every three months and to use the proceeds to purchase food, medicine and other essential items for civilian purposes. The Iraqi government refused to implement the resolution initially but finally agreed to an “oil-for-food deal” in December 1996.

Iraq depends on imports for most of its rice requirements for domestic consumption. Domestic production capacity has improved in recent years, but it remains vulnerable to weather and political conditions. It is becoming increasingly difficult for the government to convince farmers to sell their harvest to the government. Most farmers prefer to hoard their production or sell it on the black market at much higher prices than is paid by the government.

The USDA estimate of harvested area in 1995 has

been revised substantially upwards to 150 thousand ha from the previous estimate of 40 thousand. The area harvested increased to 175 thousand ha in 1996 and is projected to decline to 159 thousand from 1998 through 2000 before gradually recovering to 171 thousand ha by 2010 (Table 34 and Figure 39). Yields per ha are projected to increase steadily from 1.43 mt in 1996 to 1.93 mt in 2010. The revised USDA production estimate for 1995 increased substantially to 200 thousand mt from the previous baseline level of 50 thousand mt. Total production increased to 250 thousand mt in 1996 and is projected to reach 330 thousand by 2010.

**Fig. 39. AGRM 1997 Projections: Iraq Rice**



Total consumption is projected to increase rapidly as population grows at 3 percent per year and incomes rise. Like Iran, Iraq’s total rice consumption is driven by real CIF rice prices and real GDP. The country’s inflation is assumed to be stable at 4.2 percent. Rice consumption increased substantially to 900 thousand mt in 1996 from 450 thousand in 1995 due to the food-related relaxation of the ban for humanitarian reason. The consumption is expected to adjust downwards in 1997 to a level of 773 thousand mt before steadily increasing to 1.2 mmt by 2010. Annual per capita consumption increased to 42 kilograms in 1996 from around 21.7 kilograms in 1995, but declines to 35 kilograms in 1997 before increasing to nearly 37 in 2010.

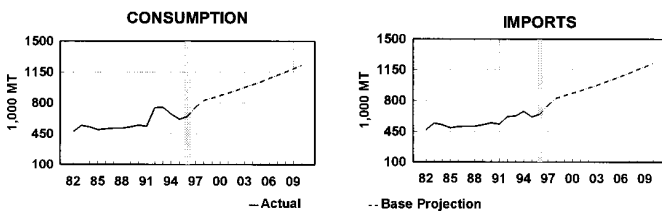
The government procures and distributes rice. Net imports increased substantially to 750 thousand mt in 1996 from 250 thousand in 1995 but will decline to 541 thousand in 1997 before slowly increasing to 862 thousand mt by 2010. Ending stocks are projected to increase from 100 thousand mt in 1996 to 200 thousand in 1999 and stabilize at that level over the forecast period. In contrast, the previous baseline assumed zero ending stocks over the same period.

**Saudi Arabia**

The Saudi government has traditionally maintained price controls for basic utilities, energy and agricultural products. Water, electricity and petroleum products are heavily subsidized, with prices often substantially below the costs of production in order to share the wealth and spur development. The country is not a member of the WTO but a WTO working party has been formed to review its request for accession (Department of State, 1995).

Since Saudi Arabia has virtually no rice production, its rice supplies are dependent upon imports. Providing best quality rice to consumers at a low price is a major government policy. While per capita consumption remains stable at 40 kilograms during the projection period, the total consumption forecast shows an increase from 645 thousand mt in 1996 to 1.2 mmt by 2010 as population grows rapidly, i.e., by more than 3 percent per year (second only to Iraq), and incomes grow by 3 percent per year (Table 35 and Figure 40). Consumption is determined by income and imported rice prices.

**Fig. 40. AGRM 1997 Projections: Saudi Arabia Rice**



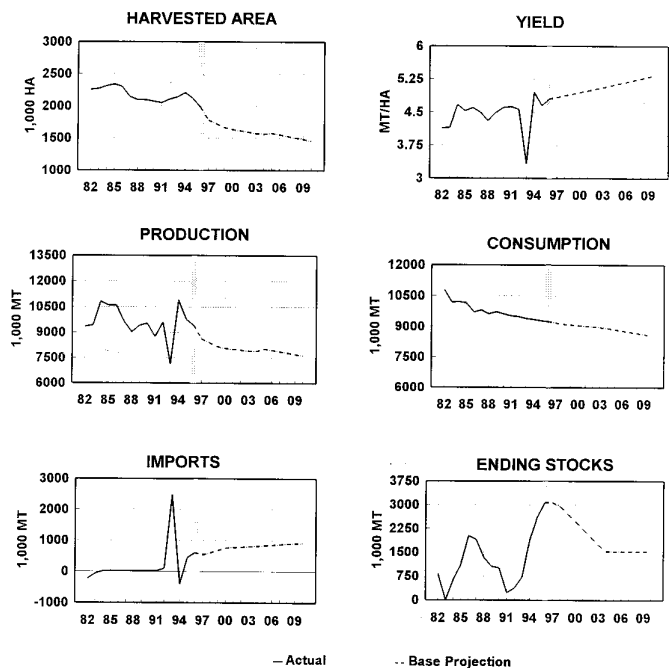
Saudi Arabia is projected to import all of its rice consumption requirements. While import subsidies have been used in the past, most imports are currently done through the open market. The government encourages suppliers to compete in providing the lowest possible import prices.

**Japan**

Japan’s current economic slowdown, which began in mid-1991, has proven to be the longest in the country’s postwar history. Japan’s economy is undergoing serious structural pressures, due primarily to technology-driven global competition. The domestic rice sector in Japan has been insulated from international markets through high support prices and tight restrictions on rice imports. Japan imported 450 thousand mt in 1995, which exceeded the minimum access requirement of 230 thousand mt under the GATT accord. Exports in 1995 were 200 thousand mt, resulting in net imports of 250 thousand mt. Imports increased to 600 thousand mt in 1996 but are expected to decline to the minimum access level of 531 thousand mt in 1997 before increasing to 924 thousand mt by 2010.

The Japanese government has used land diversion programs to control rice supplies. Rice acreage is influenced by this government policy and rising costs of production. Japan’s rice has rebounded from the 1993 cold-weather-related production shortfall, harvesting 2.2 million ha in 1994. The area harvested, however, declined slightly to under 2.0 million ha in 1996 from 2.1 million ha in 1995. To accommodate for higher yields, imports and limits on storage costs, the riceland diversion program is expected to be managed such that only 1.5 million ha of rice will be harvested by 2010 (Table 36 and Figure 41). Japan’s

**Fig. 41. AGRM 1997 Projections: Japan Rice**



rice yields are influenced by high support prices, production costs and new technology. While the Japanese government allocated ¥115.3 billion in the fiscal 1995 budget for rice farmers, subsidies to producers of independently-distributed rice are being phased out. Yield per ha is projected to increase steadily from 4.76 mt in 1996 to 5.23 mt by 2010. After a low post-war rice production record of 7.1 mmt in 1993, production recovered in 1994, reaching 10.9 mmt. Production decreased to 9.8 mmt in 1995 and 9.4 mmt in 1996 and is projected to continue to decline to 7.6 mmt by 2010.

Japan's rice consumption is strongly influenced by a negative income elasticity. The country's per capita use of rice declined substantially over the past few decades and is expected to continue declining gradually from 73.5 kilograms in 1996 to nearly 66 kilograms by the year 2010. Income and population growth rates are assumed to decline. Consequently, total consumption decreased slightly to 9.25 mmt in 1996 from 9.3 mmt in 1995 and declines to 8.6 mmt by the end of the projection period.

Due to bumper rice harvests between 1994 and 1996, ending stocks in 1996 stood at 3.1 mmt—substantially higher than the 1995 level of 2.6 mmt and the target level of 1.5 mmt. The Ministry of Agriculture, Forestry and Fisheries intends to cut the stockpile by initially exporting 100 to 200 thousand mt of rice, including some imports. The ministry will follow a “rice-as-aid plan.” About 10 nations have asked Japan to supply more than 60,000 mt of rice. Criticism of the use of imported rice for food aid is based on the notion that this prevents access of less expensive rice to Japanese consumers, violating the spirit of the Uruguay Round agreement. Ending stocks are expected to steadily decline such that by 2004, the government's target level of 1.5 mmt would have been attained.

**South Korea**

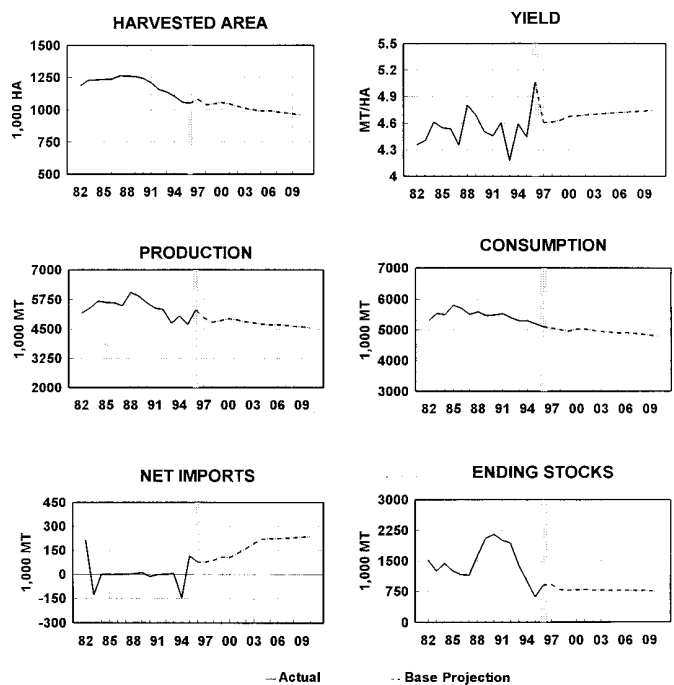
Korea's economy is based on private ownership of the means of production and distribution. Governmental intervention, however, has historically been used to guide the direction of economic development. This includes policy loans and discretionary enforcement of regulatory policies (Department of State, 1995).

A review of key demographic changes that oc-

curred in the country over the past couple of years offers a better understanding of the Korean rice industry. From the period 1970 through 1995, there was rapid rural-to-urban migration in the country, with the share of rural population declining from 45 percent of population to 10 percent. Young people moved to cities, leaving an older population and labor force in the farm sector. About 23 percent of the farm workers are over 60 years old, and 45 percent are women. Farmers are highly dependent on farm income due to the limited off-farm income opportunities.

To a large extent, this demographic shift has a dampening effect on the country's agricultural industry in general and on rice in particular. The country's major objective has been self-sufficiency in rice and increased rural incomes. The rice industry has been protected, and prices have been three to five times higher than world prices. Support policies have included producer price incentives, restrictions on rice imports and government purchases of rice output. Despite these policies, the harvested rice area in South Korea is projected to decline annually by 0.6 percent, from 1.05 million ha in 1996 to 959 thousand ha by 2010 (Table 37 and Figure 42). One factor causing this decline is the declining level of government support prices in real terms. The increase in government procurement prices in 1996 ranged from 1 to 6 percent. Yields, driven by improvements

**Fig. 42. AGRM 1997 Projections: South Korea Rice**





in technology, decline to 4.61 mt per ha in 1997 from 5.07 mt in 1996 before increasing slightly to 4.75 mt per ha by 2010. Total production would decline to nearly 5 mmt in 1997 from 5.3 mmt in 1996 and is projected to decline to 4.5 mmt by the end of the forecast period.

One favorable development is that rice farmers appear to respond well to a structural reform program being implemented by the Ministry of Agriculture, Forestry and Fisheries. Over 7,035 rice farming households have received financial support from the government to specialize in rice production. The average rice farming area per household rose 56 percent to 3.85 ha per household in 1995 from 2.47 ha in 1994. The number of farm households with more than 5 ha rice land also increased, i.e., more than tripled, from 395 to 1,426. To increase production and pay the government back, most rice farmers raised two crops a year, thus intensifying the land use rate to 138.3 percent from 129.7 percent.

Rice has become an inferior good in South Korea. It is projected that annual per capita use will decline steadily from about 111 kilograms in 1996 to 92 kilograms by 2010, a 1.3 percent annual decline. This decline is due to higher incomes (the country's growth in real GDP in 1996 at 7.3 percent is the fifth highest among the rice economies but will slow down to and stabilize at 5.7 percent by 2006) and higher real retail prices. Consumer prices are expected to increase by 5.1 percent per year during most of the projection period. Despite the population growth (1.03 percent in 1996 and less than 1 percent thereafter), total consumption is projected to decrease annually by 0.4 percent from 5.1 mmt in 1996 to 4.8 mmt in 2010.

In terms of trade, while the most explicit barriers to imports have declined over time, more subtle barriers remain intact. The typical trade barriers facing exporters into the country are the large number of regulations that complicate licensing, inspections, type approval, marking requirements and other standards affecting trade.

Under GATT, South Korea has agreed to increase imports 1 to 2 percent of domestic consumption for 5 years beginning in 1995, increasing to 2 to 4 percent of consumption by 2000 through 2004. With its developing country status and a special clause in the Uruguay agreement, the implementation period for

tariffication is extended to 10 years, from 1995 through 2005. State trading is allowed to continue, and trade will be controlled by the state during the 10-year grace period. Korea imported 115 thousand mt in 1995 and 77 thousand mt in 1996. Imports are projected to remain flat in 1997 at 77 thousand mt and increase steadily to 237 thousand by the end of the forecast period. Recently, the United States complained about South Korea's purchase of rice from China through international open bidding. The Seoul government, however, has decided to uphold its stance for rice buying through this method. Projected ending stocks range from 755 to 918 thousand mt over the projection period.

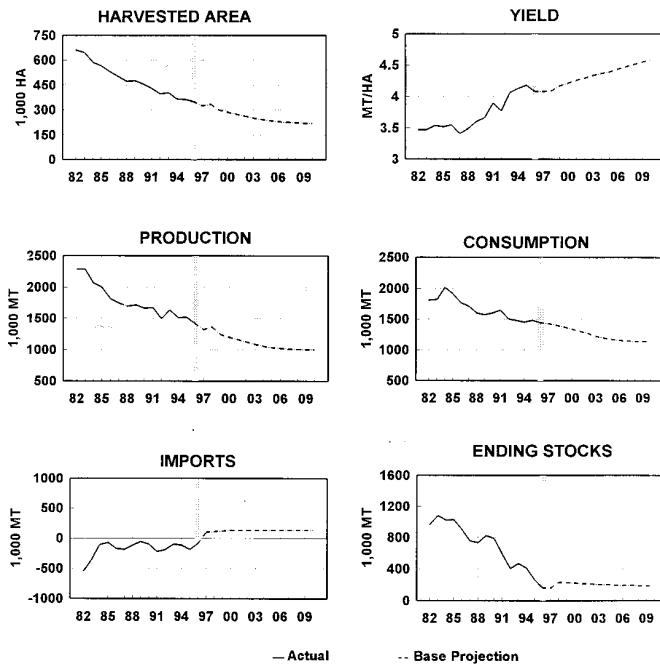
### Taiwan

Taiwan aims to accede to the World Trade Organization (WTO) and to develop into an Asia-Pacific regional operations center. In line with this goal, Taiwan has begun to take unilateral steps to liberalize its trade and investment regime (Department of State, 1995).

Taiwan plans to reduce supports for rice (along with other selected crops) over the next five years, in preparation for its application for membership in the World Trade Organization (WTO). Taiwan has agreed to convert most of its non-tariff barriers to tariffs or tariff quotas upon accession. The price guarantee programs currently in place will be kept, and imports will be permitted. Rice area harvested is projected to decline from 348 thousand ha in 1996 to 324 thousand in 1997 and increase to 334 thousand ha in 1998 before declining steadily to 219 thousand by the year 2010. This decrease is mainly due to a policy of reducing the second crop area from production and declining real farm harvest prices. Yields per ha, on the other hand, are projected to increase steadily from 4.08 mt in 1996 to 4.58 mt by 2010 (Table 38 and Figure 43). Average yield is a function of improvements in technology. The expected yield gain, however, is not adequate to compensate for the sharp decline in the area harvested—causing a decline in total production from 1.4 mmt in 1996 to only 1.0 mmt by the year 2010.

Per capita consumption declines from 66.4 kilograms in 1996 to 47.1 kilograms by 2010, causing total consumption to decrease from 1.44 mmt to 1.14 mmt during the same period, as per capita incomes

**Fig. 43. AGRM 1997 Projections: Taiwan Rice**



increase. Population growth is slightly lower than South Korea's, at 0.91 percent in 1996 and declines to 0.71 percent per year starting in 2006.

Taiwan's small rice and sugar exports enjoy indirect subsidies through guaranteed purchase prices higher than world prices. Fertilizer manufacturing is subsidized by offering lower fuel prices to domestic manufacturers. Taiwan has maintained domestic prices of rice higher than international prices. The government has purchased rice at two to three times higher than world price. Based on an assumption of Taiwan membership in the WTO, the country is expected to be a net importer of rice starting in 1997. Net imports are projected to increase steadily from 99 thousand mt in 1997 to 132 thousand mt by the year 2000 and would stabilize at this level over the rest of the projection period. Ending stocks are expected to be in the range of 156 to 233 thousand mt over the projection period.

**Rest of the World**

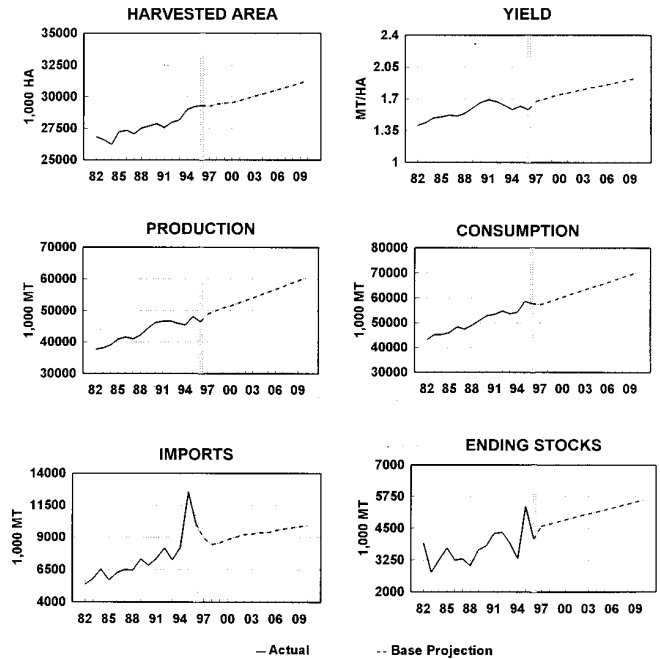
While the ROW is an aggregate region, there are a number of pertinent country-specific developments, especially on the demand side, that have substantial potential impact on world prices and hence will be mentioned here. One of these developments is the potential famine in North Korea brought about by weather-damaged crops and the country's urgent need for 500 thousand mt of U.S. rice and wheat.

Colombia's possible purchase of a substantial quantity of rice is also a subject of speculation that has affected prices in 1996. Other countries that can, time and again, cause uncertainties in the rice market due to unexpected weather-related imports include Bangladesh and the Philippines.

The rest of the world is a net rice importer. Area harvested is responsive to low quality rice (Thai 35%) price and technology. Yields are projected according to historical patterns. Consumption is responsive to the relative world prices of wheat and Thai 35% rice.

Total harvested area in 1996 was 29.3 million ha and is projected to increase slightly to 31.2 million ha by 2010. Yields are expected to increase steadily from 1.58 mt per ha in 1996 to 1.93 mt per ha by the end of the projection period (Table 39 and Figure 44). Total production is projected to grow by 1.9 percent per year, from 46.4 mmt in 1996 to 60.3 mmt by 2010.

**Fig. 44. AGRM 1997 Projections: Rest of the World Rice**



Total consumption is projected to increase to 70 mmt in 2010 from nearly 58 mmt in 1996. The ROW imports are projected to range from 9 to 10 mmt over the projection period. Ending stocks range from 5 to 6 mmt during the same period.

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Table 1. World Rice Supply and Utilization

Variable	Unit / Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	148620	148495	149015	149614	149808	150060	150277	150576	150627	150734	150876	151006	151132	151301	151475	151648
Yield	(mt/ha)	2.50	2.52	2.55	2.58	2.61	2.63	2.66	2.68	2.71	2.73	2.75	2.78	2.80	2.82	2.85	2.87
Production	(1000 mt)	371590	374870	379857	385901	390552	395171	399850	404266	407706	411438	415275	419231	423164	427299	431456	435591
Total Consumption	(1000 mt)	370450	375900	379144	384371	389100	394162	398754	403480	407908	412406	416157	419899	423498	427031	431022	435037
Net Exports	(1000 mt)	17585	15269	15598	15733	15894	16138	16347	16577	16691	16886	16960	17183	17395	17670	18003	18351
Net Imports	(1000 mt)	17585	15269	15598	15733	15894	16138	16347	16577	16691	16886	16960	17183	17395	17670	18003	18351
Ending Stocks	(1000 mt)	50430	49400	50113	51643	53094	54103	55199	55985	55784	54816	53934	53266	52932	53200	53634	54188

Table 2. Total World Rice Trade (Combined Japonica and Indica)

Country	Units / Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<b>EXPORTERS</b>																	
United States	(1000 mt)	2711	2477	2474	2486	2322	2246	2198	2195	2158	2136	2111	2094	2089	2102	2113	2139
Thailand	(1000 mt)	5280	5000	5680	6018	6261	6407	6522	6645	6747	6908	6906	6987	7048	7098	7169	7250
Pakistan	(1000 mt)	1635	1700	1634	1595	1585	1587	1570	1559	1551	1544	1535	1551	1563	1577	1585	1589
Myanmar	(1000 mt)	265	266	497	599	640	749	795	813	815	821	829	839	848	859	870	881
Vietnam	(1000 mt)	3100	2750	2741	2540	2448	2503	2525	2580	2591	2607	2615	2641	2650	2692	2762	2817
China	(1000 mt)	300	750	424	319	415	407	410	401	390	378	375	377	378	380	381	382
India	(1000 mt)	4000	1700	1619	1577	1559	1560	1570	1591	1619	1653	1692	1737	1790	1851	1925	2000
Australia	(1000 mt)	475	800	814	735	750	758	784	801	816	829	842	854	866	878	890	902
Egypt	(1000 mt)	75	75	88	83	81	78	74	70	66	61	56	52	47	43	38	33
Italy+Other EU	(1000 mt)	914	1070	935	895	885	877	884	882	882	879	881	877	875	872	869	866
Japan	(1000 mt)	200	300	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argentina	(1000 mt)	320	450	495	526	564	604	647	695	746	802	850	901	955	1017	1084	1156
Uruguay	(1000 mt)	546	475	477	502	522	538	558	580	605	622	648	670	694	719	745	772
<b>IMPORTERS</b>																	
United States	(1000 mt)	19821	17813	17878	17877	18033	18314	18536	18810	18988	19240	19341	19580	19804	20088	20432	20787
Thailand	(1000 mt)	242	333	263	286	306	330	352	375	397	420	441	464	486	508	530	550
China	(1000 mt)	0	0	240	241	243	244	246	247	249	250	250	250	250	250	250	250
Japan	(1000 mt)	850	800	800	685	666	683	663	683	719	755	756	751	742	729	718	707
Indonesia	(1000 mt)	450	600	531	606	682	758	773	789	804	820	837	854	871	888	906	924
Indonesia	(1000 mt)	1350	1000	1728	1792	1609	1583	1555	1551	1566	1554	1556	1520	1539	1632	1790	1990
Iraq	(1000 mt)	250	750	541	574	627	602	627	651	677	702	728	754	781	808	835	863
Iran	(1000 mt)	1400	1200	708	924	906	886	872	863	858	857	859	864	871	881	892	906
Saudi Arabia	(1000 mt)	615	645	750	830	856	886	914	945	976	1009	1041	1076	1112	1149	1187	1226
European Union	(1000 mt)	1403	1368	1327	1357	1392	1401	1407	1416	1423	1432	1438	1447	1454	1461	1468	1475
South Korea	(1000 mt)	115	77	77	88	107	105	132	162	192	220	224	224	227	230	233	237
Taiwan	(1000 mt)	-185	-88	99	110	121	132	132	132	132	132	132	132	132	132	132	132
Australia	(1000 mt)	30	40	42	38	40	42	45	47	49	51	53	55	57	59	61	63
Brazil	(1000 mt)	750	1054	1866	1925	1897	1840	1790	1735	1687	1653	1637	1634	1621	1598	1573	1544
ROW	(1000 mt)	12551	10033	8908	8422	8580	8821	9029	9216	9259	9385	9388	9555	9662	9763	9856	9921

Table 3. World Rice Net Trade

Country	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<b>NET EXPORTERS (1000 mt)</b>																	
United States	(1000 mt)	2469	2143	2211	2200	2017	1916	1846	1820	1761	1716	1670	1630	1603	1594	1583	1588
Thailand	(1000 mt)	5280	5000	5440	5777	6018	6163	6276	6398	6498	6658	6656	6737	6798	6848	6919	7000
Pakistan	(1000 mt)	1635	1700	1634	1595	1585	1587	1570	1559	1551	1544	1535	1551	1563	1577	1585	1589
Myanmar	(1000 mt)	265	266	497	599	640	749	795	813	815	821	829	839	848	859	870	881
Vietnam	(1000 mt)	3100	2750	2741	2540	2448	2503	2525	2580	2591	2607	2615	2641	2650	2692	2762	2817
China	(1000 mt)	-550	-50	-376	-365	-251	-276	-253	-281	-329	-377	-380	-374	-364	-350	-337	-325
India	(1000 mt)	4000	1700	1619	1577	1559	1560	1570	1591	1619	1653	1692	1737	1790	1851	1925	2000
Australia	(1000 mt)	445	760	772	697	709	716	739	754	767	778	789	799	810	820	830	839
Egypt	(1000 mt)	75	75	88	83	81	78	74	70	66	61	56	52	47	43	38	33
Argentina	(1000 mt)	320	450	495	526	564	604	647	695	746	802	850	901	955	1017	1084	1156
Uruguay	(1000 mt)	546	475	477	502	522	538	558	580	605	622	648	670	694	719	745	772
<b>NET IMPORTERS (1000 mt)</b>																	
Japan	(1000 mt)	250	300	531	606	682	758	773	789	804	820	837	854	871	888	906	924
Indonesia	(1000 mt)	1350	1000	1728	1792	1609	1583	1555	1551	1566	1554	1556	1520	1539	1632	1790	1990
Iraq	(1000 mt)	250	750	541	574	627	602	627	651	677	702	728	754	781	808	835	863
Iran	(1000 mt)	1400	1200	708	924	906	886	872	863	858	857	859	864	871	881	892	906
Saudi Arabia	(1000 mt)	615	645	750	830	856	886	914	945	976	1009	1041	1076	1112	1149	1187	1226
European Union	(1000 mt)	489	298	391	462	507	524	523	534	541	553	557	570	579	589	599	609
South Korea	(1000 mt)	115	77	77	88	107	105	132	162	192	220	224	224	227	230	233	237
Taiwan	(1000 mt)	-185	-88	99	110	121	132	132	132	132	132	132	132	132	132	132	132
Brazil	(1000 mt)	750	1054	1866	1925	1897	1840	1790	1735	1687	1653	1637	1634	1621	1598	1573	1544
Rest of World	(1000 mt)	12551	10033	8908	8422	8580	8821	9029	9216	9259	9385	9388	9555	9662	9763	9856	9921

Table 4. World Indica Rice Trade

Country	Units / Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<b>EXPORTERS</b>	(1000 mt)	17688	14791	15390	15545	15625	15933	16121	16378	16541	16787	16867	17084	17276	17522	17825	18135
United States	(1000 mt)	2142	1905	1831	1808	1671	1614	1558	1543	1495	1463	1427	1399	1374	1360	1342	1333
Thailand	(1000 mt)	5280	5000	5680	6018	6261	6407	6522	6645	6747	6908	6906	6987	7048	7098	7169	7250
Pakistan	(1000 mt)	1635	1700	1634	1595	1585	1587	1570	1559	1551	1544	1535	1551	1563	1577	1585	1589
Myanmar	(1000 mt)	265	266	497	599	640	749	795	813	815	821	829	839	848	859	870	881
Vietnam	(1000 mt)	3100	2750	2741	2540	2448	2503	2525	2580	2591	2607	2615	2641	2650	2692	2762	2817
India	(1000 mt)	4000	1700	1619	1577	1559	1560	1570	1591	1619	1653	1692	1737	1790	1851	1925	2000
EU excl. Italy	(1000 mt)	400	545	416	379	375	371	376	373	371	366	365	358	354	348	343	337
Argentina	(1000 mt)	320	450	495	526	564	604	647	695	746	802	850	901	955	1017	1084	1156
Uruguay	(1000 mt)	546	475	477	502	522	538	558	580	605	622	648	670	694	719	745	772
<b>IMPORTERS</b>	(1000 mt)	17688	14791	15390	15545	15625	15933	16121	16378	16541	16787	16867	17084	17276	17522	17825	18135
United States	(1000 mt)	242	333	263	286	306	330	352	375	397	420	441	464	486	508	530	550
Thailand	(1000 mt)	0	0	240	241	243	244	246	247	249	250	250	250	250	250	250	250
China	(1000 mt)	850	800	800	685	666	683	663	683	719	755	756	751	742	729	718	707
Indonesia	(1000 mt)	1350	1000	1728	1792	1609	1583	1555	1551	1566	1554	1556	1520	1539	1632	1790	1990
Iraq	(1000 mt)	250	750	541	574	627	602	627	651	677	702	728	754	781	808	835	863
Iran	(1000 mt)	1400	1200	708	924	906	886	872	863	858	857	859	864	871	881	892	906
Saudi Arabia	(1000 mt)	615	645	750	830	856	886	914	945	976	1009	1041	1076	1112	1149	1187	1226
European Union	(1000 mt)	1403	1368	1327	1357	1392	1401	1407	1416	1423	1432	1438	1447	1454	1461	1468	1475
Australia	(1000 mt)	30	40	42	38	40	42	45	47	49	51	53	55	57	59	61	63
Brazil	(1000 mt)	750	1054	1866	1925	1897	1840	1790	1735	1687	1653	1637	1634	1621	1598	1573	1544
ROW	(1000 mt)	10799	7600	7128	6894	7083	7435	7652	7867	7941	8105	8107	8269	8364	8447	8521	8562

Table 5. World Japonica Rice Trade

Country	Units / Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<b>EXPORTERS</b>	(1000 mt)	2132	3022	2488	2332	2408	2381	2415	2432	2447	2454	2474	2495	2528	2566	2607	2651
United States	(1000 mt)	568	572	642	678	651	632	640	651	664	673	684	694	715	742	771	805
Australia	(1000 mt)	475	800	814	735	750	758	784	801	816	829	842	854	866	878	890	902
Egypt	(1000 mt)	75	75	88	83	81	78	74	70	66	61	56	52	47	43	38	33
Italy	(1000 mt)	514	525	519	516	511	506	508	509	511	513	516	519	521	524	526	529
Japan	(1000 mt)	200	300	0	0	0	0	0	0	0	0	0	0	0	0	0	0
China	(1000 mt)	300	750	424	319	415	407	410	401	390	378	375	377	378	380	381	382
<b>IMPORTERS</b>	(1000 mt)	2132	3022	2488	2332	2408	2381	2415	2432	2447	2454	2474	2495	2528	2566	2607	2651
Japan	(1000 mt)	450	600	531	606	682	758	773	789	804	820	837	854	871	888	906	924
South Korea	(1000 mt)	115	77	77	88	107	105	132	162	192	220	224	224	227	230	233	237
Taiwan	(1000 mt)	-185	-88	99	110	121	132	132	132	132	132	132	132	132	132	132	132
Others (residual)	(1000 mt)	1752	2433	1781	1528	1497	1386	1378	1350	1318	1281	1281	1286	1298	1316	1336	1359

**Table 6. World Rice Prices and Price Relationships**

Country	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<b>Indica Rice (High Quality)</b>																	
Thai 100%B fob	US\$/mt	362	339	357	343	348	343	352	349	351	348	354	352	354	355	357	359
Thai 5% fob	US\$/mt	352	331	344	331	335	331	339	336	338	335	341	339	341	342	344	346
Thai 5% fob (1985\$)	US\$/mt	248	227	230	216	213	205	205	198	194	187	185	179	176	172	168	165
US No. 2 fob Houston	US\$/mt	412	448	459	438	445	445	456	458	463	465	474	477	483	489	495	502
US No. 2-Thai																	
5% Margin	US\$/mt	60	117	114	107	110	114	117	121	125	130	133	138	142	147	151	156
<b>Indica Rice (Low Quality) and Wheat</b>																	
Thai 35% fob	US\$/mt	302	261	288	277	294	291	302	300	301	300	305	304	305	306	307	308
US Wheat No. 2, fob Gulf	US\$/mt	209	191	152	149	163	163	169	169	169	169	171	171	171	171	172	172
Wheat/Thai 35% Price Ratio		0.69	0.73	0.53	0.54	0.55	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56
Thai 35%-																	
US Wheat Margin	US\$/mt	93	70	136	129	131	128	133	131	132	131	134	133	134	134	135	137
<b>Japonica Rice</b>																	
U.S. No.2 MG fob CA	US\$/mt	445	422	445	430	437	439	447	448	452	454	459	462	464	466	468	470
MG fob CA-LG fob Houston Margin	US\$/mt	33	-26	-14	-8	-8	-6	-9	-10	-12	-12	-15	-15	-19	-23	-27	-33

**Table 7. Thailand Rice Supply and Utilization**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	9250	9032	9118	9236	9258	9258	9220	9195	9141	9094	9016	8939	8864	8792	8720	8655
Yield	(mt/ha)	1.56	1.54	1.56	1.57	1.59	1.61	1.62	1.64	1.66	1.68	1.69	1.71	1.73	1.74	1.76	1.78
Production	(1000 mt)	14390	13900	14183	14525	14719	14877	14973	15089	15157	15233	15256	15278	15300	15325	15375	15436
Per-capita Use	(kg)	142.69	140.97	139.80	138.66	137.12	136.15	135.07	133.99	132.92	131.91	130.91	130.13	129.42	128.82	128.23	127.66
Total Consumption	(1000 mt)	8600	8600	8627	8651	8642	8662	8665	8655	8630	8594	8546	8511	8482	8459	8438	8417
Exports	(1000 mt)	5280	5000	5680	6018	6261	6407	6522	6645	6747	6908	6906	6987	7048	7098	7169	7250
Imports	(1000 mt)	0.07	0.11	240	241	243	244	246	247	249	250	250	250	250	250	250	250
Net Exports	(1000 mt)	5280	5000	5440	5777	6018	6163	6276	6398	6498	6658	6656	6737	6798	6848	6919	7000
Ending Stocks	(1000 mt)	713	1013	1128	1226	1285	1337	1368	1404	1432	1412	1466	1496	1516	1534	1553	1572

Table 8. Detailed U.S. Rice Supply and Utilization (In English Units)

Variable	Units / Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	
<b>YIELD (rough basis)</b>																		
Actual	(lb/ac)	5621	6121	6088	6141	6174	6199	6250	6288	6336	6376	6421	6452	6492	6531	6571	6612	
Program	(lb/ac)	4860	4860	4860	4860	4860	4860	4860	4860	4860	4860	4860	4860	4860	4860	4860	4860	
<b>HARVESTED ACREAGE</b>																		
Program Area/ Contract Area	(1000 ac)	2971.9	4104.5	4104.9	4105.7	4106.6	4107.6	4107.6	4107.9	4108.0	4108.0	4108.0	4108.0	4108.0	4108.0	4108.0	4108.0	
Total Harvested Area	(1000 ac)	3093.0	2799.0	2902.8	2998.7	2783.5	2825.4	2754.5	2803.9	2765.9	2773.2	2748.4	2765.5	2772.4	2796.1	2807.2	2822.5	
<b>SUPPLY (rough basis)</b>																		
Production	(mil. cwt)	173.9	171.3	176.7	184.2	171.9	175.1	172.2	176.3	175.3	176.8	176.5	178.4	180.0	182.6	184.5	186.6	
Beginning Stocks	(mil. cwt)	31.2	24.8	24.0	23.9	29.6	27.0	28.3	26.5	27.3	26.8	27.0	26.1	26.3	26.7	27.7	28.7	
Imports	(mil. cwt)	7.4	10.5	8.3	9.0	9.6	10.4	11.1	11.8	12.5	13.2	13.9	14.6	15.3	16.0	16.7	17.3	
<b>DOMESTIC USE (rough basis)</b>																		
Food	(mil. cwt)	104.6	104.7	107.2	109.2	110.9	113.5	115.8	118.1	120.4	122.6	124.7	126.9	129.1	131.4	133.6	135.2	
Seed	(mil. cwt)	77.0	78.5	79.9	82.0	83.3	85.8	87.9	90.1	92.1	94.2	96.1	98.1	100.1	102.2	104.2	106.2	
Brewing	(mil. cwt)	3.7	3.7	4.0	3.7	3.8	3.7	3.7	3.7	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.0	
Residual	(mil. cwt)	15.6	15.4	15.3	15.5	15.8	16.0	16.2	16.4	16.6	16.8	17.0	17.2	17.4	17.6	17.8	18.0	
EXPORTS	(mil. cwt)	83.0	78.0	77.9	78.3	73.1	70.7	69.2	69.1	68.0	67.3	66.5	65.9	65.8	66.2	66.5	67.4	
TOTAL USE	(mil. cwt)	187.6	182.7	185.1	187.5	184.0	184.2	185.1	187.3	188.3	189.8	191.2	192.9	194.9	197.6	200.1	202.6	
ENDING STOCKS	(mil. cwt)	24.8	24.0	23.9	29.6	27.0	28.3	26.5	27.3	26.8	27.0	26.1	26.3	26.7	27.7	28.7	30.1	
<b>PRICES</b>																		
Loan Rate	(US\$/cwt)	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	
Season Avg. Farm Price, SAFR	(US\$/cwt)	9.15	9.85	9.50	8.68	8.89	8.71	9.02	8.98	9.14	9.16	9.37	9.40	9.49	9.54	9.60	9.65	
Long Grain Farm Price	(US\$/cwt)	9.19	10.23	9.72	8.85	9.17	8.84	9.23	9.12	9.31	9.28	9.52	9.50	9.59	9.60	9.65	9.68	
Medium Grain Farm Price	(US\$/cwt)	8.86	9.06	9.05	8.37	8.38	8.45	8.64	8.73	8.84	8.94	9.11	9.22	9.34	9.43	9.52	9.62	
LG-MG Margin	(US\$/cwt)	0.34	1.17	0.67	0.49	0.78	0.39	0.59	0.39	0.47	0.34	0.41	0.28	0.26	0.17	0.13	0.06	
Export Price, fob Houston (US No. 2), EXPP	(US\$/cwt)	18.78	20.32	20.81	19.88	20.20	20.19	20.68	20.76	21.02	21.11	21.51	21.64	21.91	22.18	22.46	22.78	
Medium Grain Price fob CA (US No. 2)	(US\$/cwt)	20.18	19.28	20.17	19.51	19.84	19.94	20.26	20.33	20.49	20.58	20.84	20.94	21.07	21.16	21.23	21.31	
Deficiency/CLD/Contract Pay Rate	(US\$/cwt)	4.21	2.79	2.74	2.95	2.85	2.62	2.12	2.06	2.06	2.06	2.06	2.05	2.05	2.05	2.05	2.05	
World Price	(US\$/cwt)	7.32	6.90	7.17	6.90	6.99	6.90	7.06	7.01	7.05	6.99	7.10	7.06	7.10	7.13	7.16	7.21	
EXPP-SAFR Margin	(US\$/cwt)	6.07	6.25	7.24	7.48	7.50	7.75	7.79	7.94	7.96	8.02	8.12	8.21	8.35	8.55	8.74	8.99	
<b>INCOME FACTORS</b>																		
Production Market Value	(mil. US\$)	1591	1687	1678	1599	1528	1525	1553	1583	1602	1619	1653	1677	1709	1742	1771	1802	
Deficiency/Contract Payments	(mil. US\$)	491	472	465	500	483	443	358	348	348	348	348	348	348	348	348	348	
Marketing Loan/Certificates	(mil. US\$)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Income	(mil. US\$)	2082	2159	2143	2099	2011	1968	1911	1931	1950	1967	2001	2025	2057	2090	2119	2150	
Returns Above Variable Cost	(US\$/ac)	321.30	230.44	210.15	164.81	176.11	160.04	173.95	166.09	170.93	167.24	174.86	179.36	188.78	194.88	202.51	209.39	



Table 9. U.S. Long Grain Rice Supply and Utilization

Variable	Units / Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<b>YIELD (rough basis)</b>																	
(lb/ac)		5265	5777	5605	5644	5667	5698	5737	5781	5823	5868	5914	5947	5986	6028	6069	6112
<b>HARVESTED ACREAGE</b>																	
(1000 ac)		2312.0	1964.0	2109.8	2120.6	1967.7	2001.1	1921.3	1953.7	1907.7	1909.1	1879.3	1886.4	1874.2	1879.0	1872.7	1871.4
<b>SUPPLY (rough basis)</b>																	
(mil. cwt)		142.4	133.1	135.8	140.4	136.6	138.9	138.0	140.5	140.4	141.8	142.2	143.7	145.0	147.1	148.8	150.6
Production	(mil. cwt)	121.7	113.5	118.3	119.7	111.5	114.0	110.2	112.9	111.1	112.0	111.1	112.2	112.2	113.3	113.7	114.4
Beginning Stocks	(mil. cwt)	14.4	10.1	9.3	11.7	15.4	14.5	16.7	15.7	16.8	16.6	17.2	16.9	17.5	17.8	18.5	18.9
Imports	(mil. cwt)	6.2	9.5	8.3	9.0	9.6	10.4	11.1	11.8	12.5	13.2	13.9	14.6	15.3	16.0	16.7	17.3
<b>DOMESTIC USE</b>																	
+ Residual	(mil. cwt)	66.5	63.8	66.4	68.0	69.4	71.4	73.2	75.0	76.8	78.6	80.3	82.1	83.9	85.8	87.6	89.1
<b>EXPORTS</b>																	
(mil. cwt)		65.6	60.0	57.7	56.9	52.6	50.8	49.1	48.6	47.1	46.1	44.9	44.1	43.3	42.8	42.3	42.0
<b>TOTAL USE</b>																	
+ Residual	(mil. cwt)	132.1	123.8	124.1	125.0	122.1	122.2	122.3	123.6	123.9	124.7	125.3	126.2	127.2	128.6	129.9	131.1
<b>ENDING STOCKS</b>																	
(mil. cwt)		10.3	9.3	11.7	15.4	14.5	16.7	15.7	16.8	16.6	17.2	16.9	17.5	17.8	18.5	18.9	19.5
<b>PRICES</b>																	
Season Average Farm Price																	
(US\$/cwt)		9.19	10.23	9.72	8.85	9.17	8.84	9.23	9.12	9.31	9.28	9.52	9.50	9.59	9.60	9.65	9.68
Export Price																	
fob Houston (US No.2)	(US\$/cwt)	18.78	20.32	20.81	19.88	20.20	20.19	20.68	20.76	21.02	21.11	21.51	21.64	21.91	22.18	22.46	22.78
<b>PRODUCTION MARKET VALUE</b>																	
(mil. US\$)		1118.9	1161.4	1148.9	1059.9	1022.1	1008.3	1017.8	1029.8	1034.1	1039.9	1058.1	1066.0	1076.1	1087.6	1097.0	1107.1

**Table 10. U.S. Medium Grain Rice Supply and Utilization**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<b>YIELD (rough basis)</b>																	
(lb/ac)		6663	6926	7371	7341	7396	7413	7434	7454	7478	7497	7517	7536	7547	7561	7577	7596
<b>HARVESTED ACREAGE</b>																	
(1000 ac)		781.0	835.0	793.0	878.1	815.8	824.3	833.2	850.2	858.2	864.0	869.1	879.1	898.2	917.2	934.5	951.1
<b>SUPPLY (rough basis)</b>																	
(mil. cwt)		69.5	73.2	73.1	76.6	74.4	73.5	73.5	74.1	74.6	74.9	75.1	75.4	76.5	78.1	80.0	82.0
Production	(mil. cwt)	52.1	57.9	58.5	64.5	60.3	61.1	61.9	63.4	64.2	64.8	65.3	66.3	67.8	69.3	70.8	72.2
Beginning Stocks	(mil. cwt)	15.8	14.3	14.6	12.1	14.1	12.4	11.5	10.7	10.4	10.1	9.7	9.1	8.7	8.8	9.2	9.7
Imports	(mil. cwt)	1.2	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>DOMESTIC USE</b>																	
+ Residual		37.6	40.5	40.7	41.2	41.5	42.1	42.6	43.1	43.6	44.0	44.4	44.8	45.2	45.6	46.0	46.1
<b>EXPORTS</b>																	
(mil. cwt)		17.4	18.0	20.2	21.4	20.5	19.9	20.1	20.5	20.9	21.2	21.5	21.9	22.5	23.4	24.3	25.4
<b>TOTAL USE</b>																	
+ Residual	(mil. cwt)	55.1	58.5	60.9	62.5	62.0	62.0	62.8	63.6	64.5	65.2	65.9	66.7	67.7	68.9	70.2	71.5
<b>ENDING STOCKS</b>																	
(mil. cwt)		14.5	14.6	12.1	14.1	12.4	11.5	10.7	10.4	10.1	9.7	9.1	8.7	8.8	9.2	9.7	10.5
<b>PRICES</b>																	
Season Average Farm Price	(US\$/cwt)	8.86	9.06	9.05	8.37	8.38	8.45	8.64	8.73	8.84	8.94	9.11	9.22	9.34	9.43	9.52	9.62
Medium Grain Price,	(US\$/cwt)	20.18	19.28	20.17	19.51	19.84	19.94	20.26	20.33	20.49	20.58	20.84	20.94	21.07	21.16	21.23	21.31
fob CA (US No. 2)	(US\$/cwt)	461.4	524.5	529.0	539.3	505.9	516.6	535.4	553.0	567.6	579.1	595.3	611.0	632.8	654.1	674.4	694.7
<b>PRODUCTION MARKET VALUE</b>																	
(mil. US\$)		461.4	524.5	529.0	539.3	505.9	516.6	535.4	553.0	567.6	579.1	595.3	611.0	632.8	654.1	674.4	694.7

**Table 11. U.S. Rice Supply and Utilization (in Metric Units)**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<b>Area Harvested</b>	(1000 ha)	1251	1132	1174	1213	1126	1143	1114	1134	1119	1122	1112	1119	1122	1131	1136	1142
<b>Yield</b>	(mt/ha)	4.54	4.80	4.78	4.82	4.85	4.87	4.91	4.94	4.97	5.00	5.04	5.06	5.10	5.13	5.16	5.19
<b>Production</b>	(1000 mt)	5678	5440	5611	5847	5457	5561	5466	5598	5565	5614	5603	5666	5715	5798	5857	5925
<b>Imports</b>	(1000 mt)	242	333	263	286	306	330	352	375	397	420	441	464	486	508	530	550
<b>Food Use</b>	(1000 mt)	2515	2493	2537	2604	2646	2724	2791	2860	2925	2990	3052	3116	3180	3244	3308	3373
<b>Seed Use</b>	(1000 mt)	121	117	126	117	120	117	118	116	116	114	114	114	114	114	114	95
<b>Brewer Use</b>	(1000 mt)	509	489	485	492	501	508	515	521	527	534	540	546	553	559	566	572
<b>Total Consumption</b>	(1000 mt)	3416	3324	3402	3467	3521	3603	3678	3751	3822	3892	3960	4030	4100	4171	4242	4294
<b>Per Capita Use</b>	(kg)	12.95	12.48	12.64	12.76	12.84	13.03	13.18	13.33	13.46	13.60	13.72	13.85	13.97	14.10	14.22	14.28
<b>Exports</b>	(1000 mt)	2711	2477	2474	2486	2322	2246	2198	2195	2158	2136	2111	2094	2089	2102	2113	2139
<b>Residual</b>	(1000 mt)	271	225	254	254	254	254	254	254	254	254	254	254	254	254	254	254
<b>Total Use</b>	(1000 mt)	6127	5801	5876	5953	5844	5849	5876	5946	5980	6028	6071	6124	6189	6273	6355	6433
<b>Ending Stocks</b>	(1000 mt)	826	798	796	975	894	936	877	905	887	892	866	872	883	917	949	992

**Table 12. Arkansas Rice Supply by Type**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Long Grain Area	(1000 ac)	1140.0	910.0	977.5	994.0	932.9	946.7	916.1	930.8	914.4	916.8	906.7	911.4	907.7	910.1	908.1	908.2
Long Grain Yield	(pounds/ac)	5370	6050	5807	5828	5849	5873	5914	5957	6000	6045	6091	6121	6151	6182	6213	6246
Long Grain Prod.	(mil. cwt)	61.2	55.1	56.8	57.9	54.6	55.6	54.2	55.4	54.9	55.4	55.2	55.8	55.8	56.3	56.4	56.7
Medium Grain Area	(1000 ac)	200.0	260.0	241.6	284.4	262.5	264.6	266.1	270.5	271.6	273.8	275.7	279.4	286.7	294.0	300.6	307.1
Medium Grain Yield	(pounds/ac)	5900	6500	6200	6226	6251	6277	6303	6330	6357	6384	6411	6437	6463	6489	6515	6542
Medium Grain Prod.	(mil. cwt)	11.8	16.9	15.0	17.7	16.4	16.6	16.8	17.1	17.3	17.5	17.7	18.0	18.5	19.1	19.6	20.1
Total Area	(1000 ac)	1340.0	1170.0	1219.1	1278.5	1195.5	1211.3	1182.2	1201.3	1186.0	1190.6	1182.4	1190.8	1194.4	1204.0	1208.8	1215.3
Average Yield	(pounds/ac)	5449	6149	5885	5916	5937	5961	6002	6041	6082	6123	6166	6195	6226	6257	6289	6320
Total Production	(mil. cwt)	73.0	71.9	71.7	75.6	71.0	72.2	71.0	72.6	72.1	72.9	72.9	73.8	74.4	75.3	76.0	76.8

**Table 13. Louisiana Rice Supply by Type**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Long Grain Area	(1000 ac)	456.0	463.0	475.4	458.1	436.3	436.8	423.9	424.6	415.9	413.0	406.3	404.1	399.8	397.4	393.7	390.6
Long Grain Yield	(pounds/ac)	4610	4900	4868	4887	4907	4935	4976	5020	5065	5112	5161	5198	5237	5278	5320	5364
Long Grain Prod.	(mil. cwt)	21.0	22.7	23.1	22.4	21.4	21.6	21.1	21.3	21.1	21.1	21.0	21.0	20.9	21.0	20.9	21.0
Medium Grain Area	(1000 ac)	114.0	70.0	70.4	80.6	68.5	72.5	76.6	82.0	85.8	90.1	94.3	99.3	107.3	115.2	122.7	130.0
Medium Grain Yield	(pounds/ac)	4550	4700	4612	4632	4639	4661	4684	4708	4730	4753	4776	4800	4823	4846	4868	4891
Medium Grain Prod.	(mil. cwt)	5.2	3.3	3.2	3.7	3.2	3.4	3.6	3.9	4.1	4.3	4.5	4.8	5.2	5.6	6.0	6.4
Total Area	(1000 ac)	570.0	533.0	545.8	538.6	504.8	509.3	500.5	506.5	501.7	503.1	500.6	503.4	507.1	512.6	516.4	520.6
Average Yield	(pounds/ac)	4598	4874	4835	4849	4871	4896	4932	4969	5008	5048	5088	5120	5150	5181	5213	5246
Total Production	(mil. cwt)	26.2	26.0	26.4	26.1	24.6	24.9	24.7	25.2	25.1	25.4	25.5	25.8	26.1	26.6	26.9	27.3

**Table 14. Texas Rice Supply (Aggregate; Mostly Long Grain)**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total Area	(1000 ac)	318.0	298.0	284.0	306.0	282.9	290.2	277.5	283.5	276.1	277.0	272.6	274.5	272.8	275.5	276.2	277.8
Average Yield	(pounds/ac)	5598	6196	6014	6080	6140	6174	6218	6257	6303	6349	6401	6424	6497	6569	6642	6716
Total Production	(mil. cwt)	17.8	18.5	17.1	18.6	17.4	17.9	17.3	17.7	17.4	17.6	17.4	17.6	17.7	18.1	18.3	18.7

**Table 15. Missouri Rice Supply (Long Grain)**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total Area	(1000 ac)	112.0	90.0	107.9	110.3	99.2	101.7	96.0	98.3	95.0	95.0	92.9	93.3	92.6	93.0	92.6	92.6
Average Yield	(pounds/ac)	5300	5550	5370	5385	5400	5415	5433	5451	5469	5488	5506	5522	5538	5554	5570	5586
Total Production	(mil. cwt)	5.9	5.0	5.8	5.9	5.4	5.5	5.2	5.4	5.2	5.2	5.1	5.2	5.1	5.2	5.2	5.2

**Table 16. Mississippi Rice Supply (Mostly Long Grain)**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total Area	(1000 ac)	288.0	208.0	265.0	252.2	216.4	225.7	207.9	216.5	206.2	207.3	200.8	203.1	201.2	203.0	202.0	202.2
Average Yield	(pounds/ac)	5400	6000	5841	5881	5922	5962	6003	6043	6083	6124	6164	6205	6245	6286	6326	6367
Total Production	(mil. cwt)	15.6	12.5	15.5	14.8	12.8	13.5	12.5	13.1	12.5	12.7	12.4	12.6	12.6	12.8	12.8	12.9

**Table 17. California Rice Supply (Aggregate; Mostly Medium and Short Grain)**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total Area	(1000 ac)	465.0	500.0	481.0	513.1	484.7	487.2	490.4	497.8	500.8	500.2	499.1	500.4	504.2	508.0	511.1	514.0
Average Yield	(pounds/ac)	7600	7500	8364	8384	8406	8441	8477	8516	8557	8600	8646	8693	8743	8796	8852	8910
Total Production	(mil. cwt)	34.8	37.1	40.2	43.0	40.7	41.1	41.6	42.4	42.9	43.0	43.1	43.5	44.1	44.7	45.2	45.8

Table 18. China Rice Supply and Utilization

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	30700	30700	30982	31199	31314	31358	31348	31310	31245	31163	31131	31103	31079	31059	31042	31025
Yield	(mt/ha)	4.22	4.36	4.27	4.30	4.33	4.36	4.40	4.43	4.45	4.48	4.49	4.52	4.54	4.57	4.60	4.62
Production	(1000 mt)	129650	133700	132305	134130	135570	136637	138016	138807	139116	139476	139876	140562	141249	142009	142754	143485
Per Capita Use	(kg)	108.05	108.60	108.19	108.28	108.17	108.33	108.26	108.33	108.35	108.38	107.98	107.68	107.33	106.99	106.66	106.31
Total Consumption	(1000 mt)	130000	132000	132790	134140	135184	136501	137476	138590	139599	140604	141005	141524	141985	142457	142932	143401
Exports	(1000 mt)	300	750	424	319	415	407	410	401	390	378	375	377	378	380	381	382
Imports	(1000 mt)	850	800	800	685	666	683	663	683	719	755	756	751	742	729	718	707
Net Exports	(1000 mt)	-550	-50	-376	-365	-251	-276	-253	-281	-329	-377	-380	-374	-364	-350	-337	-325
Ending Stocks	(1000 mt)	21456	23206	23096	23452	24089	24501	25294	25792	25638	24887	24139	23550	23177	23079	23239	23648

Table 19. India Rice Supply and Utilization

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	42910	42700	42746	42802	42865	42938	43019	43105	43079	43081	43105	43099	43117	43155	43208	43271
Yield	(mt/ha)	1.86	1.87	1.93	1.96	2.00	2.02	2.04	2.07	2.09	2.12	2.14	2.17	2.19	2.22	2.24	2.27
Production	(1000 mt)	79620	80000	82507	84020	85574	86748	87954	89188	90203	91290	92438	93441	94510	95633	96802	98012
Per Capita Use	(kg)	84.05	83.72	83.21	83.14	83.18	83.21	83.14	83.15	83.03	82.95	82.86	82.56	82.20	81.71	81.57	81.48
Total Consumption	(1000 mt)	78720	79800	80680	81981	83361	84728	85974	87300	88489	89696	90886	91839	92723	93467	94630	95857
Net Exports	(1000 mt)	4000	1700	1619	1577	1559	1560	1570	1591	1619	1653	1692	1737	1790	1851	1925	2000
Ending Stocks	(1000 mt)	10983	9483	9691	10153	10807	11268	11677	11975	12071	12012	11873	11738	11735	12049	12297	12451

Table 20. Pakistan Rice Supply and Utilization

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	2162	2229	2213	2212	2221	2235	2247	2259	2266	2270	2266	2272	2270	2263	2249	2230
Yield	(mt/ha)	1.82	1.91	1.91	1.93	1.95	1.97	1.99	2.01	2.03	2.05	2.08	2.10	2.12	2.15	2.17	2.20
Production	(1000 mt)	3936	4266	4220	4264	4329	4402	4473	4543	4606	4662	4705	4766	4813	4859	4890	4910
Per Cap Use	(kg)	19.01	19.39	18.60	18.59	18.58	18.57	18.56	18.55	18.53	18.51	18.48	18.43	18.38	18.33	18.27	18.20
Total Consumption	(1000 mt)	2500	2600	2558	2622	2687	2759	2835	2913	2992	3071	3150	3229	3309	3389	3470	3551
Net Exports	(1000 mt)	1635	1700	1634	1595	1585	1587	1570	1559	1551	1544	1535	1551	1563	1577	1585	1589
Ending Stocks	(1000 mt)	512	478	507	553	609	665	734	804	868	914	933	919	860	753	589	358

Table 21. Myanmar Rice Supply and Utilization

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	5700	5666	5723	5825	5816	5850	5870	5917	5947	5987	6023	6073	6115	6164	6214	6267
Yield	(mt/ha)	1.75	1.74	1.85	1.87	1.89	1.91	1.93	1.95	1.98	2.00	2.02	2.05	2.07	2.09	2.12	2.14
Production	(1000 mt)	10000	9860	10560	10872	10981	11172	11339	11560	11753	11968	12179	12421	12651	12899	13154	13417
Per-capita Use	(kg)	212.84	201.96	209.21	208.89	208.24	207.98	207.90	207.51	207.63	207.63	207.52	206.49	205.56	204.75	204.08	203.54
Total Consumption	(1000 mt)	9600	9300	9836	10027	10205	10405	10619	10822	11057	11287	11517	11700	11891	12092	12305	12530
Net Exports	(1000 mt)	265	266	497	599	640	749	795	813	815	821	829	839	848	859	870	881
Ending Stocks	(1000 mt)	757	1051	1277	1524	1660	1678	1603	1529	1409	1270	1104	986	898	845	824	830

**Table 22. Vietnam Rice Supply and Utilization**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	7187	6900	7148	7155	7149	7150	7138	7132	7112	7091	7065	7046	7019	7005	7001	6991
Mekong Delta	(1000 ha)	3292	3160	3278	3299	3294	3294	3283	3275	3257	3237	3214	3196	3174	3164	3164	3159
Rest of Vietnam	(1000 ha)	3895	3740	3870	3857	3854	3856	3855	3857	3855	3854	3851	3849	3845	3841	3836	3831
Yield Average	(mt/ha)	2.45	2.46	2.49	2.53	2.56	2.60	2.64	2.68	2.72	2.76	2.80	2.84	2.89	2.93	2.98	3.02
Production	(1000 mt)	17600	17000	17823	18132	18268	18557	18815	19091	19332	19572	19799	20044	20271	20536	20829	21108
Per Capita Use	(kg)	194.91	188.33	196.07	199.50	199.35	199.34	199.39	199.30	199.31	199.31	199.26	199.26	199.21	199.17	199.11	199.04
Total Consumption	(1000 mt)	14500	14250	15082	15592	15819	16054	16290	16512	16741	16965	17183	17403	17621	17844	18066	18291
Net Exports	(1000 mt)	3100	2750	2741	2540	2448	2503	2525	2580	2591	2607	2615	2641	2650	2692	2762	2817
Ending Stocks	(1000 mt)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

**Table 23. Australia Rice Supply and Utilization**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	149	165	165	165	165	165	165	166	167	168	169	171	172	173	173	173
Yield	(mt/ha)	4.56	6.30	6.23	6.26	6.30	6.34	6.38	6.41	6.45	6.49	6.53	6.57	6.62	6.68	6.75	6.82
Production	(1000 mt)	680	1040	1025	1030	1037	1045	1055	1066	1078	1091	1106	1122	1137	1153	1169	1184
Per Capita Use	(kg)	14.74	15.09	15.21	15.33	15.45	15.58	15.70	15.83	15.95	16.08	16.21	16.34	16.47	16.60	16.74	16.87
Total Consumption	(1000 mt)	270	280	286	291	297	302	307	313	318	324	329	335	340	346	352	357
Imports	(1000 mt)	30	40	42	38	40	42	45	47	49	51	53	55	57	59	61	63
Exports	(1000 mt)	475	800	814	735	750	758	784	801	816	829	842	854	866	878	890	902
Net Exports	(1000 mt)	445	760	772	697	709	716	739	754	767	778	789	799	810	820	830	839
Ending Stocks	(1000 mt)	56	56	24	65	96	123	131	130	123	113	100	88	75	63	50	37

**Table 24. Egypt Rice Supply and Utilization**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	420	420	420	420	420	420	420	420	420	420	420	420	420	420	420	420
Yield	(mt/ha)	5.00	5.95	5.58	5.72	5.85	5.98	6.01	6.06	6.10	6.13	6.17	6.23	6.29	6.35	6.41	6.47
Production	(1000 mt)	2100	2500	2344	2403	2457	2511	2526	2544	2560	2576	2591	2618	2644	2668	2692	2716
Per Capita Use	(kg)	33.50	38.01	35.74	35.98	35.43	35.42	35.34	35.13	34.92	34.73	34.42	34.12	33.87	33.63	33.41	33.20
Total Consumption	(1000 mt)	2075	2400	2299	2358	2365	2407	2445	2474	2504	2534	2555	2577	2602	2629	2656	2686
Net Exports	(1000 mt)	75	75	88	83	81	78	74	70	66	61	56	52	47	43	38	33
Ending Stocks	(1000 mt)	233	258	215	176	187	214	221	220	211	192	171	160	154	151	149	146

**Table 25. Argentina Rice Supply and Utilization**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	182	215	220	229	237	246	255	264	274	285	296	307	319	332	345	359
Yield	(mt/ha)	3.13	3.26	3.36	3.42	3.48	3.54	3.60	3.66	3.72	3.78	3.84	3.90	3.97	4.03	4.09	4.15
Production	(1000 mt)	570	700	737	782	826	870	916	967	1021	1078	1137	1200	1267	1337	1411	1490
Per capita use	(kg)	7.29	7.21	7.06	7.11	7.16	7.22	7.28	7.35	7.42	7.49	7.56	7.64	7.71	7.79	7.87	7.95
Total Consumption	(1000 mt)	250	250	248	252	256	261	266	272	277	283	288	294	300	306	312	318
Exports	(1000 mt)	320	450	495	526	564	604	647	695	746	802	850	901	955	1017	1084	1156
Ending Stocks	(1000 mt)	60	60	54	58	64	68	71	72	69	62	61	66	78	92	107	123

**Table 26. Uruguay Rice Supply and Utilization**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	146	140	149	155	160	164	168	172	176	180	183	187	191	194	197	201
Yield	(mt/ha)	4.55	3.71	3.76	3.79	3.82	3.85	3.89	3.94	4.00	4.03	4.07	4.10	4.15	4.19	4.24	4.30
Production	(1000 mt)	665	520	559	586	610	630	652	676	704	724	746	767	790	814	838	864
Per capita use	(kg)	25.40	25.24	25.43	25.98	26.84	27.68	28.12	28.48	28.86	29.19	29.48	29.70	29.89	30.00	30.11	30.15
Total Consumption	(1000 mt)	80	80	81	83	87	90	91	93	94	96	97	98	99	100	100	101
Exports	(1000 mt)	546	475	477	502	522	538	558	580	605	622	648	670	694	719	745	772
Ending Stocks	(1000 mt)	59	24	25	26	27	29	32	36	41	48	48	47	44	39	32	23

**Table 27. Brazil Rice Supply and Utilization**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	3880	3608	3658	3553	3566	3547	3527	3512	3500	3487	3467	3444	3430	3420	3410	3401
Irrigated	(1000 ha)	949	906	981	1017	1043	1072	1102	1132	1164	1197	1228	1259	1289	1320	1351	1383
Upland	(1000 ha)	2931	2702	2677	2536	2523	2475	2424	2381	2336	2291	2240	2184	2141	2100	2059	2018
Average Yield	(mt/ha)	1.76	1.80	1.71	1.76	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.16	2.21	2.27	2.33	2.39
Total Production	(1000 mt)	6834	6480	6267	6247	6432	6564	6696	6842	6996	7152	7295	7434	7598	7771	7950	8135
Per capita use	(kg)	49.65	49.55	49.72	49.74	49.69	49.61	49.52	49.42	49.56	49.80	50.14	50.53	50.94	51.37	51.80	52.24
Total Consumption	(1000 mt)	7980	8060	8180	8271	8347	8412	8472	8530	8627	8742	8873	9013	9158	9307	9460	9615
Net Imports	(1000 mt)	750	1054	1866	1925	1897	1840	1790	1735	1687	1653	1637	1634	1621	1598	1573	1544
Ending Stocks	(1000 mt)	1054	528	481	381	364	355	369	416	472	535	594	649	710	772	835	899

**Table 28. European Union Rice Supply and Utilization**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	357	405	399	391	373	373	373	372	371	370	369	368	367	367	366	365
Yield	(mt/ha)	3.46	3.90	3.99	4.01	4.01	4.03	4.06	4.08	4.11	4.13	4.16	4.18	4.21	4.23	4.26	4.28
Production	(1000 mt)	1234	1580	1592	1568	1496	1506	1512	1518	1524	1530	1535	1541	1547	1552	1558	1564
Per Capita Use	(kg)	5.07	5.16	5.39	5.50	5.56	5.61	5.66	5.70	5.75	5.79	5.84	5.88	5.92	5.97	6.01	6.05
Total Consumption	(1000 mt)	1782	1818	1905	1948	1977	2000	2021	2041	2061	2080	2099	2118	2136	2155	2173	2192
Imports	(1000 mt)	1403	1368	1327	1357	1392	1401	1407	1416	1423	1432	1438	1447	1454	1461	1468	1475
Exports	(1000 mt)	914	1070	935	895	885	877	884	882	882	879	881	877	875	872	869	866
Net Imports	(1000 mt)	489	298	391	462	507	524	523	534	541	553	557	570	579	589	599	609
Ending Stocks	(1000 mt)	171	231	309	391	417	446	460	471	475	477	470	463	452	439	423	404

**Table 29. Italy Rice Supply**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	239	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240
Yield	(mt/ha)	3.32	3.54	3.87	3.89	3.92	3.95	3.97	4.00	4.02	4.05	4.08	4.10	4.13	4.16	4.18	4.21
Production	(1000 mt)	794	850	928	934	941	947	953	960	966	972	979	985	991	998	1004	1010
Exports (Japonica)	(1000 mt)	514	525	519	516	511	506	508	509	511	513	516	519	521	524	526	529

**Table 30. Spain Rice Supply**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	54	105	100	94	77	78	79	79	79	79	78	78	78	78	78	78
Yield	(mt/ha)	4.24	4.90	4.63	4.65	4.67	4.68	4.70	4.72	4.74	4.75	4.77	4.79	4.80	4.82	4.84	4.86
Production	(1000 mt)	229	515	464	437	362	367	370	371	372	373	374	375	376	378	379	380

**Table 31. Other EU Rice Supply**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested (EU-Ita-Sp)	(1000 ha)	64	60	58	57	56	55	54	53	52	51	51	50	49	48	48	47
Yield (EU-Ita-Sp)	(mt/ha)	3.38	3.40	3.42	3.45	3.47	3.49	3.51	3.54	3.56	3.58	3.60	3.63	3.65	3.67	3.69	3.71
Production (EU-Ita-Sp)	(1000 mt)	211	215	200	197	194	192	190	188	186	184	182	181	179	177	175	174
Exports (EU-Ita), Indica	(1000 mt)	400	545	416	379	375	371	376	373	371	366	365	358	354	348	343	337

**Table 32. Indonesia Rice Supply and Utilization**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	11400	11600	11641	11702	11760	11818	11875	11932	11988	12043	12094	12140	12181	12212	12232	12236
Yield	(mt/ha)	2.87	2.89	2.93	2.97	3.00	3.03	3.07	3.10	3.13	3.16	3.19	3.22	3.25	3.27	3.30	3.33
Production	(1000 mt)	32700	33500	34065	34698	35281	35854	36419	36978	37528	38065	38586	39085	39557	39993	40381	40708
Per-capita Use	(kg)	163.81	169.28	170.08	170.20	170.37	170.40	170.40	170.47	170.59	170.57	170.56	170.34	170.18	170.15	170.16	170.08
Total Consumption	(1000 mt)	33350	35000	35708	36275	36852	37402	37940	38494	39057	39584	40108	40575	41064	41591	42135	42664
Net Imports	(1000 mt)	1250	1000	1728	1792	1609	1583	1555	1551	1566	1554	1556	1520	1539	1632	1790	1990
Ending Stocks	(1000 mt)	2558	2058	2142	2358	2395	2431	2466	2502	2539	2573	2607	2637	2669	2703	2739	2773

**Table 33. Iran Rice Supply and Utilization**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	620	650	677	701	721	740	756	770	784	796	807	818	828	838	847	856
Yield	(mt/ha)	2.90	2.92	2.95	2.97	3.00	3.02	3.05	3.07	3.10	3.12	3.15	3.17	3.20	3.22	3.25	3.27
Production	(1000 mt)	1800	1900	1995	2082	2162	2235	2303	2366	2427	2485	2541	2596	2649	2701	2753	2804
Per Capita Use	(kg)	50.75	51.28	47.13	46.17	46.01	45.83	45.65	45.49	45.32	45.17	45.01	44.85	44.70	44.55	44.40	44.26
Total Consumption	(1000 mt)	3100	3200	3004	3006	3059	3112	3165	3220	3276	3333	3391	3450	3510	3572	3635	3699
Net Imports	(1000 mt)	1400	1200	708	924	906	886	872	863	858	857	859	864	871	881	892	906
Ending Stocks	(1000 mt)	902	802	501	501	510	519	528	537	546	555	565	575	585	595	606	617

**Table 34. Iraq Rice Supply and Utilization**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	150	175	164	159	159	159	160	162	163	164	165	166	167	169	170	171
Yield	(mt/ha)	1.33	1.43	1.57	1.60	1.62	1.65	1.67	1.70	1.72	1.75	1.78	1.81	1.84	1.87	1.90	1.93
Production	(1000 mt)	200	250	258	255	256	262	268	275	281	287	294	301	308	315	323	330
Per Capita Use	(kg)	21.74	42.06	34.98	35.25	35.48	35.71	35.89	36.06	36.21	36.33	36.43	36.52	36.58	36.63	36.66	36.67
Total Consumption	(1000 mt)	450	900	773	804	834	864	895	926	957	990	1022	1055	1089	1123	1157	1193
Net Imports	(1000 mt)	250	750	541	574	627	602	627	651	677	702	728	754	781	808	835	863
Ending Stocks	(1000 mt)	0	100	125	150	200	200	200	200	200	200	200	200	200	200	200	200

**Table 35. Saudi Arabia Rice Supply and Utilization**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Per Capita Use	(kg)	32.72	33.23	37.41	40.09	40.07	40.14	40.08	40.13	40.14	40.19	40.16	40.21	40.21	40.22	40.23	40.23
Total Consumption	(1000 mt)	615	645	750	830	856	886	914	945	976	1009	1041	1076	1112	1149	1187	1226
Net Imports	(1000 mt)	615	645	750	830	856	886	914	945	976	1009	1041	1076	1112	1149	1187	1226

**Table 36. Japan Rice Supply and Utilization**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	2118	1977	1781	1723	1665	1633	1613	1594	1573	1561	1578	1554	1531	1507	1483	1460
Yield	(mt/ha)	4.62	4.76	4.85	4.88	4.91	4.94	4.97	4.99	5.02	5.05	5.08	5.11	5.14	5.17	5.20	5.23
Production	(1000 mt)	9781	9413	8628	8403	8170	8060	8010	7961	7902	7888	8021	7946	7870	7792	7713	7634
Per capita use	(kg)	74.10	73.47	72.65	71.99	71.47	71.00	70.54	70.11	69.62	69.13	68.61	68.06	67.51	66.96	66.41	65.85
Total Consumption	(1000 mt)	9300	9250	9177	9124	9088	9057	9026	8995	8955	8910	8858	8799	8740	8680	8619	8557
Exports	(1000 mt)	200	300	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Imports	(1000 mt)	450	600	531	606	682	758	773	789	804	820	837	854	871	888	906	924
Net imports	(1000 mt)	250	300	531	606	682	758	773	789	804	820	837	854	871	888	906	924
Ending Stocks	(1000 mt)	2614	3077	3059	2944	2707	2468	2225	1979	1730	1529	1529	1529	1530	1530	1531	1531

**Table 37. South Korea Rice Supply and Utilization**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	1056	1050	1081	1038	1045	1055	1044	1026	1011	999	990	991	983	976	967	959
Yield	(mt/ha)	4.45	5.07	4.61	4.61	4.63	4.68	4.69	4.69	4.70	4.71	4.72	4.72	4.73	4.74	4.74	4.75
Production	(1000 mt)	4694	5320	4983	4789	4843	4934	4892	4816	4751	4702	4668	4679	4649	4619	4586	4550
Per capita use	(kg)	114.15	110.81	108.70	106.61	104.57	105.06	104.02	102.29	100.71	99.43	98.06	97.43	96.24	95.01	93.72	92.40
Total Consumption	(1000 mt)	5200	5100	5054	5006	4958	5029	5025	4985	4949	4926	4897	4902	4880	4853	4824	4792
Imports	(1000 mt)	115	77	77	88	107	105	132	162	192	220	224	224	227	230	233	237
Exports	(1000 mt)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net imports	(1000 mt)	115	77	77	88	107	105	132	162	192	220	224	224	227	230	233	237
Ending Stocks	(1000 mt)	615	912	918	788	781	792	791	785	779	776	771	772	769	764	760	755

**Table 38. Taiwan Rice Supply and Utilization**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	363	348	324	334	298	285	274	262	250	242	236	230	226	223	221	219
Yield	(mt/ha)	4.18	4.08	4.08	4.09	4.17	4.22	4.26	4.30	4.34	4.37	4.39	4.43	4.48	4.51	4.55	4.58
Production	(1000 mt)	1517	1420	1323	1367	1245	1201	1165	1126	1084	1056	1036	1022	1012	1007	1005	1006
Per capita use	(kg)	68.79	66.37	65.16	63.38	61.56	59.63	57.60	55.46	53.24	51.53	50.22	49.22	48.45	47.86	47.42	47.08
Total Consumption	(1000 mt)	1479	1440	1426	1399	1371	1338	1303	1265	1223	1193	1171	1156	1146	1140	1138	1138
Net Imports	(1000 mt)	-185	-88	99	110	121	132	132	132	132	132	132	132	132	132	132	132
Ending Stocks	(1000 mt)	268	160	156	233	228	223	217	211	204	199	195	193	191	190	190	190

**Table 39. Rest of the World Rice Supply and Utilization**

Variable	Units /Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	29228	29282	29234	29403	29490	29523	29692	29871	30041	30213	30383	30558	30729	30902	31075	31248
Yield	(mt/ha)	1.62	1.58	1.67	1.70	1.72	1.75	1.76	1.78	1.80	1.82	1.84	1.86	1.88	1.89	1.91	1.93
Production	(1000 mt)	48138	46352	48873	49900	50841	51545	52400	53254	54119	54988	55864	56742	57628	58518	59414	60314
Total Consumption	(1000 mt)	58620	57678	57277	58245	59334	60290	61345	62387	63304	64294	65181	66214	67211	68202	69191	70158
Net Imports	(1000 mt)	12551	10033	8908	8422	8580	8821	9029	9216	9259	9385	9388	9555	9662	9763	9856	9921
Ending Stocks	(1000 mt)	5371	4078	4582	4660	4747	4823	4908	4991	5064	5144	5214	5297	5377	5456	5535	5613



Appendix Table 1. Population

Country/Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	(Percentage Change from Previous Year)															
United States	1.04	1.01	0.98	0.95	0.92	0.90	0.88	0.87	0.85	0.84	0.83	0.83	0.83	0.83	0.83	0.83
Thailand	1.60	1.22	1.16	1.09	1.02	0.95	0.84	0.68	0.52	0.35	0.19	0.20	0.20	0.20	0.20	0.20
Pakistan	3.00	1.93	2.56	2.56	2.56	2.70	2.83	2.81	2.80	2.78	2.77	2.75	2.74	2.73	2.72	2.71
Myanmar	1.87	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10
Vietnam	2.20	1.71	1.66	1.60	1.54	1.49	1.44	1.41	1.38	1.34	1.31	1.28	1.28	1.28	1.28	1.28
China	1.20	1.03	0.98	0.93	0.88	0.83	0.78	0.74	0.71	0.69	0.66	0.65	0.65	0.65	0.65	0.65
India	2.40	1.77	1.73	1.69	1.64	1.60	1.56	1.53	1.50	1.47	1.44	1.41	1.41	1.41	1.41	1.41
Australia	1.30	1.28	1.20	1.13	1.06	1.01	0.98	0.95	0.93	0.90	0.88	0.86	0.86	0.86	0.86	0.86
Egypt	2.10	1.92	1.89	1.87	1.85	1.82	1.81	1.80	1.79	1.77	1.75	1.73	1.73	1.73	1.73	1.73
Argentina	1.40	1.11	1.10	1.09	1.08	1.07	1.05	1.04	1.03	1.02	1.00	0.99	0.99	0.99	0.99	0.99
Uruguay	-0.32	0.63	0.95	0.31	0.62	0.31	0.31	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Japan	0.32	0.32	0.33	0.33	0.33	0.32	0.30	0.28	0.25	0.21	0.17	0.13	0.13	0.13	0.13	0.13
Indonesia	1.58	1.56	1.54	1.52	1.49	1.47	1.44	1.42	1.39	1.36	1.33	1.30	1.30	1.30	1.30	1.30
Iraq	2.99	3.38	3.27	3.17	3.07	2.98	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Iran	2.17	2.16	2.15	2.13	2.14	2.12	2.11	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10
Saudi Arabia	2.50	3.28	3.27	3.26	3.26	3.26	3.26	3.26	3.26	3.27	3.28	3.29	3.29	3.29	3.29	3.29
European Union	0.33	0.31	0.30	0.28	0.27	0.25	0.23	0.21	0.19	0.17	0.15	0.13	0.13	0.13	0.13	0.13
South Korea	1.04	1.03	1.02	1.00	0.97	0.95	0.92	0.88	0.85	0.82	0.79	0.76	0.76	0.76	0.76	0.76
Taiwan	0.94	0.91	0.89	0.86	0.84	0.82	0.80	0.79	0.77	0.76	0.74	0.71	0.71	0.71	0.71	0.71
Brazil	1.26	1.20	1.14	1.08	1.01	0.94	0.90	0.88	0.86	0.84	0.81	0.79	0.79	0.79	0.79	0.79

Appendix Table 2. Real Gross Domestic Product (GDP)

Country/Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	(Percentage Change from Previous Year)															
United States	3.00	2.20	2.40	2.30	2.30	2.20	2.20	2.20	2.20	2.20	2.10	2.10	2.10	2.10	2.10	2.10
Thailand	8.60	7.40	8.30	8.10	7.90	7.80	7.80	7.70	7.60	7.30	7.10	7.00	7.00	7.00	7.00	7.00
Pakistan	4.70	5.40	4.90	5.90	6.10	6.20	6.10	5.90	6.00	6.10	6.20	6.00	6.00	6.00	6.00	6.00
Myanmar	2.47	2.47	2.47	2.47	2.47	2.47	2.47	2.47	2.47	2.47	2.47	2.47	2.47	2.47	2.47	2.47
Vietnam	10.50	10.20	10.10	9.70	9.40	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50
China (GNP)	10.20	9.50	9.60	9.20	8.90	8.60	8.60	8.50	8.40	8.30	8.20	8.10	8.40	8.40	8.40	8.40
India	7.10	6.50	6.90	6.80	6.90	7.00	6.90	7.20	7.10	7.30	7.40	7.20	7.20	7.20	7.20	7.20
Australia	3.20	3.60	3.00	3.40	3.40	4.30	3.70	3.50	3.50	3.40	3.40	3.40	3.40	3.40	3.40	3.40
Egypt	4.60	2.90	3.60	3.70	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50
Argentina	-4.40	3.00	4.70	4.90	4.10	4.00	3.40	5.60	5.60	4.90	4.70	4.60	4.60	4.60	4.60	4.60
Uruguay	2.40	0.50	3.50	2.60	3.00	3.00	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90
Japan	0.80	3.80	2.10	3.20	2.90	2.60	2.50	2.30	2.50	2.40	2.40	2.40	2.40	2.40	2.40	2.40
Indonesia	8.10	8.00	7.70	7.60	7.10	6.70	6.30	6.10	5.90	5.60	5.60	5.50	5.50	5.50	5.50	5.50
Iran	2.50	2.10	2.60	2.80	2.60	3.10	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
Saudi Arabia	-0.10	1.80	2.40	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
European Union	2.80	1.40	2.20	2.60	2.40	2.40	2.40	2.50	2.40	2.30	2.20	2.20	2.20	2.20	2.20	2.20
South Korea	9.00	6.60	6.70	6.60	6.40	6.20	6.00	6.10	5.90	5.60	5.60	5.70	5.70	5.70	5.70	5.70
Taiwan	6.10	6.00	6.10	6.50	6.30	6.40	6.40	6.40	6.40	6.40	6.40	6.40	6.40	6.40	6.40	6.40
Brazil	4.10	2.80	5.50	5.10	4.20	5.30	4.60	5.60	5.40	3.70	3.70	3.90	3.90	3.90	3.90	3.90

Appendix Table 3. Gross Domestic Product (GDP) Deflator

Country/Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	(Percentage Change from Previous Year)															
United States	2.00	2.40	2.40	2.60	2.50	2.70	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
Thailand	6.30	5.40	5.60	4.80	4.70	4.70	4.70	4.70	4.70	4.70	4.70	4.70	4.70	4.70	4.70	4.70
Pakistan	12.10	9.60	10.40	8.80	9.10	8.20	8.20	8.00	7.90	7.80	7.70	7.60	7.60	7.60	7.60	7.60
Myanmar	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.66
Vietnam	17.40	17.80	15.40	13.70	10.70	10.00	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50
China	13.50	7.40	11.40	11.10	10.90	10.60	9.00	7.90	6.80	5.80	5.70	5.70	5.70	5.70	5.70	5.70
India	4.00	4.10	5.00	6.60	6.30	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20
Australia	2.60	2.80	2.40	2.80	2.60	2.70	2.50	2.20	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Egypt	12.00	8.40	8.00	8.40	8.40	8.40	8.40	8.40	8.40	8.40	8.40	8.40	8.40	8.40	8.40	8.40
Argentina	5.00	2.50	3.10	3.00	4.70	5.40	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30
Uruguay	30.10	30.10	24.40	24.90	22.50	15.20	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10
Japan	-0.50	-0.30	0.30	0.80	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Indonesia	7.90	7.80	7.80	7.80	6.90	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
Iran	35.50	35.90	25.30	20.60	17.50	10.50	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Saudi Arabia	4.40	0.90	0.80	2.00	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30
European Union	2.10	5.30	4.90	0.10	0.80	2.40	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
South Korea	5.40	6.00	5.20	4.90	4.70	4.70	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Taiwan	2.10	2.50	2.70	2.80	2.70	2.90	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
Brazil	70.70	18.60	13.20	11.60	10.60	10.10	12.20	12.20	12.20	12.20	12.20	12.20	12.20	12.20	12.20	12.20

Appendix Table 4. Consumer Price Index (CPI)

Country/Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	(Percentage Change from Previous Year)															
United States	2.85	2.80	2.60	2.60	2.40	2.50	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
Thailand	5.80	5.90	5.40	5.30	5.20	5.10	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Pakistan	13.00	10.20	10.10	9.50	9.60	9.40	9.20	9.20	9.20	9.20	9.20	9.20	9.20	9.20	9.20	9.20
Myanmar	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
Vietnam	12.70	10.60	10.00	9.50	9.40	8.10	7.90	7.90	7.90	7.90	7.90	7.90	7.90	7.90	7.90	7.90
China	16.70	9.30	11.00	12.40	12.10	11.70	9.80	9.80	9.80	9.80	9.80	9.80	9.80	9.80	9.80	9.80
India	10.00	8.00	8.10	7.50	7.30	7.30	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20
Australia	4.60	3.10	2.80	3.60	3.90	3.10	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
Egypt	8.30	12.00	8.60	7.80	6.40	5.10	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Argentina	3.40	0.20	2.50	3.10	4.00	4.60	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.30
Uruguay	30.10	30.10	27.60	24.30	15.50	17.40	16.20	16.20	16.20	16.20	16.20	16.20	16.20	16.20	16.20	16.20
Japan	-0.10	0.10	0.70	1.60	2.00	2.10	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
Indonesia	9.40	8.20	8.60	8.50	8.40	8.20	8.10	8.10	8.10	8.10	8.10	8.10	8.10	8.10	8.10	8.10
Iraq	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20
Iran	49.70	45.60	30.20	21.30	13.40	9.10	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50
Saudi Arabia	4.90	1.20	1.70	1.80	1.00	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
European Union	3.30	2.50	2.60	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
South Korea	4.50	5.10	5.20	5.40	5.40	5.10	5.10	5.10	5.10	5.10	5.10	5.10	5.10	5.10	5.10	5.10
Taiwan	3.70	3.00	3.40	3.40	3.30	3.50	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40
Brazil	76.80	19.50	14.00	11.20	10.10	9.60	9.60	9.80	9.80	9.80	9.80	9.80	9.80	9.80	9.80	9.80

Appendix Table 5. Exchange Rate\*

Country/Yr	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010		
								(Percentage Change from Previous Year)										
Thailand	-0.60	1.50	0.60	0.30	0.30	0.20	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10		
Pakistan	2.30	10.20	6.90	5.80	4.20	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30		
Myanmar	-1.59	-1.59	-1.59	-1.59	-1.59	-1.59	-1.59	-1.59	-1.59	-1.59	-1.59	-1.59	-1.59	-1.59	-1.59	-1.59		
Vietnam	3.90	4.10	4.50	4.70	4.60	4.70	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40		
China	-3.10	0.10	3.20	2.90	2.80	3.00	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90		
India	6.60	8.40	7.10	4.60	4.30	4.20	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40		
Australia	-1.30	-5.10	2.00	1.70	4.00	2.10	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80		
Egypt	0.20	2.60	2.60	2.00	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50		
Argentina	0.10	-0.10	0.00	0.00	0.00	0.00	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50		
Uruguay	0.00	0.00	20.00	17.71	15.93	12.98	12.16	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00		
Japan	-8.00	14.50	2.70	0.90	-1.80	-1.00	-1.00	-0.90	-0.80	-0.70	-0.60	-0.50	-0.50	-0.50	-0.50	-0.50		
Indonesia	4.10	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50		
Iraq	2.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Iran	44.70	20.00	1.40	1.50	1.40	0.90	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80		
Saudi Arabia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
European Union	-4.63	4.40	4.90	3.20	0.90	-0.60	-0.60	-0.60	-0.60	-0.60	-0.60	-0.60	-0.60	-0.60	-0.60	-0.60		
South Korea	-4.00	3.70	-1.90	-0.90	-0.80	-0.90	-0.90	-0.90	-0.90	-0.90	-0.90	-0.90	-0.90	-0.90	-0.90	-0.90		
Taiwan	0.40	2.60	-0.80	-1.60	-0.30	-0.40	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10		
Brazil	43.70	9.70	15.00	10.50	13.00	14.40	12.60	15.10	14.50	13.90	13.30	12.70	12.70	12.70	12.70	12.70		

\* Relative to the U.S. dollar.

**English/Metric Conversion Table**

English to Metric			Metric to English		
to convert from	to	multiply the English unit by	to convert from	to	multiply the metric unit by
<b>Length</b>			<b>Length</b>		
miles	kilometers	1.61	kilometers	miles	0.62
yards	meters	0.91	meters	yards	1.09
feet	meters	0.31	meters	feet	3.28
inches	centimeters	2.54	centimeters	inches	0.39
<b>Area and Volume</b>			<b>Area and Volume</b>		
sq yards	sq meters	0.84	sq meters	sq yards	1.20
sq feet	sq meters	0.09	sq meters	sq feet	10.76
sq inches	sq centimeters	6.45	sq centimeters	sq inches	0.16
cu inches	cu centimeters	16.39	cu centimeters	cu inches	0.06
acres	hectares	0.41	hectares	acres	2.47
<b>Liquid Measure</b>			<b>Liquid Measure</b>		
cu inches	liters	0.02	liters	cu inches	61.02
cu feet	liters	28.34	liters	cu feet	0.04
gallons	liters	3.79	liters	gallons	0.26
quarts	liters	0.95	liters	quarts	1.06
fluid ounces	milliliters	29.57	milliliters	fluid ounces	0.03
<b>Weight and Mass</b>			<b>Weight and Mass</b>		
pounds	kilograms	0.45	kilograms	pounds	2.21
ounces	grams	28.35	grams	ounces	0.04
<b>Temperature</b>			<b>Temperature</b>		
F	C	$5/9(F-32)$	C	F	$(9/5)C+32$