Arkansas Global Rice Model[1] International Rice Baseline Projections for 2000–2010

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Introduction

Rice is an important food staple for nearly three billion people, half of the world's population. Rice accounts for over 21 percent of global calorie intake. More than 90 percent of global rice production is produced by Asian farmers. While production and consumption are concentrated in Asia, rice is an important crop in specific regions in North and South America, Africa, and Europe.

Given the role of rice as a major world food commodity and an important export crop in the United States, projections of and information on its supply and demand are very important for rice market participants, government decision-makers, and other stakeholders. The Arkansas Global Rice Project attempts to answer this need by developing a long-term outlook for world rice each year. The Arkansas Global Rice Model (AGRM) is used as the basic framework to develop this outlook. The AGRM is under continual development. Each autumn, the AGRM staff, as part of the Food and Agricultural Policy Research Institute (FAPRI) consortium of universities, meets to discuss important assumptions that will become part of the outlook. Macroeconomic and policy assumptions are agreed upon at that time. A preliminary baseline is developed in November. After review of the consortium baseline, revisions are developed by March and the final document is prepared for presentation in April. The outlook in this document is therefore the result of continual study and input from many researchers.

The AGRM projections for the global rice economy can be used for policy, technology, and structural market analysis; however, it is not a fore-

[1] This study is based on work supported by the Cooperative State Research Education and Extension Service, U.S. Department of Agriculture, under Agreement No. 99-3451-7485.

cast. The actual market and policy conditions over the next 10 years are likely to be substantially different from the baseline. While the baseline is a plausible outlook, it is conditioned by the macroeconomic and policy assumptions used to generate it.

Macroeconomic and Policy Assumptions

The Arkansas Global Rice Project reflects the latest developments in the rice industry in particular, and in the world economy in general. Thus the projections presented in this paper are only as good as the underlying assumptions used. Macroeconomic data are based on forecasts from the Wharton Econometrics Forecasting Associates (WEFA) and Project LINK (Appendix Tables 1-5).

One of the main assumptions in the baseline projections is that many national economies are expected to recover from the 1997-1999 international financial crises. The epicenter of the most recent global financial crisis is Thailand, also the foremost rice exporter in the world. Similar macroeconomic and financial market collapse spread to various parts of the world but were concentrated in Asia and Latin America. Prior to the crisis, a decade of extraordinary economic growth in Asia had been financed by bank lending. However, by 1997, weaknesses in the banking and financial sectors, including corruption, a high dependence on foreign debt, and a lack of sound financial management resulted in capital flight and equity depreciation. The financial crisis led to weakened economies characterized by negative income growth, currency depreciations and high interest rates. The financial crisis had substantial negative impacts on countries such as Indonesia, Thailand, South Korea, Russia, Brazil and some Latin American countries.

The crisis reduced global agricultural commodity prices, production, consumption, and trade. The depreciated currencies had mixed effects. They benefited domestic agricultural producers and exporters but were unfavorable to domestic consumers. They also reduced imports and improved agricultural trade balances. The magnitude of effects varied depending on the pre-crisis economic conditions, policies, and financial and banking frameworks of the affected countries. During this crisis, economies of the affected countries contracted 2-14 percent, currencies depreciated 35-75 percent, and interest rates increased 6-47 percent.

Economic recovery in some affected countries started in 1999, with South Korea and Thailand leading the way (USDA-ERS, 2000e).

Figures 1 and 2 show the annual growth rates of real Gross Domestic Product (GDP) of major rice exporting and importing economies, respectively, for the period 1997-2010. Figure 1 shows the marked recovery in Thailand's economy, growing 1.6 percent in 1999 from a substantial contraction of 8.1 percent in 1998. Thailand's economy is expected to expand at 2.9 percent in 2000 and to continue to grow—reaching a rate of 5.8 percent in 2003 before gradually slowing down and stabilizing at 5.3 percent in 2007. The economies of Vietnam and India slowed in 1998 to 4.4 and 4.6 percent, respectively, from 8.5 and 6.5 percent in 1997, but started to recover in 1999. Vietnam and India have comparable GDP growth rates in the long-term at around 6 percent.

China's economy also slowed to 7.8 percent in 1998 from 9.3 percent in 1997 and is expected to recover in 2002. In contrast, the relatively insulated economy of Pakistan managed to grow in 1998 by 4.7 percent vs. 4.1 percent in 1997, although the growth slowed to 4.3 percent in 1999. Pakistan's GDP is expected to continue to grow at rates of 5-6 percent over the longer-term.

Exchange rates depreciated in a number of rice exporting/importing countries during the crisis period. Appendix Table 5 shows that in 1998, the currency of Thailand depreciated by 33.8 percent, India (14.0 percent), Pakistan (12.6 percent), Indonesia (244.2 percent), Brazil (7.7 percent), Japan (8.2 percent), and South Africa (20.0 percent). Except for Brazil, currency values of these countries began to recover in 1999 and are expected to continue to stabilize in 2000.

Overall, the U.S. economy remained strong throughout the international financial crisis, as indicated by its continuous strong growth from 1997 through 1999 (3.6, 3.9 and 4.1 percent growth rates). While the United States experienced reduced exports, foreign capital inflows and cheaper imports from the crisis countries helped keep interest rates

and inflation in check. This was further supported by the continued growth in U.S. productivity. However, weakened agricultural commodity prices caused by slack export demand, squeezed market incomes of agricultural producers, prompting the U.S. government to provide emergency farm income support in 1998, 1999, and 2000 (Figure 3).

The baseline reflects the impact on U.S. rice producers of the Federal Agriculture Improvement and Reform Act of 1996 (FAIR Act). This legislation eliminated supply control mechanisms, decoupled income support from production of a specific program crop, and replaced deficiency payments with transition contract payments for the seven-year period covering 1996 through 2002. Nonrecourse loans for rice remained at $6.50 per hundredweight (cwt). The contract payments, together with loan deficiency payments, contributed a substantial part of the U.S. rice growers' income during the last four years. The payments from 1996 through 1999 were $2.77, $2.71, $4.35, and $5.64 per cwt, respectively. The contract payments for the next three years will be $2.60, $2.11 and 2.04.

The U.S. economy's growth is projected to slow to 2 percent in 2000, and is expected to range from 2.4 to 2.9 percent over the baseline period. The GDP growth rates of the major rice importing countries are presented in Figure 2. The economy of Indonesia, the top global rice importer, deteriorated in 1998, contracting by 13.7 percent, from a positive growth of 6.1 percent in 1997. Indonesia's economy further declined 3.5 percent in 1999, but is expected to recover and grow 3.2 percent in 2000 and 4.3 percent in 2001.

Other major rice importing countries—Japan, Saudi Arabia and Iran—also experienced a contraction of their economies in 1998: 2.9 percent, 1.3 percent, and 0.5 percent, respectively, compared to growth of 1.0 percent, 3.2 percent and 3.3 percent in 1997. Economies of Japan, Saudi Arabia, and Iran recovered in 1999 and are expected to expand in 2000 and over the long term.

The growth of the economies of Brazil and South Africa, two other major rice importers, were relatively flat in 1998 but are expected to grow in excess of 3 percent in 2000.

Growth in population is the main driver of increases in rice consumption. The populations of major rice consuming nations will continue to grow but at decreasing rates (Figures 4 and 5). This growth is enough to project a relatively steady growth for global rice consumption to 2010.

Rice has been traditionally one of the most protected agricultural commodities in the world. However, developments over the past decade have made the international rice economy increasingly market-oriented. The Uruguay Round Agriculture Agreement (URAA) was implemented in 1995 after nine years of negotiations. The agreement required tariff reductions, market access, reductions in aggregate support levels, and reductions in export subsidies notably in the European Union (EU) and the United States. Perhaps most important for rice was the market access requirement which opened both the Japanese and South Korean rice markets to world trade. By 1999, the World Trade Organization (WTO) could be attributed with an expansion in trade of approximately 750 thousand metric tons (Wailes, 2000). Most of this was for high-quality medium grain rice imports into Japan under their tariff rate quota (TRQ) and South Korea's minimum access agreement. These reforms were modest by any account and substantial trade liberalization reform is awaited in the next WTO negotiation round.

Regional initiatives in the 1990s were also important. Both the North American Free Trade Agreement (NAFTA) and Mercosur free trade agreements have contributed to an expansion in rice trade in the western hemisphere as well as significant production shifts.(Bierlen, *et al.*, 1997). By 1999, the NAFTA agreement arguably expanded long grain rice trade between the United States and Mexico by 200 thousand metric tons, and the Mercosur agreement has expanded South American rice trade by 600 thousand metric tons (Wailes, 2000).

National policy reforms have also been important in a number of major rice producing countries. In addition to the U.S. FAIR Act of 1996, other countries have initiated market reforms in rice production and marketing such as in China, Japan, Korea, Taiwan and Vietnam. 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. Finally, fundamental demand-determining factors of income and population growth, as well as dietary changes, continue to influence the dynamics of the world rice economy.

The baseline projections of rice consumption, production, trade, stocks, and prices presented in this paper baseline outlook reflect the latest developments in the international rice industry. The current baseline projections include changes relative to previous projection reports (Wailes, *et al.*, 1995; 1996a,b; 1997a,b; 1998). The major changes include (1) updated macroeconomic data and population forecasts from Wharton Econometrics Forecasting Associates and the United Nations Project LINK, (2) current rice supply and utilization data (USDA, 2000a, 2000b), and (3) and additional supply and demand submodels for Mexico, Canada, and South Africa. Throughout this report, data through 1998 are actual. 1999 data are actual on the supply side and model estimates are reported for the demand side. All estimates for 2000 and beyond were generated by the AGRM.

The Arkansas Global Rice Model projections are based on a multicountry econometric model framework that provides projections for a set of 23 major rice producing and/or trading countries and one aggregate rest-of-the-world (ROW) region. Projections include production (area harvested and yields), utilization, net trade (exports less imports), stocks, and prices at national levels. Estimates for these variables are based on a set of explanatory variables, including exogenous macroeconomic factors such as income, population, inflation and exchange rates, technology development, and especially, government-determined policy variables that reflect the various mechanisms by which countries intervene in their rice sector economy (Wailes, *et al.*, 1997).

An updated baseline projection for the world rice economy is valuable because 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 need for a revised baseline is reinforced by continual changes around the world which directly or indirectly influence the rice market. 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 EU, Iran, Iraq, Saudi Arabia, Taiwan, Brazil, Mexico, Canada, and South Africa. Projections for the United States are separated by state (Arkansas, Louisiana, Texas, Missouri, Mississippi, and California) and rice type (i.e., long grain and medium grain). The EU's rice supply is divided among Italy, Spain, and "Other" EU countries (France and Greece). India production and consumption projections are disaggregated by regional models—North, East, West, and South. Hong Kong projections are now integrated with the China numbers. 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. Utilization is projected to remain strong in 2000 at 401 mmt, an increase of 4.0 mmt over the estimated 1999 level—with China and India accounting for over 60 percent of the additional consumption. Total utilization of rice is projected to continue to grow at an average annual rate of 1.11 percent, to 443 mmt by 2010 from 389 mmt in 1998 (Table 1 and Figure 6). This growth rate is lower than the 1.53 percent annual growth rate that occurred over the 1993-98 period and is much lower than the growth in rice consumption over the previous 20 years (1978-1998) at 2.19 percent (Figure 7).

Several factors are contributing to the rapid slowdown in world rice consumption, including projected reductions in population growth rates in many Asian countries (Appendix Table 1) and diversification in food consumption patterns as a result of changing lifestyles and spending patterns, especially in Asian countries that have experienced rapid urbanization. For some Asian countries, rice has be-

come an inferior good; i.e., rice consumption declines as incomes rise, implying negative income elasticities (Ito, Peterson, and Grant). Based on AGRM estimates, these countries are Japan, South Korea, Taiwan, and Thailand. In less industrialized Asian nations and a few non-Asian industrialized market economies, such as the United States, rice consumption increases with income growth.

Production

Assuming normal growing conditions, world rice output in 2000 is projected to be 399 mmt, similar to the record 1999 output. Countries with lower projected rice output in 2000 are the United States, Thailand, Pakistan, China, Egypt, Japan, and South Korea. Production increases in 2000 are projected for Myanmar, Vietnam, India, Australia, Argentina, Uruguay, Indonesia, the EU, Taiwan, and Brazil. The growth in world rice production necessary to satisfy the projected consumption levels over the next 11 years (2000-2010) will mainly come from yield increases, as it has for the past 20 years (Figures 8-10).

Area Harvested

Area harvested is projected to increase slightly at an annual rate of 0.11 percent, from 152.3 million hectares (ha) in 1998 to 154.4 million in 2010 (Table 1). In contrast, the annual growth rate observed for the past 20 years (1978-98) was 0.33 percent. However, over the past five years, rice area harvested grew surprisingly by 0.82 percent annually, an expansion of over 6 million ha (figure 8). Four countries, India, China, Vietnam, and Thailand accounted for nearly three-fourths of the expansion. India has expanded rice area as a result of irrigation development projects. China's concern in the mid-1990s with long-term food security issues resulted in a set of policies such as the "grain bag" policy that federalized responsibility of grain security to the provincial governors. Rice area expansion in Vietnam over the past five years was a result of the reconstruction of production capacity in the north. Thailand, along with other countries such as the United States, expanded as a result of favorable world prices for rice compared to other grains. Offsetting this recent trend were rice area reductions in Brazil, Japan, and South Korea as a result of regional (Mercosur) and multilateral (WTO) trade agreements. World rice area harvested increased by 0.6 million ha in 1999 in response to relatively high rice prices in 1998 and recovery in production in a number of countries that suffered weather-related crop damage in 1998.

Yields

The world average rice yield increased slightly to 2.59 metric tons (mt)/ha in 1998 from 2.56 mt in 1997, and it is projected to increase to 2.89 mt by 2010—a 0.93 percent annual increase. This rate of growth is comparable to the level seen for the past five years ending in 1998 at 0.97 percent. This projection, however, is much lower than the 1.80 percent rate observed for the past 20 years (Figure 9).

Private and public rice research and development efforts are creating potentially higher yielding and value-enhanced rice varieties. The International Rice Research Institute (IRRI) has announced that a new variety of higher-yielding rice is expected to be available to farmers for commercial planting by 2004. The new rice variety, called "super rice" by some scientists, can yield up to 12 mt per ha and has better resistance to disease and insects compared to current varieties. The new rice plant is reportedly suitable for paddies in tropical and subtropical regions—and should be suitable to 80 percent of India's total rice area, and half of China's rice area. The rice could also be grown on irrigated farms in the Philippines, Indonesia, Malaysia and Thailand.

Given this development, the global average annual yield growth is projected to be only 0.82 percent over the next five years, and 1.09 percent over the following six years (Figure 9). It is expected that ongoing development and adoption of the new high-yielding varieties will take some time to have a more substantial effect on world average yield. To the extent that actual yield growth exceeds the projected growth rate, fewer land resources will be needed to support the consumption projections.

The yield projections do not include weather variables and therefore reflect, implicitly, an assumption of average weather. However, it should be recognized that a major source of volatility in world rice prices, production, and trade is the monsoon

Biotechnology in Rice

Biotech rice varieties will be commercially planted in the U.S. in 2001. China, the Philippines and other Asian countries are also nearing the commercialization stage for biotech rice as well. Cautious optimism may be placed on these developments and the potential impact on global rice supply and demand. Soybeans, corn, canola and cotton biotech varieties have been produced in the U.S. since 1996. All of these biotech varieties were developed by a few major private corporations that resulted from mergers and acquisitions of seed, chemical and pharmaceutical companies. The first wave of biotech varieties are all either pesticide tolerant or insect resistant. U.S. food manufacturers and consumers had accepted these varieties without resistance, unlike their European counterparts. However, over the past year a number of U.S. food processors (e.g. Gerbers, Frito-Lay, and Heinz) have decided not to use biotech commodity ingredients. There is growing concern that consumer fears that have led the European Union policy to ban imports of biotech commodities will spread to the U.S. Both the National Research Board of the Academy of Science and the Committee on Science in the U.S. House of Representatives released reports in April, 2000 arguing that while biotech varieties are safe, that the coordinated regulatory framework, involving the U.S. Department of Agriculture, the Food and Drug Agency, and the Environmental Protection Agency, needs additional reforms including transparency and better coordination (Adkisson, Smith). The White House and the FDA announced new regulations in early May, 2000 in an effort to respond to the Adkisson and Smith report recommendations.

Rice biotech varieties that are nearing the commercialization stage, unlike other commodities, include several value-enhanced developments. Researchers at the Swiss Federal Institute of Technology's Institute for Plant Sciences spliced three genes (two from daffodils and another from a bacterium) into rice to make it rich in beta carotene, the source of vitamin A. The rice has been named "Golden Rice" because of its yellowish color. Deficiency in vitamin A is the leading cause of blindness in developing nations and results in an estimated million deaths of young children who are more vulnerable to infections. The same researchers are on the verge of a biotech iron-fortified rice. Development of varieties that have clear and obvious consumer or processor value enhancements will likely find a more receptive public. Nevertheless, regulatory issues such as labeling, harmonization of international standards for field testing and release, and an overall approach to risk assessment will need to be resolved before biotech varieties are widely accepted world-wide.

Researchers at the University of Washington have produced a "working draft" of the genome sequence of the rice plant. Monsanto Co., which funded the project said that "the information could lead to the development of new rice varieties offering better nutrition and higher yields." The genetic map is approximately 85 percent complete and Monsanto said it would make the research public through the International Rice Genome Sequence Project (IRGSP), an international research consortium of 10 research teams working to complete the sequencing of the rice genome.

There are at least two rice herbicide tolerant products that are expected to be commercialized in the U.S. next year or soon thereafter. One rice biotech product is Clearfield® Rice. It was developed by the more conventional technique of genetic mutation and involved no transgenic application. This may offer an opportunity in the EU and

other countries where there is strong resistance to biotech products which are developed using the transgenic biotechnology. It was produced by American Cyanamid through cooperation with universities and public and private seed companies to develop rice varieties tolerant to imidazolinone herbicides. These herbicides are flexible, environmentally-friendly and provide superior contact and residual control of weeds. The other rice product is LibertyLink® Rice, a transgenic variety (the gene is from a naturally-occurring soil bacterium) produced by AgrEvo. When used together with Liberty herbicide, this rice will allow farmers greater flexibility and environmental soundness in weed control, especially for red rice.

Overall, relative market returns will eventually dictate the rate of adoption of these biotech crops. Annou, Wailes, and Cramer have suggested a potential increase in producer net returns for LibertyLink rice in the range of $24-32 per acre in Arkansas. The benefits include reduced applications of herbicides and less management time, and a quality effect. LibertyLink rice will be profitable where red rice and other weeds are serious problems. Control of red rice is likely to provide the producer with a higher grade of rice and better market price. This, of course, assumes that the biotech varieties will be acceptable to the rice processors and consumers.

climate of many Asian countries. As such, the year-to-year accuracy of these projections is not expected to be high. However, the long-term estimates are consistent with the historical trends and current research developments.

Total production is projected to increase to 446 mmt by 2010 from 394 mmt in 1998 (Table 1). This increase represents an annual growth rate of 1.1 percent (Figure 10). Since this rate is slightly lower than that of consumption, a gradual decline of global stock levels is expected through 2006, before recovering slightly toward the end of the projection period. Growth in world rice production has actually slowed to a rate of 1.79 percent per year for the period 1992-98, well below the 2.2 percent annual growth for the 20-year period 1978-98.

Trade

Total world rice trade has expanded at an annual growth rate of 11 percent over the past six years (comparing the 1992-93 average with the 1997-98 average). This expansion has been the result of: (1) weather-related production shortfalls (e.g., in Indonesia, China, Philippines, and Bangladesh), (2) greater political stability in some rice-consuming countries (e.g., Iraq and Iran), (3) growth in population and incomes, and (4) trade policy reforms such as regional agreements, the WTO, and unilateral policy rationalization.

Total world rice trade is projected to grow by 1.9 percent per year over the projection period (Table 2). This projection reflects a significant slowdown in the growth of rice trade compared to the recent average annual increase (Figure 11). The trade projection reflects a situation in which the major effects of existing unilateral, regional and multilateral rice trade liberalization have been substantially realized. The baseline policy assumption of no new trade liberalization agreements is also important in explaining the reduced trade growth. 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 12). Yield shocks have dramatically influenced trade volume and variability from year-to-year such as in 1993, 1994, and 1995.

Total world rice trade in the 1999 marketing year is expected to be 14 percent lower than the 1998 level, at 21.9 million metric tons (mmt) due to weaker import demand brought about by production recovery in major importing countries. Projected 1999 net trade is 19.6 mmt. Total 2000 trade is projected to partially recover to 23.6 mmt,

with net trade of 21.2 mmt.

Despite the growth in the 1990s, rice trade is projected to remain as a small percentage of world consumption. Total trade accounted for only 6.6 percent of consumption in 1998. It is projected to remain at 6-7 percent in this baseline. Major exporters in 1998 were Thailand, Vietnam, India, China, the United States, and Pakistan. Major importers in 1998 were Indonesia, the EU, Iran, Brazil, Iraq and Saudi Arabia. Indonesia is expected to remain the largest importer over the projection period, followed by the EU, Iran, Brazil and Saudi Arabia. World net rice trade is projected to decrease from 23.3 mmt in 1998 to 19.6 mmt in 1999, and increase steadily to 27.5 mmt in 2010 (Table 3).

Long Grain Markets

Long grain rice trade is presented in Table 4. Nearly 90 percent of total global rice trade is long grain and aromatic types, such as jasmine and basmati. Major exporters are Thailand, Vietnam, India, the United States, and Pakistan. The United States is projected to lose market share in the long grain export market over time because of relatively slow growth in production and expansion in its domestic demand. Total world long grain exports are expected to increase 11 percent to 20.5 mmt in 2000 from 18.5 mmt in 1999. Major long grain rice importers in 1998 were Indonesia, the EU, Brazil, and Middle Eastern countries. The United States and China are rapidly growing markets for aromatic rice imports, which are projected to increase continually over the projection period. The ROW accounts for 55 percent of global imports in 1998; this share is estimated to gradually decline to 51 percent over the projection period as a result of increased production in these countries.

Medium Grain Markets

The world medium grain rice trade is presented in Table 5. Medium grain trade numbers are rough estimates and are likely overstated because not all trade from China, Italy, Australia, and Japan is medium grain rice. The major sources of medium grain rice exports are Australia, China, the United States, Italy, and Egypt. China is the world's largest producer of medium grain rice. It is expected to compete for the high-quality export markets in East Asia. However, the extent to which China can dominate this export market will be a function of its own domestic demand for medium grain rice, which continues to expand rapidly. The major importers of medium grain are Japan and South Korea as a result of market access requirements of the GATT accord. The projection for Taiwan assumes a minimum access requirement will apply once admitted into the WTO. Total medium grain trade, however, is expected to account for only 12 percent of the total world rice trade if market access rules are not increased for the years beyond 2002 for Japan and 2005 for South Korea. Medium grain rice trade would grow annually by 1.2 percent over the projection period.

Stocks

World ending stocks in the 1999 marketing year are expected to be 61.7 mmt, 3.5 percent higher than the 1998 level, as weakness in trade partly offsets strength in consumption. Global stocks are projected to decrease by 3.2 percent in 2000 as trade improves and consumption remains strong.

World ending stocks are projected to range from 51 to 60 mmt over the baseline period (Table 1). Stocks increased by an annual average of 1.4 mmt (or 2.6 percent per year) for the past five years from 52.4 mmt in 1993 to 59.6 mmt in 1998 (Figure 13). Global stocks are projected to decline to about 51 mmt in 2006 before recovering to 58 mmt by the end of the baseline period. Global rice stocks-to-use ratio would range from 12 percent to nearly 15 percent over the projection period, equivalent to 1.4 to 1.8 months of global rice consumption.

Prices

The international reference price for long grain rice (Thai 5% NPQ fob) is estimated to have decreased substantially, in nominal terms, to US$228/mt in the 1999 marketing year from $273 in 1998 (Table 6) because of weak import demand, abundant supplies and increasing competition between the major world rice exporters. Barring unforeseen

shocks, rice prices are projected to improve in 2000 to $251. In February 2000, international prices softened in response to a lack of international demand. In late March 2000, Thai and Vietnamese rice prices continued to weaken as new supplies entered the market while buyers reportedly waited for prices to soften further. Fragrant rice prices, however, have remained firm.

The world long grain reference price is projected to average generally in the range of $251 to $318/mt from the period 2001 through 2010, depending on the dynamics of world rice supply and demand. In real terms (1985 dollars), however, the world price is projected to decline from $180/mt in 1998 to $158 by 2010 (Figure 14).

The No. 2 California medium grain fob price, the reference price for medium grain rice, is projected to decrease to US$458/mt in the 1999 marketing year from $470 in 1998, and would gradually decline from $423 in 2000 to $406 by the end of the baseline period. The relationship between the long grain and medium grain rice prices is important where substitution in production is possible. A comparison of the U.S. no. 2 long grain fob Houston price to the U.S. no. 2 medium grain fob California price gives an indication of the relationship (Figure 15). Long grain enjoyed a price premium of nearly 5 percent in 1997 over medium grain with strong long grain prices. The situation reversed in 1998, with medium grain setting a substantial price premium ($101) over long grain because of the latter's excess supply. Medium grain price is projected to maintain a premium over the long grain, but the premium is expected to decline over time as a result of the expected reallocation of resources toward medium grain.

The other price projected is the lower quality Thai fob 25% broken long grain. Its relationship to the U.S. wheat no. 2 fob price (Table 6 and Figure 16) is relatively important in explaining substitution of wheat for rice in the ROW rice consumption projection. The substitution relationship has an elasticity of demand in ROW with respect to the price ratio of rice to wheat of –0.27. Low wheat prices in 1997 and 1998 resulted in an unusually low ratio to the Thai 35% price of 48 to 50 percent, respectively. The weakness in rice import demand in 1999 pulled rice prices in the same direction as wheat, with the ratio increasing to 59 percent in 1999. Because the wheat supply response to own price is generally believed to be more elastic than rice supply to rice price, the rice to wheat price ratio is expected to remain in the more typical range of 60 to 64 percent during most of the projection period.

Rice consumption is expected to be smaller in the future because of shifts in Asian diets toward protein-based foods as incomes rise. Gains in production to meet additional consumption needs are expected to mainly come from yield growth, with only minor increases in area harvested. While nominal world rice prices are projected to increase, real prices will continue to decline.

Presented below is a detailed discussion for each exporting and importing country included in the model. In addition to updated rice industry data, this section covers macroeconomic information, pertinent domestic policies, and recent developments affecting rice.

Summary

Changes in international and domestic agricultural and trade policies are increasingly shaping the future of the world rice economy. Recent agreements at the international, regional, and national levels have made the rice industry more market-oriented. This means that the major rice producing countries face an increasingly competitive global rice marketplace.

Relative prices, income and population growth, and dietary changes are expected to continue to determine rice demand. This baseline includes an assumption of continued recovery from the recent Asian financial crisis in the immediate term. Weather, assumed to be normal for the baseline, will continue to be an important determinant of the seasonal variability in the supply and demand for rice, especially in the monsoon-dependent Asian countries.

The impact that biotechnology will have on rice

remains to be seen, given the fact that biotech rice products have yet to be introduced. While the potential seems to be promising as observed in other crops such as corn, cotton, and soybeans, numerous issues still need to be addressed by all stakeholders—who include growers, consumers, service providers, input suppliers, and the government regulatory agencies, among others.

This baseline provides the basis to conduct a wide variety of market and policy analyses on the rice economy including alternative macroeconomic, policy, weather, and technology scenarios.

Annual growth rates for global rice trade are expected to slow from a recent growth rate of 11 percent to only 1.8 percent. Likewise, growth in global rice consumption is expected to be smaller in the future as a result of shifts in Asian diets toward protein-based foods as incomes rise. Gains in production to meet additional consumption needs are expected to come mainly from yield growth, with only minor increases in area harvested. While nominal world rice prices are projected to increase, real prices will continue to decline.

Presented below is a detailed discussion on each exporting and importing country included in the model. In addition to updated rice industry data, this section covers macroeconomic information, pertinent domestic policies, and recent developments affecting rice.

Major Exporting Countries

Thailand

Thailand's rice output in 2000 is projected to be 3.2 percent lower than the 1999 level as a result of lower area and yields. Thailand is estimated to harvest 9.8 million ha of rice in 2000, slightly lower than the 1998 area (Table 7 and Figure 17). The harvested area is expected to decline gradually to 9.4 million by the end of the projection period. In the longer term, yields in 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 grow 1.3 percent annually, from 1.61 mt per ha in 1999 to 1.80 mt in 2010. As a result of changes in area harvested and yield, rice production is projected to increase gradually from 15.9 mmt in 1999 to 17.0 mmt by 2010. These output projections are slightly higher than those in our 1998 baseline levels basically because of the slightly slower projected decline in area combined with a comparable yield growth.

Rice demand in Thailand is price-inelastic. Per capita rice use in Thailand is projected to decrease gradually from 148.2 kg in 1998 to 139.4 kg by 2010. Based on a negative relationship with income, per capita rice consumption declines as income increases and dietary habits change. Reflecting the country's relatively low population growth (nearly 1.0 percent in 1998 and declining to 0.65 percent by 2010), the total rice consumption will increase gradually from 8.9 mmt in 1998 to 9.2 mmt by 2010.

Thailand has recently experienced its greatest postwar economic crisis. To put Thailand's current situation into perspective, an overview of the events that led to this unfortunate crisis is presented below (U.S. Department of State, 1998). A regional economic weakness first turned into crisis in Thailand during late 1996, when a property value bubble burst, exposing extensive bad debts. Speculation on the Thai baht followed. Efforts by the government to defend the currency using its foreign exchange reserves backfired —instead of stabilization, Thailand was forced to float the baht, leading to a substantial devaluation. Many of the country's finance companies failed; the subsequent credit crunch squeezed the import/manufacturing/export cycle. The cheaper currency did not help exports because so many products are assembled with high-priced imported components. Currency devaluations by Thailand's regional competitors contributed to the problem. The growth of the country's gross domestic product substantially slowed from 6.5 percent in 1996 to zero in 1997 and a decline of 8.0 percent in 1998. (U.S. Department of State, 1998). The country also experienced a budget deficit in fiscal 1997, the first in a decade (U.S. Department of State, 1997). Recent developments appear to be encouraging. The country's economy, along with those of a number of other Asian countries, started a slight recovery in 1999—with projected real GDP growth of 1.6 percent. Long-term, growth of the country's economy

is expected to stabilize at 5.3 percent.

Thailand's economy is export-oriented, supported by a free-market philosophy. In line with the WTO and the Association of Southeast Asian Nations (ASEAN) commitments, the country instituted tariff reductions beginning in January 1995. By early 1997, the total number of tariff rate categories was reduced to 6 from 39. Tariff rates are 30 percent for goods needing "special protection," which include agricultural products, autos and auto parts, alcoholic beverages, and a few other "sensitive" items. The government is gradually easing import duties in line with WTO commitments, which may improve market access for some American products. Rice will continue to be protected, but within WTO schedules.

Barriers to imports of farm products are being eased. 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 that may constitute export subsidies. These programs include subsidized credit on some government- to-government sales of Thai rice; preferential financing for exporters in the form of packing credits; tax certificates for rebates of packing credits; and rebates of taxes and import duties for products intended for re-export. Thailand's economy has changed from one primarily based upon agriculture, with some light industries, to one dominated by manufacturing and services (U.S. Department of State, 1997).

Despite the recent economic challenges, Thailand remains 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 WTO agreements. Thailand, however, is expected to see increasing competition from Vietnam and Pakistan.

Total rice exports are expected to be 13 percent lower in 1999 at 5.8 mmt as a result of weaker international demand and stiffer competition from Vietnam. Exports are expected to recover slightly in 2000, growing 1.4 percent to 5.9 mmt. Thereafter, exports are expected to recover strongly, reaching 7.8 mmt by 2010.

Under the GATT accord, Thailand has a minimum access of 239 thousand mt of rice for 1996, increasing to 250 thousand mt in 2004, and remaining at that level over the rest of the projection period. The USDA Foreign Agricultural Service, however, reported that actual total annual imports of Thailand from 1996 through 1998 ranged only from 100 to 300 mt. This baseline assumes that the country will import an insignificant quantity throughout the baseline period. Ending stocks are expected to range between 1.5 to 2.0 mmt during the same period.

United States

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 producers. 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. Because of 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 1996 FAIR Act significantly changed the price and income mechanisms for rice and other grains. Supply control mechanisms were essentially eliminated. Income support was 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 last five years. The FAIR Act established a seven-year payment contract (sometimes

referred to as the AMTA payment) with farmers and ranchers, which covers the period 1996 through 2002. Eligibility for payments is not influenced by current crop planting, production, or prices.

The AMTA 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). Under this system, rice producers are provided complete flexibility in planting decisions. They receive a rice contract payment whether they produce rice or not. The production decision will be primarily determined by relative market returns. In 1998, 1999, and 2000 U.S. rice producers received additional income assistance from "emergency" program spending in the form of Marketing Loss Assistance (MLA) payments. These payments were made for all program crops on the basis of low prices for the major program crops–wheat and corn (rice prices continued to be relatively strong for the 1998 crop). The MLA payments have been administered with the AMTA payments using the same eligibility criteria. The average rice MLA payment in 1998 was $1.45/cwt and the AMTA payment was $2.92/cwt. With a continuation of low wheat and corn and now rice prices in 1999 and 2000, Congress appropriated MLA payments equal to the AMTA payments. The "double" AMTA payments in 1999 were $5.64/cwt and will be $5.42 in 2000 (Table 8).

Nonrecourse loans will continue to be available to rice producers at a maximum rate of $6.50/cwt. For the purpose of projections, the contract payment is assumed to continue at the 2002 rate for the period through 2010.

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). The 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 yield 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 planted 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 2.80 million acres in 1996. Acreage recovered in 1997 to 3.03 million because of attractive prices, gained some more in 1998 to 3.32 million acres, and is estimated to have increased to 3.56 million in 1999 (second highest on record; the record was the 3.79 million acres harvested in 1981) mainly because of attractive rice prices relative to competing crops. The dramatic acreage increase in 1999, as expected, is price-depressing as indicated by low rough long grain rice futures prices, which range from $5.63-$5.91/cwt at the time of this writing.

The 2000 harvested area is estimated to have decreased nearly 8 percent to 3.28 million acres (1.33 million ha) in 2000 as producers respond to the weaker price expectations. Over the longer run, area harvested is expected to range between 3.3 to 3.4 million acres over the baseline period. These levels are substantially higher than last year's baseline (which projected 2.83 million acres in the year 2000) because of improved expected returns of rice relative to other crops (Table 8 and Figure 18). Long grain harvested acreage increased to 2.74 million acres in 1999 from 2.61 million in 1998 and is estimated to have decreased 10 percent to 2.46 million in 2000.

Long grain area is projected to range between 2.5 to 2.6 million acres over the rest of the baseline period (Table 9). Medium grain acreage, on the other hand, decreased substantially to 709 thousand acres in 1998 from 794 thousand in 1997 because of relative strength of the long grain rice prices in 1997. The medium grain acreage increased dramatically in 1999 to 824 thousand acres because of the wide price premium enjoyed by medium grain over the long grain as the latter had excessive supply. Medium grain area is projected to decline from the period 2000 through 2002, before gradually increasing, recovering to the 1999 level by 2009. For purposes

of comparison with other countries, Table 11 provides U.S. rice supply and utilization in metric units.

U.S. rice acreage by state is presented in Table 12 through Table 17 and Figure 19. Arkansas' total rice area increased to 1.65 million acres in 1999 from 1.53 million in 1998. Arkansas' harvested area is estimated to decrease in 2000 to 1.54 million acres (623 thousand ha); and would range between 1.54 and 1.66 million acres over the rest of the baseline period. Arkansas long grain area increased to 1.39 million acres in 1999 from 1.32 million in 1998; and is estimated to decrease to 1.3 million in 2000. Over the rest of the baseline period, long grain acreage would range from 1.31 to 1.40 million. Arkansas' medium grain area increased substantially to 251 thousand acres in 1999 from 202 thousand in 1998; and is expected to be in the range of 211 to 257 thousand acres during the rest of the projection period (Table 12 and Figure 20).

Louisiana's total rice area increased by 37 thousand acres to 620 thousand in 1998, with all the gains coming from long grain area (Table 13 and Figure 21). After decreasing slightly in 1999, area harvested is estimated to further decline to 563 thousand acres in 2000, before recovering gradually to nearly 595 thousand acres in 2010.

Texas harvested a total of 283 thousand acres in 1999—24 thousand acres lower than the previous year—and will expect a further decline in 2000 to 221 thousand acres. Missouri's rice area increased 23 thousand acres to 140 thousand in 1998, and increased further by 44 thousand acres in 1999. In 2000, Missouri's acreage is estimated to decline 13 percent to 160 thousand (Table 15).

Mississippi's harvested acreage increased to 268 thousand acres in 1998 from 238 thousand in 1997 (Table 16); it increased further by 55 thousand acres in 1999. Mississippi's area is estimated to decrease substantially in 2000 to 247 thousand acres. California's acreage decreased by 38 thousand acres to 478 thousand in 1998 as a result of unfavorable weather, but recovered in 1999 to nearly 535 thousand. For crop year 2000, only California has a projected increase in acreage—a gain of nearly 19 thousand acres. Thereafter, California's acreage is projected to decline, and range generally between 520 and 530 thousand acres.

The average annual changes in total harvested area by state over the baseline period are as follows:

Arkansas, –6 percent; Louisiana, nearly –9 percent; Texas, –15 percent; Missouri, –13 percent; Mississippi, –24 percent; and California, nearly +3 percent. Declines in acreage are expected to be offset partially by yield gains resulting from continued research for rice production (Figure 22). Over the baseline period, long grain yields are projected to grow at 0.9 percent per year, while medium grain yields are projected to grow at 1.0 percent per year. The average U.S. rice yield decreased to 56.69 cwt/acre in 1998, mainly owing to unfavorable weather. Yields recovered slightly in 1999 to 59.08 cwt and are expected to steadily improve to about 66 cwt by 2010.

In 1998, the higher acreage (6.9 percent above 1997) offset the decline in yield (–3.9 percent), resulting in 2.8 percent increase in production at 188.1 million cwt. Production is estimated to have increased substantially in 1999 to a record of 210.5 million cwt because of marked increases in both acreage and yields. This output exceeded the previous record of 197.8 million cwt in 1994. Lower acreage is projected to reduce total production to 199 million cwt in 2000, before gradually recovering to 224 million by 2010. On the average, long grain production is expected to increase 1.7 percent per year, while medium grain production is expected to increase nearly 1.6 percent per year over the baseline period. Figure 23 shows total U.S. rice production by state.

Total U.S. rice supply is estimated to have increased to 243.6 million cwt in 1999 from 226.6 million in 1998, and would range between 250 to 270 million cwt during the rest of the baseline period. U.S. rice imports are projected to grow just under 4 percent per year, driven by the decline in real international rice prices and the growth in domestic fragrant rice consumption.

Domestic use of rice is estimated to have increased to 120 million cwt in 1999 from 119 million in 1998. Steady growth is projected over the baseline period, reaching just under 149 million cwt by 2010 (Figure 24). With a stable population growth of less than 1 percent over the baseline period (Appendix

Table 1), the expansion in rice consumption is a result of increased per capita direct and processed food consumption. The main processed food uses of rice are cereals, pet foods, and package mixes. Pet food is the fastest-growing sector in the processed category.

The increase in food consumption is driven by growth in income and declining real retail prices, assuming low levels of inflation over the period (Appendix Tables 2 and 4). Socio-demographic factors also have been found to be important in explaining the expansion in U.S. rice consumption (Gao, *et al.*, 1995). One of the more important of these variables that contributes to the increase in direct food use is the growing Asian and Hispanic population in the United States. Hispanics account for 10 percent of total U.S. population, and this segment is growing at nearly 4 percent per year; the Asian population accounts for 4 percent of total U.S. population and is growing at 5 percent annually.

Other components of domestic rice utilization in the United States include seed use and brewery demand. Seed demand, which is derived primarily from rice acres planted, is projected to be flat over the baseline period. Small growth in brewing demand is projected on the basis of relatively stagnant growth in the demand for beer domestically. One important component of domestic use is the residual (defined as the sum of unreported use, processing losses, and estimating errors), which averaged about 7 percent of domestic use over the last 10 years. Relatively high levels of residual (about 7-8 percent) are assumed for both 1999 and 2000. These levels are just under the 1998 level. At this magnitude, it is very important to have a good estimate of this component because it could influence prices, especially for nontraditional uses of rice. Over the baseline period, residual is assumed to decrease in importance as better information becomes available, accounting for only 3 percent of domestic use by 2005 and beyond.

Exports are estimated to have increased to 87.5 million in the 1999 marketing year, from 85.3 million cwt in 1998 and are projected to increase to 89.6 million in 2000. Given the relatively inelastic domestic demand for U.S. rice, the availability of domestic rice supply for exports is projected to grow only slightly during the rest of the projection period. There has been a significant shift in U.S. exports from milled to rough rice, especially over the last four years. During the period 1990-1993, rough rice accounted for less than 7 percent of total rice exports. The share of rough rice exports started to increase dramatically in 1994, accounting for 19 percent of total rice exports, up from 5 percent in 1993. Over the period 1994 through 1998, rough rice averaged about 22 percent of total rice exports. The main reason for this shift was the increased demand for rough rice from a number of Latin American countries, notably Mexico, Brazil, Costa Rica, and Venezuela. Other buyers include Colombia, Ecuador, Panama, El Salvador, Honduras, Guatemala, and Nicaragua. These countries prefer to import rough rice to improve utilization of their milling capacity. They encourage this situation by setting lower tariffs for rough rice compared to milled rice imports.

While recent demand for rough rice exports has slowed because of production recovery in Latin America, the potential remains promising over the baseline period. At the expense of the U.S. rice milling industry, U.S. rough rice is well-positioned to maintain its competitive edge in this market segment, not only geographically but because there are only a very few countries that allow rough rice exports. There is no other major rice supplier that exports significant volumes of rough rice to the world market.

U.S. long grain exports are estimated to have decreased 3 percent to 68.5 million cwt in 1999 from 70.7 million in 1998, and would remain in the range of 69-75 million cwt over the baseline period, as real Thai 5% fob price decline. Medium grain exports, on the other hand, are estimated to have increased to 18.5 million in 1999 from 14.6 million cwt in 1998, but would decrease in 2000 to the 1998 level. Thereafter, medium grain exports are projected to recover, reaching nearly 22 million cwt in 2010, mainly as a result of the increase in exportable supply, which more than compensates for the decline in real medium grain export price.

The WTO minimum access requirements for export markets in Japan and South Korea also support the growth of medium grain exports. Total U.S. rice stocks in 1999 are expected to increase substantially, i.e., by 62 percent, to 36 million cwt (1.1 mil-

lion mt, milled) as abundant supply outpaces total use. The stocks level is projected to decrease to just under 34 million cwt in 2000, and generally to decline over the baseline period as domestic use continues to grow. By 2010, ending stocks are projected to reach around 27 million cwt. Stocks-to-use ratio would decline from 0.17 in 1999 to 0.11 by 2010, levels that are historically reasonable.

The nominal U.S. season average farm prices are estimated to have declined 31 percent in 1999 to $6.14/cwt from $8.89 in 1998 as a result of a much larger rice crop and stocks build-up. Long grain prices are estimated to be significantly lower at $5.25, while medium grain prices are estimated to remain relatively firm at $8.59. Recently, U.S. milled prices have weakened from limited export business, a large price premium over Thai rice, and record domestic supplies. The season average price is projected to recover slightly to $6.24 in 2000 as ending stocks decline as a result of stronger total use and lower production.

Thereafter, farm prices are projected to fluctuate between $6.55 and $7.72, assuming normal supply and demand conditions (Figure 26). The average long grain farm price is estimated to have decreased to $5.25/cwt in the 1999 marketing year (from $8.56 in 1998) because of excess supply. In 2000, it is expected to recover to $5.70 as a result of projected lower ending stocks. Long grain prices are expected to remain in the range of $6.15-$7.45 over the baseline period.

The average medium grain farm price increased 10 percent to $9.87/cwt in 1998 because of tight supply, but it is estimated to be lower in 1999 at $8.59 because of increased supply. The average medium grain price is projected to further decline in 2000 to $7.45 as a result of a build-up in stocks and would generally remain in the range of $7.25-8.55 thereafter (Figure 27). Contrary to the price path in last year's baseline, the medium grain farm price maintains a premium over the long grain farm price throughout the entire projection period. Over time, the price premium is expected to narrow as producers respond by reallocating their resources in favor of medium grain. The medium grain premium is projected to decline from $3.34/cwt in 1999 to $1.13 in 2010.

The long grain export price (fob Houston) decreased to $16.73/cwt (milled basis) in 1998 from $18.82 in 1997, and is estimated to have declined further to $13.20 in 1999 before steadily increasing to just under $18.00 by 2010 (Table 8). The average premium of the U.S. rice export price over the Thai price in 1999 is estimated to be $63/ton, 35 percent lower than the 1998 level, and substantially lower than the $123 in 1997. This is due to the combined effects of excess supply-driven decline in U.S. long grain prices and the mild post-devaluation recovery in Thai rice prices. The U.S. premium in 2000 is expected to widen slightly as long grain export prices recover slightly. Over the long term, the premium is projected to be relatively stable, assuming no supply and demand shocks occur.

The medium grain export price (fob California) increased to $21.32/cwt (milled basis) in 1998 from $17.96 in 1997, and is estimated to have declined slightly to $20.77 in 1999 and $19.20 in 2000. The medium grain export price is projected to decline slightly, generally remaining under $19 over the rest of the baseline period. In real terms, both U.S. farm and export prices would 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. The country's economy, which was cooling prior to the Asian economic crisis of 1997-1998, showed signs of further slowdown this past year. This situation is caused by a combination of factors—declines in consumer demand and exports, downsizing of state-owned enterprises (SOEs), industrial inefficiency, and excess capacity. The Five-Year Plan for 1996-2000 which noted the importance of non-state and corporate sectors, also reconfirmed the role of SOEs, which still directly account for 27 percent of total industrial output and indirectly for a much larger proportion of GDP—even though one-half of SOEs reported losses in 1997. The central government is deeply concerned about the effect on social stability of the dis-

location and layoffs resulting from the closure and restructuring of noncompetitive SOEs. SOEs reportedly laid off between 4 and 5 million workers per year from the period 1996 through 1998, bringing the SOE workforce down to about 72 million. The Five-Year Plan prioritizes two key areas—narrowing the gap between regional incomes, and doubling of GDP during 2000-2010 (or a growth of 8 percent per year). The 7.8 percent real GDP growth in 1998 nearly met the government target of 8 percent. The damaging summer floods may have affected the economy, but no estimate of the impact is available (U.S. Department of State, 1998).

China made substantial adjustments to its import tariff schedule in April 1996 and October 1997. The average import tariff had decreased from over 40 percent in 1995 to 17 percent in late 1997. China, however, continues to impose barriers to U.S. exports, although trade-liberalizing reforms are being undertaken. Liberalization of China's import regime has not kept pace with its export-oriented efforts. Aside from high tariffs, numerous nontariff measures restrict imports. These include import licensing requirements; import quotas, restrictions, and controls; tendering requirements; and standards and certification requirements. China's restrictive system of trading rights severely limits domestic and foreign-invested enterprises' ability to directly import and export. This system raises the cost of imported goods by channeling imports through fee-collecting Chinese foreign trade companies. In most cases, U.S. suppliers are unable to sell directly to their ultimate customer. One difficulty faced by foreign traders is the lack of published trade-related laws and regulations ahead of implementation. An example would be the absence of published itemized import quotas of China, which is very important to foreign and domestic traders. Overall, import growth continued to slow through late 1997 and into 1998.

China abolished direct subsidies for exports on January 1, 1991. However, many of the country's manufactured exports receive indirect subsidies through guaranteed provision of energy, raw materials, or labor supplies; bank loans that need not be repaid or with preferential terms; and tax rebates (U.S. Department of State, 1997).

In the early 1990s, the government pursued a policy toward a free market for grains. But from 1994 to 1996, government policies for greater control over grain markets were asserted, largely driven by inflationary pressure on food prices, coupled with a decrease in area sown to grain and international concerns that China may not be capable of producing sufficient grain for domestic consumption. The Grain Bag Policy was initiated in late 1994 and implemented in 1995. This policy gave provincial governors specific responsibilities for grain supply and demand at the provincial level. Governors must stabilize grain area and production, increase production if necessary for self sufficiency, maintain stock levels, control grain trade among provinces, and ensure adequate supplies at the regional level. The basic objective is to attain a nationwide aggregate balance of grain on the basis of regional balance of grain (Crook, 1997).

The government intervention in the 1994-96 period resulted in expanded grain production in 1997 through 1999. Low prices and large grain stocks invoked a further retrenchment in grain policy, with government procurement regaining a larger share of farmer marketings and the free market channels experiencing reduced market share. China's grain policy has changed substantially over the past year. The government is reportedly moving toward more market orientation again in its grain sector. Contrary to the government's previous practice of actively buying grains and holding them in storage to maintain farm prices, in 1999 the government tried to reduce grain stocks by lowering procurement prices and volume, and selling on the domestic market. As a consequence, prices fell to near world levels, which augurs well with China's preparation for entry into the WTO. With the new grain policy and lower grain prices, rice farmers are responding by reducing planting. The new grain policy emphasizes quality over quantity, encouraging farmers to grow higher quality rice varieties and to reduce planting of low quality varieties. The government will no longer buy the lower-quality early-season rice varieties at protected prices in most of the Southern provinces.

China's rice production has an early, middle, and late crop. The middle crop or single crop is the

largest, with 40 to 45 percent of the production. The remainder of production is during the early and late seasons, which are nearly equal in output. Long grain rice is grown in the Southern provinces and along the Yangtze River. Long grain accounts for approximately 70 percent of rice production, and medium grain the rest. The early long grain crop accounts for about 20% of total rice area. Medium grain rice is grown north of the Yangtze River (Crook, 1996).

Following two years of declining production, rice harvested area started to increase in 1995, reaching 31.8 million ha in 1997 from 30.3 million in 1994, partly because of favorable government policies and market prices. The area harvested in 1998 declined to 31.2 million ha owing to unfavorable weather. Area in 1999 recovered slightly to 31.3 million ha, but is projected to decrease steadily to 30.7 million by the end of the baseline period. One reason for this decrease is the decline in real procurement prices, with the annual change in the Consumer Price Index ranging from 3.4 to 5.5 percent over the same period. Real input prices remain stable.

Rice yields in China are influenced by the free-market price and the flow of the new technologies, as well as by government price policies. The government promotes research in producing high-yield rice varieties. Currently, Chinese scientists have reported a new high-yield variety that will yield 13.26 mt per ha in test plots and maturity yield of 120 days (USDA/FAS, 1997 and 1998). Yields are projected to recover slightly to 4.50 mt per ha in 1999 from the weather-affected level of 4.46 mt in 1998, and steadily increase to 4.91 mt by 2010 (an annual growth of 0.8 percent). The decline in area in 1998 pulled total production during the year down to 139.1 mmt from 140.5 mmt in 1997. This production shortfall caused China to cut its exports during the same period. Production recovered in 1999 to 141.0 mmt and declined over the next couple of years before increasing steadily to 150.6 mmt by 2010, as yield growth compensated for the decline in area. (Table 18 and Figure 28). Off-farm employment has become a problem for China's grain production as farmers find better-paying industrial jobs and rural industrial development uses an increasing amount of farmland.

Chinese annual per capita rice consumption is projected to remain relatively flat in 1999 at 110.3 kg, and would decline slightly to 109.2 kg by 2010. With a negative income elasticity, per capita consumption declines slightly as real income grows. Real GDP is projected to grow between 6.3 to 7.7 percent during the projection period, the fastest growth rate among the rice economies.

Total rice consumption is expected to maintain a modest growth based on population growth (0.8 percent in 1999 and slowing to 0.6 percent by 2010). However, on a per capita basis the Chinese are expected to consume less rice in favor of a more diversified diet as their incomes grow. With rising incomes, Chinese consumers are becoming conscious of rice quality. Southern Chinese, who previously preferred long grain rice, have begun consuming more medium grain rice, which is more flavorful and higher in quality (USDA/FAS, 2000).

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 as a result of a weather-related production shortfall. China became a net rice exporter of around 600 thousand mt in 1996. Net exports increased substantially to 3.2 mmt in 1997 before declining to 2.2 mmt in 1998. China's net exports of rice in 2000 are projected to decrease because of a combination of lower output (both area and yields are projected to be slightly lower) and continued strength in domestic consumption.

China is expected to continue to be a net rice exporter over the next decade, with net exports ranging between 700 thousand to 1.2 million mt. China exports both long grain and medium grain rice, with long grain accounting for more than half of total exports. Its main export destinations in 1999 were Indonesia, Ivory Coast, Philippines, and Cuba. Thailand dominates China's official rice imports, and Vietnam, which borders China, dominates unofficial trade. Ending stocks are projected to range from 20 to 27 mmt over the baseline period.

India

India's economy continues to perform well, and long-term prospects remain promising. Economic

reforms since 1991 have helped the country achieve significant macroeconomic stability and a moderate degree of liberalization of its trade, investment, and financial sectors. Real GDP grew at 5.5 percent in 1999 and is expected to gain 6.0 percent in 2000, and would continue growing at a rate of 6 to 6.7 percent over the baseline period. Growth has slowed recently because of falling demand, high real interest rates, political uncertainty, and secondary effects from the Asian economic crisis. The United States continues to be the largest investor in India and its biggest trading partner. The country has used exchange rate policy to improve its export competitiveness. However, some concerns remain about inadequate infrastructure and chronic large budget deficits. U.S. trade has benefitted from significant reductions in India's import licensing requirements, with imports from the United States increasing to an estimated $3.5 billion in 1997-98 from $2.0 billion in 1991-92. (U.S. Department of State, 1998).

India is experiencing a trend of diverting area from food grains to commercial crops. While area planted to wheat and coarse cereals declined, oilseeds area is estimated to have increased. 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 in 1999 decreased slightly to 44.5 million ha from 44.6 million in 1998 because of favorable weather, and it is projected to increase slightly to 45.1 million by the end of the baseline period (Table 19 and Figure 29). The increase is also driven by technology and infrastructure development, which is partly offset by the decline in real farm harvest price.

India is subdivided into four distinct regions—North, South, East, and West.[2] In 1999, 19.4 million ha were estimated to have been harvested in the Eastern region (which is equivalent to 43.5 percent of the total), 9.2 million in the Northern region (20.6 percent), 8.0 million in the Southern region (18.0 percent) and 7.9 million in the Western region (17.8 percent). Most of the increase in area occurs in the Western region, with area growing just under 0.5 percent per year. By 2010, the Western region is projected to harvest about 8.3 million ha, which would account for 18.4 percent of total.

The use of hybrid rice is gaining popularity in India, and several research institutions have successfully developed highly promising hybrids. Increasing use of hybrid rice is observed in Punjab; Haryana and Western Uttar Pradesh in North India; and in Andhra Pradesh, Karnataka and Tamil Nadu in the South. The Indian Council of Agricultural Research (ICAR) projects that the area planted in hybrid rice will expand substantially over the next few years, from under 100 thousand ha to nearly 5 percent of total rice area. ICAR has developed seven location-specific hybrid rice varieties, in addition to the six being marketed by private companies. The Indian Agricultural Research Institute 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 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, to develop hybrid rice using biotechnology to improve yields. These developments indicate India's strong resolve to use technology as the country's competitive edge in its rice industry in the long run.

More than half of India's rice crop is rain-fed. Hence, it is highly dependent on monsoon rains. The country has had favorable weather over the last 10 years, boosting its production. Rice yields are responsive to changes in fertilizer prices and the adoption of high-yielding varieties. National average rice

[2] Eastern Region; Assam, Orissa, Tripura, West Bengal, Bihar. Northern Region; Haryana, Haimachel, Pradesh, Punjab, Uttar, Pradesh, Delhi, Madhya. Southern Region; Karnataka, Kerala, Tamilnadu, Andhra Pradesh. Western Region; Gujarat, Pradesh, Maharashtra.

yields are projected to increase at an annual rate of nearly 1.4 percent, from an average of 1.89 mt per ha during the 1996-98 period to 2.27 mt by 2010. Total production is projected to increase to 102.4 mmt in 2010 from 86.5 mmt in 1999.

India's national average per capita rice consumption is projected to increase slightly to 82.8 kg in 2010 from 82.5 kg in 1998. By region, the annual changes in per capita consumption are as follows: North (flat); South (+0.08 percent); East (flat); and West (+0.14 percent).

Total consumption is projected to grow steadily as a result of population growth (1.7 percent in 1999 and decreasing to 1.4 percent by 2010) and income growth (5.5 percent in 1999 and increasing to 6.7 percent by 2003 before declining to 6.0 percent by 2010). Total consumption is projected to increase to 83.6 mmt in 1999 from 81.2 mmt in 1998, and increases steadily to nearly 97.8 mmt by 2010, a growth of nearly 1.6 percent per year. The food processing industry is one of the major growth sectors in India. REI Agro, Ltd., of Calcutta has built a Rs218-million, 72-thousand mt/year basmati rice processing plant at Bewal in Haryana. Its output is intended for export to USA, 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, 1997). India uses procurement prices and open market sales programs to stabilize prices. Many basic food products are under a dual pricing system: some output is supplied at fixed prices through government distribution outlets (termed "fair price shops"), with the rest sold by producers on the free market. Prices in government outlets are usually regulated according to cost-plus formulas—some of which have not been adjusted in more than a decade (U.S. Department of State, 1998). The fixed procurement prices set by the government serve as price floors for producers. A procurement price prevents substantial declines in the rice price, while the open market sales program prevents significant increases in price. While farmers are not required to sell their paddy to the government at the support price, harvest prices typically fall below the support in the major rice-growing states of Punjab and Haryana, prompting farmers to sell to the Food Corporation of India or other government procurement agencies. The procured paddy is custom-milled and distributed through the government-run Public Distribution System. A large portion of the procured paddy comes from millers who are required to sell a portion (ranging from 50 percent in Andhra Pradesh to 75 percent in Punjab and Haryana) of their milled production at a government-established rate or "levy." Levy prices vary by state and are linked to the procurement (support) price and milling costs. Increases in support prices are expected to move the open market prices higher, potentially affecting the competitiveness of Indian rice in the world market (USDA/FAS, 1999).

The minimum export price was eliminated for both 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 used exchange rate policy to improve its export competitiveness. While most of the direct export subsidies have been phased out, numerous indirect subsidies remain. These include export promotion measures such as exemptions or concessional tariffs on raw materials and capital inputs and access to special import licenses for restricted inputs. Export earnings are tax-exempt. Commercial banks also provide export financing on concessional terms (U.S. Department of State, 1997 and 1998).

India was the world's third largest exporter of rice in 1998, improving from its fourth rank in 1997. Its primary rice export destinations are Saudi Arabia, United Arab Emirates, United Kingdom, Kuwait, the United States, 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 but declined substantially to 2.1 mmt in 1996, before recovering to 3.3 mmt in 1997 and 1998. In the 1995 marketing year, India exported basmati rice valued at Rs8.5 billion, and non-basmati rice worth Rs37.2 billion. Exports are projected to substantially decline to 1.2 mmt in 1999 as weak international prices and strong support for domestic prices limit

export prospects for non-basmati rice. However, India is projected to remain a major rice exporter over the next decade, with sustained average annual exports of 3 to 4 mmt.. Exports are driven mainly by excess rice supply. The Indian government's 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 to give higher priority to domestic food security requirements. At present, there is no quantitative ceiling on the 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, together with Pakistan, has a duopoly over basmati rice exports. The two countries are the only significant producers of high-quality basmati rice in the world. Basmati rice accounts for only 1 mmt, or 5 percent of the total world rice trade. The government of India plans to introduce futures trading in basmati rice and non-edible commodities.

With the strong domestic consumption being supported by favorable production, ending stocks are projected to remain between 9 to 13 mmt over the baseline period. The Indian government may decide to impose quantitative restrictions on stocks of non-basmati rice exported on private account which are now under open general license. The relatively low level of the country's food grain stocks in the central pool, due to a decline in procurement, has been a cause for concern.

Pakistan

The government that assumed office in February 1997 has emphasized tax and tariff reforms, government and public enterprise restructuring and downsizing, financial sector reform, and exchange market reform. Economic performance since February 1997 has been mixed, with the general economy remaining sluggish and the outcome of important reforms remaining in doubt. Pakistan's real GDP growth declined to 1.3 percent in 1997 (from 5.2 percent in 1996), in part because of the poor cotton crop and a decrease in manufacturing output. Growth recovered in 1998, at 4.7 percent partly because of the improved terms on structural adjustment loans provided by the International Monetary Fund (IMF) in October 1997. By late 1998, however, Pakistan's economy was in financial crisis. Following the Pakistan-India nuclear tests of May 1998, the country's macroeconomic situation deteriorated despite favorable agricultural growth and low inflation. Foreign exchange receipts declined from export sales, worker remittances, and private capital investment. As early as July 1998, Pakistan's government made a policy decision to enter technical default with some official creditors by delaying payments and accumulating arrears. By late November 1998, official foreign exchange reserves had fallen to $400 million. Barely able to sustain minimum essential debt service payments, the government of Pakistan was faced with one of the world's lowest private investor confidence and sovereign credit ratings. Until mid-1998, Pakistan had had an excellent record of honoring external debt obligations, even during periods of tight financial situations. The country remains dependent on foreign donors and creditors to meet its financing needs. Real GDP growth is estimated to be 4.3 percent in 1999 and is projected to range between 5 and 6 percent over the baseline period.

Pakistan continued a managed floating exchange rate system until July 21, 1998. The exchange rate was determined according to a managed float, with the State Bank of Pakistan making adjustments against a basket of major currencies. The U.S. dollar is used as an intervention currency to determine other rates. Government authorities devalued the rupee by 8.7 percent in October 1997 in the face of domestic inflation, declining exports and foreign exchange reserves, and perceived overvaluation relative to competitors' currencies (U.S. Department of State, 1997). From July 22, 1998, the government introduced a multiple exchange rate system comprising an official rate, a floating interbank rate (FIBR), and a composite rate. The official exchange rate continued to tie the rupee to the dollar. The FIBR is an attempt toward a market-determined exchange rate system. Before the 1998 financial crisis, Pakistan significantly liberalized foreign exchange controls

(U.S. Department of State, 1998). In recent years, Pakistan has implemented significant trade reforms. Import licenses have been abolished on all "freely importable" goods since July 1993.

On rice, the basic government policy is to increase production through improved yields and government support prices, which are adjusted annually to keep pace with increased costs of production. The government support prices are announced prior to the planting season. They are assumed to increase steadily over time in real terms.

Although the government announces the procurement price, which acts as a support price, it has not procured rice since 1995. Increases in consumer prices are expected to stabilize at 9.4 percent by 2003, from 9.7 percent in 1999 (Appendix Table 4).

Rice production in Pakistan consists of two main varieties—basmati and IRRI-adapted high-yield long grain varieties. The share of basmati rice is expected to remain steady at 52 percent of total rice area, with the remainder accounted for by IRRI and other local varieties. Rice is not a subsistence crop, but a cash crop grown for export. Rice is the third largest crop after wheat and cotton. Rice cultivation usually follows the wheat crop. Cotton and rice are substitute crops; for example, rice area was up slightly in 1997 because of pest and disease problems in cotton production in the Punjab province. Two major areas of rice production are Punjab province, with 60 percent of the total rice area, and Sind province, with 31 percent. Approximately 84 percent of Punjab province is basmati rice, and 90 percent of Sind province is IRRI rice (USDA/FAS, 1998).

The rice area harvested in Pakistan is projected to stay around 2.5 million ha over the baseline period (Table 20 and Figure 30). Rice yields in Pakistan are responsive to input prices and the adoption of high-yielding varieties. Yields/ha in 2000 are expected to decrease slightly to 1.95 mt per ha from 2.04 mt in 1999 and increase steadily to 2.20 mt by 2010. Following the yield trend, total production is projected to increase steadily from 4.7 mmt in 1998 to 5.6 mmt by 2010.

Annual per capita consumption of rice in Pakistan is lower than in other Asian countries, at 19.2 kg in 1999, and is projected to be relatively stagnant over the next decade. However, a relatively high population growth rate (2.2 percent in 1998 and slowing to 1.7 percent by 2010) results in an increase in total rice consumption from 2.6 mmt in 1998 to 3.3 mmt by 2010.

Pakistan, the world's fifth largest rice exporter, is projected to maintain exports at the 2-mmt level over the next decade. Recent news sources indicate that Pakistan's rice exporters may have some difficulties as some of its primary buyers impose import duties. These include Indonesia (30 percent duty), Sri Lanka (25 percent duty), and Madagascar (15 percent duty and 15 percent value-added tax). Pakistan is also facing strong competition from China, its major competitor in the Indonesian market.

Rice is the country's second leading source of export revenues. Rice exports typically consist of 75 percent IRRI rice and 25 percent basmati rice. There is no subsidy or tax on rice exports. Exporters compete in the open market for exportable supplies. The country's top IRRI rice export destinations in 1998/99 are Africa NES (26 percent), Bangladesh (16 percent), Indonesia (14 percent), Kenya (6 percent), and South Korea (5 percent). Major destinations for basmati rice are Dubai/UAE (35 percent), Saudi Arabia (13 percent), Oman (9 percent), the UK (5 percent), and Kuwait (4 percent).

Ending stocks are projected to generally remain in the range of 900 thousand mt to 1.2 mmt over the baseline period.

Myanmar (formerly Burma)

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 potential, given its rich natural resources and relatively low-wage labor, but still considerable political constraints exist. 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 GDP and half of its foreign exchange earnings come from agriculture, forestry, fishing, and livestock.

A number of foreign investments in Myanmar will have direct benefits to the country's rice industry.

Singapore, recognizing Myanmar's potential, invested $584 million in the country by the end of 1995—which accounted for 22 percent of Myanmar's total foreign investments that year. Foreign investments are going to 36 projects, including one aimed at improving the output of the country's fragrant rice varieties. Marubeni Corporation has been working on a joint-venture with the Myanmar government to produce rice for animal feed. The rice feed is planned to be exported to other Asian countries beyond the year 2000.

Myanmar was once the dominant rice exporting country in the world, accounting for nearly three-fourths of the world rice exports in the first half of this century. Production was severely disrupted by World War II. Thereafter, Myanmar's exports became less dependable under intervention policies of the new independent government.

Rice production in Myanmar is one to the most diversified in Asia. Approximately 52 percent of the rice area is rain-fed lowland, 24 percent is deepwater rice, 18 percent is irrigated lowland, and about 6 percent is upland, which is typically slash-and-burn methods used for subsistence production. Irrigated rice in the dry season has been expanding, and traditional methods such as Taungya, shifting cultivation on hillsides, has been declining (Young, *et al.*, 1998).

The government of Myanmar has maintained a quota system that requires farmers to sell 12 baskets (20.9 kg/basket) of rice to the government at a procurement price below the market prices. In late 1997, a new procurement system was proposed by the government that allows higher prices and also targets traders and millers for procurement and not just farmers.

The Ministry of Agriculture (MOA) had very ambitious plans for expanding rice area. In 1995, the country implemented a policy requiring two wet-season rice crops on all designated rice land. In April 1996, MOA announced plans to expand monsoon paddy area by 800,000 ha within its second five-year plan period; this would come from culturable waste lands, fallow lands, and reclaimed lands. But in 1997 the MOA realized that it lacks sufficient input supplies for this expansion in new area. The new policy emphasizes improving yields. But because of a shortage of foreign currency, there has been a lack of urea fertilizer for the rice crop (USDA/FAS, 1997 and 1998). The government made policy changes in 1998 that are expected to benefit the country's rice industry. Local entrepreneurs are now permitted to reclaim wetlands, virgin lands, and vacant lands to grow rice and other cash crops. The government also allowed the private sector to export half their rice production.

Following the current support policies and a more conservative government expansion in irrigated rice area than previous year's forecast, the total harvested area is projected to increase to 6.13 million ha by 2010 from 5.60 million ha in 1998 (Table 21 and Figure 31). The government has developed 800 thousand ha of summer (second crop) irrigated rice. An additional 750 thousand ha is planned to be brought into production over the next decade. Average yields/ha are projected to increase steadily by 1.2 percent per year to 1.88 mt by 2010 from 1.66 mt in 1998. As a result, total production is projected to grow steadily to 11.5 mmt in 2010 from 9.3 mmt in 1998. Production in 1997/1998 was lower because of a number of factors including heavy flooding in a number of regions, pests, disease problems, inferior seed qualities, shortage of fertilizer, and even low water levels for the second crop in the Irrawady River Delta.

Total rice consumption is projected to increase slightly to 9.33 mmt in 1999 from 9.28 mmt in 1998. Consumption will continue to increase steadily to 10.9 mmt by 2010 as a result of population growth of 1.5 percent and income growth of nearly 2.5 percent per year. Annual per capita consumption ranges from 192 to 194 kg over the baseline period. Per capita consumption, however, may be overstated because of the existence of a substantial amount of unreported trade with China and various ethnic tribes along the borders with Laos and Thailand.

While Myanmar is an emerging major exporter in the international rice market, current trade projections are substantially lower than the government's original targets, as production is unlikely to be attained based on the evidence of the past four years. An increase in exports is driven mainly by available supply.

Rice imports and exports are controlled by the GOM agency Myanmar Export Import Services (MEIS). Rice cannot be exported by the private sector. MEIS establishes export targets on the basis of

production data from the MOA. Recently, MEIS has lowered export targets because of unreliable data for production and the risk of causing a domestic shortage and increasing the retail price of rice. Rice is the staple food, and the price of rice is a politically sensitive issue. The government needs to maintain sufficient supplies to provide government employees and military personal subsidized rice (USDA/FAS, 1998).

Exports are estimated to have reached 150 thousand mt in 1999 and are expected to be 197 thousand in 2000; they are estimated to continue to improve over the rest of the baseline period—reaching 692 thousand mt by the year 2010. Exports in 1996 (15 thousand mt) and in 1998 (56 thousand mt) were the lowest for Myanmar since 1972, when exports were 152 thousand mt. From 1990 through 1995, net exports averaged 352 thousand mt/year. Ending stocks are projected to be generally in the range of 600 to 800 thousand mt over the baseline period.

The future time frame for increased rice production and export is difficult to project for Myanmar, as governmental intervention in the rice sector distorts operation of the free market and the serious financial problems faced by the government constrain economic development. Despite these constraints, the present government appears to be committed to increasing rice production and export. The rate of expansion in the future will depend largely on the government's continued willingness and ability to invest in the rice sector by improving the infrastructure as well as providing adequate economic incentives for rice production. Although the present procurement price does not cover production cost, the government offsets this apparent inequity to some degree by providing subsidized inputs. This intervention has been reduced over time, as the procurement requirement is now only about 12 percent of production. On the other hand, the free-market price for remaining paddy appears to provide a strong incentive for rice production, e.g., it was over three times the reported farm production cost/mt in 1995. Thus the current main constraint to expanding production seems to be the poor infrastructural support system, including continued problems with the timely and sufficient supply of key inputs for high-yielding varieties, such as chemical fertilizers (Young, Cramer and Wailes, 1998).

The major factors, other than market price, that will determine rice production within the next decade are (1) continued irrigation and drainage development to expand the area of dry-season paddy and to support multi-cropping; (2) increased use of high-yield varieties, which now account for only about half of rice production; and (3) increased use of chemical fertilizer and other modern inputs to achieve higher yields. In the long term, the irrigation and drainage development potentially could be increased to cover virtually all of the rice production areas, multi-cropping potentially could be increased to cover three crops per year, more land area could be reclaimed or converted from wasteland to possible rice cultivation (Young, Cramer and Wailes, 1998).

Vietnam

Agricultural production in Vietnam was collectivized from 1976 to 1981. Agricultural output was quite low. From 1982 to 1987, a contract system was utilized. Farmers had contracts with cooperatives to produce a specific quantity. Production in excess of the contract was consumed or sold to private traders. 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. Novartis, one of the first major companies to invest in the country, has started a new agrochemical and pharmaceutical complex in Dong Nai province, near Ho Chi Minh City. The facility is intended to 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 has a loan

agreement of US$215 million to the Vietnam Chemical Corporation to build the first phosphate fertilizer plant in Vietnam. The production capacity of the plant is 330 thousand mt/year of fertilizer intended for rice production.

Rabobank Nederland, one of the world's largest 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 investment 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 export. 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 municipalities taking 51.5 percent and the foreign companies, 48.5 percent. The US$10 million project established in My Tho, a major urban center in Mekong Delta, has an initial full processing capacity of 90 thousand mt of rough rice. It will be expanded to 180 thousand mt/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 5,000 rice mills with a total annual capacity of 10 mmt of rice; it has facilities that can husk, sort, and polish rice with a capacity of 2.3 mmt/year.

Rice production in Vietnam has increased rapidly over the last decade as a result of the economic reforms instituted by the government, as well as expanded use and improvements in technology. One of the major catalysts of the country's march toward progress is a socioeconomic development plan for the Mekong River Delta that will cost US$6 billion over the next five years and US$28 billion over the following 10 years. The 39,600-km^2 delta contributes 60 percent of the country's food output and half of its rice exports.

Growth in Vietnam's rice-growing area in the Mekong River Delta over the last decade has resulted from improved irrigation systems, use of new rice varieties, and improved technologies in rice production. These factors enabled Vietnam to consistently produce exportable surplus and become a major player in global rice trade.

Rice accounts for 70 percent of the delta's 2.6 million ha of agricultural land. The goals of the plan are to upgrade the delta's food production through intense cultivation and to improve the quality of rice. The country's Ministry of Agriculture and Rural Development has implemented a US$120 million program to improve the quality of the country's rice for the period 1997 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 postharvest 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. One production concern is the penetration of salt water, which occurs when water level in the Mekong is low. Despite some drought and salinity problems in the Mekong River Delta in 1998, Vietnam's total area harvested increased to 7.57 million ha in 1998 from 7.38 million in 1997. Area decreased slightly in 1999 to 7.60 million ha, but would grow steadily to 7.85 million by 2010 (Table 22 and Figure 32). Yields/ha are projected to continue to increase steadily from 2.65 in 1998 to 3.11 mt by the end of the baseline period—or an annual growth of 1.4 percent. Total production is projected to be 20.3 mmt in 1999 and would grow steadily by 1.9 percent annually, to 24.4 mmt by 2010.

Per capita rice consumption is projected to de-

crease gradually to 209.5 kg in 2010, from 211.5 kg in 1999. However, total rice consumption is expected to grow steadily from 15.6 mmt in 1998 to 18.6 mmt in 2010 due to population and income growth.

Vietnam is emerging as a major world rice exporter, and has overtaken India and the United States as the second biggest rice exporter over the last three years. Major destinations in 1999 include Indonesia, Africa, Iraq, and the Philippines. An unfavorable factor for Vietnam is Indonesia's recent decision to halt the lucrative small-vessel direct exports (largely private-sector trade) from the Mekong River Delta to major Indonesian ports. The government has approved a rice export quota of 4.3 mmt for the year 2000.

The country limits rice exports by a licensing system, but it has been pressured to liberalize export trade. The country has relaxed the state's monopoly on rice trade by allowing private companies to sell grain abroad. The government has recently allowed companies that are not among the 47 government-designated rice exporters to make direct exports under certain conditions. Two major conditions are that prices should be as good or better than those offered by designated companies and exports should be to new markets. 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. In order 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 that Vietnamese rice has a lower price than that from other countries. In order 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/year of rough rice, its milling facilities could process only 1.3 mmt of high-quality rice per year. The rest is crudely processed by farmers, leading to quality problems.

Rice exports of Vietnam are estimated to have declined 13 percent in 1999 to 3.9 mmt and are expected to increase just slightly in 2000 because of competition from Thailand. Thereafter, exports are projected to increase steadily to 5.7 mmt by 2010 as domestic output continues to increase as a result of steady improvement in yields. Indonesia's recently imposed import tax on rice has affected trade in Vietnam unfavorably. The government of Vietnam has recently allowed more companies to make direct exports, provided that prices are competitive or better than those offered by designated companies, and exports to new markets. Another recent proposal being considered by the government is providing interest-free loans to exporters. Effective April 1, 2000, import licences are no longer required on agricultural goods, except for vegetable oils and refined and unrefined sugar. On the rice quota, the country accepted the proposal from IMF and World Bank on allowing greater participation of the private sector in rice exporting starting January 1, 2001.

Inadequate information on rice stocks is reflected in an assumption of zero change over the forecast period.

Australia

The Australian economy is enjoying its sixth year of consistently strong growth, accompanied by low inflation and low interest rates. So far, the Asian economic crisis has not significantly affected Australia's economic growth. Real GDP grew by 2.8 percent in 1996, 4.0 percent in 1997 and 4.7 percent in 1998. The growth is estimated to have slowed in 1999 to 4.3 percent, but would recover to 5 percent in 2000. The country's economic growth is projected to stabilize around 6 percent over the baseline period. While inflation is well under control (in fact, deflation occurred in 1997 at –0.2 percent, the first in 35 years), the unemployment rate remains high, i.e., over 8.0 percent. While Australia's economy is dominated by its services sector (65 percent of GDP), agricultural and mining sectors (9 percent of GDP combined) account for the bulk (57 percent) of the

country's goods and services exports.

Australia harvested 141 thousand ha of rice in 1997, a decrease of 25 thousand ha from 1996, because of a shortage of irrigation water. Area recovered in 1998 at 152 thousand ha, but again decreased substantially to 130 thousand ha in 1999. Area is projected to gradually increase to 152 thousand ha by 2010, based on expectations of normal level for irrigation water (Table 23 and Figure 33).

The dominant rice-growing area is in Murray-Darling basin in New South Wales, which has approximately 1,800 irrigated growers (USDA/FAS, 1998). Rice yields in Australia are influenced by market conditions and the development of new technologies. Average yield per ha is projected to increase to 6.34 mt in 2000 from 6.15 mt in 1999, and increase steadily to 7.23 mt by 2010. Total production in Australia is estimated to have decreased nearly 20 percent to 800 thousand mt in 1999 as a result of lower area and yields, but it is projected to increase steadily thereafter to 1.1 mmt in 2010.

Per capita consumption is projected to grow steadily at 1.1 percent per year. Per capita consumption has been growing because of an increasing number of Asian immigrants and rising health consciousness among consumers. Total consumption is projected to increase to 413 thousand in 2010, from 330 thousand mt in 1998 because of population growth (ranging between 0.7 and 0.9 percent over the baseline period).

Over 70 percent of Australia's rice production is exported, driven by aggressive international marketing. Papua New Guinea is its biggest single customer. Trade with some Pacific Island nations is sometimes constrained by economic problems and a lack of foreign exchange of those countries. Australia provides approximately a quarter of Japanese rice import quota commitments. Australia is producing rice specifically for the Japanese market and currently expects to provide 100 thousand mt. Net exports are projected to decrease to 461 thousand mt in 1999 from 635 thousand in 1998, and to increase steadily to 674 thousand 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). Asian immigrants prefer fragrant rice such as jasmine and basmati. Thailand is the largest supplier at 20-25 thousand mt/year. Other suppliers are India, Pakistan, Italy, and the United States. The rice cooperative has responded to this import demand by promoting production of fragrant rice even though it has a higher cost of production and requires a premium by producers.

Ending stocks are expected to remain under 100 thousand mt over the baseline period.

Egypt

In the midst of economic crises experienced by emerging economies recently, the Egyptian economy has been characterized by exceptional stability. One reason for this accomplishment is that the country is largely unintegrated into the global economy and thus less vulnerable to shocks than those of other emerging economies. Real GDP growth has been steadily around 5.0 percent over the last three years, compared to an average of 3.5 percent over previous three years. The country's GDP growth will range from 6.0 to 6.7 percent over the baseline period. Inflation has gone down to 3.8 percent in 1998 from 7.0 percent in 1996 and is expected to go up and stabilize at 6.5 percent over the baseline period. Exchange rate is expected to be relatively stable over the next decade.

Another factor that led to the country's favorable situation is the set of macroeconomic reform policies launched in 1991 (U.S. Department of State, 1998). Egypt has been instituting reforms to reduce the State's role and increase reliance on market mechanisms. Some of the reforms instituted in 1991 included lifting of foreign exchange controls, unification of exchange rate, instituting a sales tax, reduction of the budget deficit, and freeing interest rates. The government is focusing on improving the country's export competitiveness, liberalizing its trading regime, encouraging the private sector, eliminating obstacles to doing business, and improving the investment climate.

Egypt reduced tariffs across the board effective October 1, 1996, lowering the maximum tariff from 70 percent to 55 percent; and further reducing it to 50 percent in July 1997; it was recently reduced to

40 percent. Egypt became a member of the WTO in June 1995. Egypt does not require import licenses. For food and non-food imports with a shelf-life, the government requires that they not exceed half the shelf-life at the time of entry into the country. Direct export subsidies do not exist in the country. Under its commitment to the World Bank, Egypt has abolished privileges enjoyed by public sector enterprises, e.g., subsidized inputs, credit facilities, reduced energy prices, and preferential custom rates—thus reducing the indirect subsidization of exports (U.S. Department of State, 1997).

Despite the relatively significant economic gains, the government remains on guard, continuing to look at a number of areas for structural reforms. These areas include cutting red tape and simplifying bureaucracy; continue privatization; strengthening intellectual property rights; continuing efforts to lower tariffs and remove nontariff barriers; and modernizing the legal and regulatory framework for business. Favorable results of implementing structural reforms are critical to support the government's goal of attaining a sustainable annual real GDP growth of 7.0 to 8.0 percent.

Rice is planted during May and June and harvested in late October. All rice production is irrigated and located in the Nile Delta area in lower Egypt. Most of the rice produced is short grain varieties. Rice is a summer crop grown following winter crops, with berseem being the most common. Additional winter crops include wheat, broad beans, and sugar beets. Rice is the second largest crop in summer following corn, and cotton is the third largest crop (USDA/FAS, 1998) .

Because of a scarcity of water for irrigation, the government of Egypt has attempted to restrict rice production to an area of 378 thousand ha. Rice production has been more profitable than alternative crops and the government has not enforced the area restrictions through fines. This has resulted in rice production area far surpassing the government restriction for the past four years. In 1996 and 1997 rice area is 591 and 630 thousand ha, respectively (USDA/FAS, 1998).

A new rice policy was announced in November 1997 with the objective of reducing the area planted to rice. The government of Egypt is promoting new rice varieties that are capable of increasing yields by 40 percent, which could partially offset the impact on production of future declines in area. Average rough yields are expected to increase from 8.5 to 12 mt. The current level of production could then be achieved with 30 percent less area. This would free up an estimated 3 billion ft^3 of water for the newly reclaimed land. The government plans to have all rice area planted to new varieties by the year 2000. The 3 billion ft^3 of water would be utilized in new agricultural projects to produce high-value horticultural crops (USDA/FAS, 1997 and 1998).

The harvested rice area in Egypt declined to 504 thousand ha in 1998, but increased again in 1999 to the 1997-level of 630 thousand. Thereafter, area is projected to stabilize in the range of 560-570 thousand ha (Table 24 and Figure 34), because of a government policy limiting the use of water for rice. Rice yields in Egypt, which are among the highest in the world, are projected to increase to 5.93 mt per ha in 2000 from 5.75 mt in 1999 and would grow steadily to 6.87 mt in 2010 (equivalent to an annual growth rate of 2.0 percent). Increases in yields are mainly driven by improvements in development and extension of technology. The yield levels are influenced by uncertainties regarding allocation of water, genetic potential of the varieties under test, and soil salinity problems. Total production is projected to remain within the range of 3.4 to 3.9 mmt over the baseline period.

Annual per capita consumption is projected to be relatively flat over the baseline period, ranging between the narrow range of 42-43 kg. Because of population growth (1.5 to 1.8 percent), total consumption is projected to grow steadily from 2.9 mmt in 1999 to 3.4 mmt by the end of the baseline period. Net exports are projected to increase from 421 thousand to 446 thousand mt during the same period. Ending stocks are projected to be in the range of 400-600 thousand mt.

Argentina

Argentina remains one of the southern hemisphere's most promising emerging markets. The comprehensive reform program implemented in Ar-

gentina under the Carlos Menem administration, which began in 1991, has revitalized the country's economy and has transformed the country from a closed, highly regulated economy to one based on market forces and international trade. Real GDP growth averaged more than 6 percent over the period 1991 through 1997. While growth in 1998 slowed to around 4.2 percent from 8.6 percent in 1997, inflation remains low at around 1.0 percent; and the exchange rate is stable. While real GDP is estimated to have contracted by 2.8 percent in 1999, it is projected to improve in 2000 and beyond, averaging nearly 5.0 percent. The Central Bank of Argentina controls the money supply through the buying and selling of dollars. Under the Convertibility Law of 1991, the exchange rate of the Argentine peso is fixed to the dollar at the rate of one to one. Price controls on almost all goods and services have been eliminated. Argentina, Brazil, Paraguay, and Uruguay established the Mercosur in 1991; on January 1, 1995, they formed a partial customs union with a common external tariff (CET) covering approximately 85 percent of trade. The CET ranged from 0 to 20 percent. In 1998, Mercosur members increased the CET by 3 points for most products. Chile and Bolivia signed a free-trade agreement with Mercosur, exclusive of CET, on October 1, 1996, and April 30, 1997, respectively. Argentina became a founding member of the WTO on January 1, 1995. Mercosur is also considering a possible free-trade agreement with the Andean community. One key element of the Menem administration's reforms has been opening up the Argentine economy to international trade. The government abolished the import licensing system in 1989; in 1990, it cut the average tariff from about 29 percent to less than 10 percent. However, the country's average tariff is now higher, i.e., nearly 14 percent because Mercosur's CET rates are higher (Bierlen, Wailes and Cramer, 1997; U.S. Department of State, 1998). In August 1996, Argentina raised the tariff on capital goods from 10 to 14 percent to boost revenues. This is relevant especially to U.S. exporters because capital goods account for 40 percent of U.S. exports to Argentina. In the area of foreign investment, there are very few barriers. Firms need not obtain permission to invest in Argentina. Foreign investors may wholly own a local company. There are no restrictions on repatriation of funds.

Argentina experienced severe flooding during the 1997 crop year, causing substantial declines both in rice area and yields. Harvested rice area in Argentina in 1997 dropped to 213 thousand mt from 230 thousand in 1996. Area recovered in 1998 to 289 thousand ha, but declined substantially in 1999 to 210 thousand. Thereafter, area would increase steadily to 361 thousand ha by 2010 (Table 25 and Figure 35). Considerable land area is available for development 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 because of improved varieties, technology, and fertilizer use. Yields declined by over 11 percent to 3.1 mt per ha in 1997 because of flooding. The average yield per ha recovered in 1998 at 3.74 mt but declined in 1999 to 2.86 mt before increasing steadily to 3.91 mt by 2010. With gains in both area and yield, total production is projected to increase 4 percent per year over the baseline period, increasing to 1.4 mmt in 2010 from 600 thousand mt in 1999.

Per capita consumption is estimated to have decreased to 6.80 kg in 1999 from 6.89 in 1998 and is projected to increase steadily to 7.77 kg by 2010, an annual growth of 1.1 percent. Total consumption is projected to increase to 326 thousand by 2010, from 250 thousand mt in 1998. Argentina previously maintained export taxes on rice, but starting in 1992, a subsidy of 2.5 percent was implemented.

As a member of the Mercosur, the Argentine rice industry has benefitted by an expansion in Brazilian rice imports with protection of a common external tariff of 20 percent. The country's total exports are projected to increase substantially from 495 thousand mt in 1999 to 1.1 mmt by 2010, equivalent to an annual growth of over 5 percent. Ending stocks would remain in the range of 100-170 thousand mt during the same period.

Uruguay

The Uruguayan economy has performed well in recent years under good rates of growth, low bud-

get and current deficits, and declining inflation rates. The country's real GDP is estimated to have declined by 1.2 percent in 1999, from a growth of 4.5 percent in 1998, and is projected to stabilize at nearly 5.0 percent by 2004. The inflation rate declined to 9.9 percent in 1998, from 15.2 percent in 1997 and 24.3 percent in 1996. Inflation further decreased to 7.8 percent in 1999, and would stabilize at 7.3 percent by 2004.

Uruguay has a small, relatively open economy. Historically, the country's economy has been agriculture-based. Agriculture remains important both directly (beef, wool, and rice) and indirectly for inputs to other sectors (textiles, leather, and meat). Supported with the country's Mercosur membership, trade is advancing rapidly. Trade with Argentina and Brazil accounts for nearly half of Uruguay's total world trade. The United States is the fourth largest trading partner for Uruguay, after Argentina, Brazil, and the EU. The Uruguayan government allows the peso to float against the dollar within a 3 percent range. The country has no foreign exchange controls and allows free conversion of the peso into dollars for transactions and much of the economy is "dollarized." Procurement practices are well-defined, transparent and closely followed. The country's present tariff structure is set by the Mercosur (Bierlen, Wailes and Cramer, 1997).

Uruguay's rice crop suffered also from severe flooding in 1997. Harvested area is projected to increase to 238 thousand ha in 2010 from 185 thousand in 1999 (Table 26 and Figure 36). After experiencing record yields of 4.55 mt per ha in 1995 and 4.63 mt in 1996, Uruguay's average yield fell substantially in 1997 to 3.69 mt. Yields recovered in 1998 at 4.37 mt but declined again in 1999 at 4.16 mt. Assuming normal weather, average yield is projected to grow steadily from 4.25 mt in 2000 to 4.73 mt by 2010. Total production is projected to increase to 1.1 mmt in 2010 from 770 thousand in 1999.

Total consumption is projected to increase gradually from 90 thousand mt in 1998 to 121 thousand in 2010 as population grows. Per capita consumption is expected to increase steadily to 33.8 kg in 2010 from 28.7 in 1999 as incomes grow. As a member of Mercosur like Argentina, Uruguay has been able to increase its exports to Brazil because of 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/mt above world market price. Uruguay exports high-quality long grain rice to non-Mercosur markets. The country's exports are projected to increase to 1 mmt by 2010 from 635 thousand mt in 1999. Ending stocks are expected to remain under 140 thousand mt during the baseline period.

Major Importing Countries

Brazil

Brazil is in the sixth year of an economic stabilization program (Real Plan), which has brought down inflation, reduced state control of the economy, and encouraged greater private sector (including foreign) investment to achieve sustainable long-term 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 (U.S. Department of State, 1997).

Brazil's economy grew around 3.2 percent in 1997. Because of the impact of the world financial crisis and the even tighter monetary policy adopted in response to it, real growth slowed to 0.2 percent in 1998 and remain flat in 1999. Real GDP is expected to recover in 2000 at 3.5 percent growth, and would stabilize around 4 percent during the rest of the baseline period.

Population is expected to grow at a declining rate, i.e., from 1.3 percent in 1998 to 0.8 percent in 2010. The country experienced the third highest inflation rate in 1996 at 19.5 percent. The Real Plan was premised on tight monetary policy. Since the introduction of a new currency, the Real, in July 1994, domestic inflation has dropped from an average monthly increase of 50 percent in the first half of 1994 to about 1.4 percent in 1998. This situation has been achieved by maintaining high interest rates to attract foreign capital, a strong currency, and market-opening measures which increased competition and exerted downward pressure on prices, particularly for traded goods.

The Brazilian Congress ratified the GATT Uruguay Round Agreement in December 1994 and Brazil became a founding member of the WTO. Brazil and its Mercosur partners (Argentina, Paraguay, and Uruguay) implemented the CET on January 1, 1995. The CET currently covers approximately 85 percent of 9,000 tariff items; most of the remaining 15 percent will be covered by CET by 2001, and all will be covered by 2006. Current levels range between zero and 23 percent.

While the Brazilian government does not provide direct subsidies to exporters, it offers a number of tax and tariff incentives to encourage export production and encourage the use of local inputs for exported products. Incentives include tax and tariff exemptions for equipment and materials imported for the production of goods for export, excise and sales tax exemptions on exported products, and excise tax rebates on materials used in the manufacture of export products.

Brazil imposed new import financing rules, effective March 1997, that are adversely affecting a range of U.S. exports to Brazil. The rule requires importers to purchase foreign exchange to pay for most imports upon importation or 180 days in advance, rather than when payment is due under the contract (Bierlen, Wailes and Cramer, 1997; U.S. Department of State, 1997). Mercosur is working on expanding its coverage. It is negotiating free- trade agreements with its South American neighbors. Association agreements with Chile and Bolivia became effective in October 1996, and negotiations with the Andean Pact commenced in November 1996. Brazil and Argentina reduced tariffs on a list of 224 Argentine products and 32 Brazilian products to zero on January 1, 1999 (U.S. Department of State, 1998).

Brazil has three exchange rates: commercial, tourist (or floating), and parallel. The commercial rate is used for commercial and financial transactions registered with Brazil's Central Bank, Banco Central do Brasil. The tourist rate is used in individual transactions, such as travel, education, and other unilateral transfers. The parallel rate is similar to the tourist rate but is not recorded with the central bank. The spread between the three rates narrowed with stabilization (U.S. Department of State, 1998).

Brazil has three rice production environments: lowland-irrigated, lowland rain-fed, and upland rice areas. Ninety percent of the lowland-irrigated area is planted to modern rice varieties; 80 percent is planted in rotation with two years of rice and three years of pasture. There are 12,000 irrigated rice producers in Brazil. The irrigated rice area is expected to grow annually at 1.9 percent over the baseline period. However, 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 over the same period. Total harvested rice area is projected to decrease by nearly 1 percent annually, from 3.7 million ha in 1999 to 3.1 million by 2010, with the decrease as a result of a relatively larger decline in upland area compared to the increase in irrigated area (Table 27 and Figure 37). 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 steadily from 2.02 mt in 1999 to 2.56 mt by 2010, an annual growth of 2.3 percent. This high yield growth rate is due in part to the projected shift to higher-yielding irrigated area and a decline in lower-yielding upland rice area. Total rice production declined dramatically in 1997 because of unfavorable weather, i.e., flood damage in Rio Grande do Sul and drought in the northeast part of the country. Production recovered to 7.7 mmt in 1998, but declined to 7.4 mmt in 1999, before increasing steadily to 7.8 mmt by 2010.

Annual per capita consumption is expected to stabilize around 48 kg over the baseline period. Total rice consumption is projected to continue increasing steadily from 8.2 mmt in 1998 to 9.1 mmt in 2010. Brazil is expected to remain a rice-importing country, with projected net imports of 0.8 to 1.3 mmt over the baseline period. Most of Brazil's imports will come from the Mercosur countries Argentina and Uruguay. These countries have a major advantage because of relatively low transportation and production costs. Import tariffs are imposed on non-Mercosur rice, but there was no tariff on imports from Argentina and Uruguay. Ending stocks are projected to be in the range of 760-970 thousand mt over the baseline period.

European Union

The EU, the world's largest economy and the largest U.S. trade and investment partner, is a supranational organization composed of 15 European countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom. It is a unique organization in that the member states have ceded to it increasing authority over their domestic and external policies, especially with the 1986 "Single Market" and the 1993 "Maastricht" amendments to the 1958 Treaty of Rome.

The EU's authority is most apparent in trade-related matters. As a long-standing customs union, the EU now represents collective external trade interests of the member states in the WTO. Internally, the free movement of goods, services, capital, and people within the EU is guaranteed by the Single Market program, an effort to harmonize member state laws in order to eliminate nontariff barriers to these flows. Externally, with respect to services investment, intellectual property rights, and food safety issues, among others, competency for policy and negotiations is balanced between member states, the Commission and the Parliament. The European Commission enforces treaty provisions against anti-competitive practices throughout the EU (U.S. Department of State, 1998).

The Maastricht Treaty mandated the creation of an Economic and Monetary Union (EMU) among the member states that went into effect on January 1, 1999. With the launch of the euro, the 11 participating countries (Denmark, Greece, Sweden, and the UK are excluded) now have a single monetary policy conducted by the European Central Bank based in Frankfurt. Member states have generally been successful in achieving the "convergence criteria" for EMU: maximum deficits of 3 percent of GDP, maximum gross national debt of 60 percent of GDP, inflation and interest rate levels no more than 1.5 percentage points above the average of the three lowest rates among member states, and two years of relative exchange rate stability. The EU's budget, which is limited to 1.27 percent of the combined GDP of the 15 member states, comes mainly from member state contributions because the EU has no independent taxing authority. The final stage of EMU began in January 1, 1999, when 11 member states irrevocably fixed their exchange rates to the euro, the single European currency. Financial transactions are now available in euros through commercial banking institutions. Euro notes and coins will be introduced on January 1, 2002, fully replacing national currencies by July 1, 2002. During the transition period, the euro will co-exist with national currencies as legal tender. While the European Central Bank is responsible for setting monetary policy in the euro area, national central banks will continue to conduct money market operations and foreign exchange intervention.

The growth of the EU's aggregate economy is projected to stabilize at 2.5 percent per year over the baseline period. While the EU is important as both a rice importing and exporting region, it has traditionally been a net importer and is projected to remain so over the forecast period. The total harvested area is projected to stabilize between the range of 400 to 414 thousand ha over the forecast period (Table 28 and Figure 38). Italy and Spain account for the bulk (83 percent in 1999) of EU's total rice area; hence discussion in this paper focuses on these two countries.

Italy, which is the world's sixth largest economy, has undergone a dramatic transformation into an industrial power in the last 50 years. It maintains an open economy and is a member of major multilateral economic organizations such as the Group of Seven (G-7) industrialized countries, the Organization for Economic Cooperation and Development, the WTO, the IMF, and the EU. Italy has a dynamic private sector, which is predominantly characterized by a large number of small and medium-sized firms, although there are also some large companies with well-known names. Economic activities are concentrated in the north, causing a significant wealth gap between the north and the south—a situation considered one of the country's most difficult economic and social problems. Price stability is the primary objective of the Bank of Italy's monetary policy. Interest rates in Italy have come down substantially; consumer inflation is about 2.0 percent and whole-

sale inflation is negligible. Italy has not implemented any structural policies over the last two years that directly impede U.S. exports. However, certain characteristics of the Italian economy impede growth and reduce import demand. These include rigid labor markets, underdeveloped financial markets, and a continued heavy state role in the production sector. There has been some progress at addressing these structural issues. (U.S. Department of State, 1997).

Spain's economy grew nearly 4.0 percent in 1998 and is expected to moderate to 3.0-3.5 range in 1999. The country's growth is broad-based, with support coming from agricultural exports, capital goods, investment, and private consumption. Much of the country's economic policy had focused on meeting the criteria for consideration to join the European Monetary Union. These policies provided continuing benefits in the form of lower interest rates and low inflation rates, which have helped Spain promote investment and spur consumer demand. The country's annual inflation is under 2.0 percent, which is at its lowest in over 30 years. As a member of the EU, Spain has eliminated tariff barriers for imports from other EU countries and applies common EU external tariffs to imports from non-EU countries. Under the EU's Common Agricultural Policy, Spanish farm incomes are protected by direct payments, and guaranteed farm prices that are higher than world prices using high external tariffs. However, the Uruguay Round agreement requires that all import duties on agricultural products be reduced by an average of 20 percent during the five-year period from 1995 through 2000. Spain aggressively uses "tied-aid" credits to promote exports, especially in Latin America and more recently, China. As a member of the of the EU, Spain benefits from EU export subsidies, which are applied to many agricultural products when exported to destinations outside the Union (U.S. Department of State, 1998).

Italy accounted for nearly 56 percent of EU's total rice area in 1999, but is constrained from expanding its area beyond 240 thousand ha (Table 29 and Figure 39). Spain's rice area, on the other hand, is dependent on rain-fed reservoirs. Year-to-year variability in irrigation water supplies has the largest impact on Spain's rice area. Under normal weather, Spain has had enough water for approximately 80 thousand ha of rice. Over the longer-term, rice area in Spain is projected to stabilize around 112-115 thousand ha (Table 30 and Figure 40). The rest of EU's rice area (France and Greece) is expected to stabilize around 60 thousand ha over the baseline period (Table 31 and Figure 41).

The EU average rice yield is projected to grow about 0.8 percent per year from 4.29 mt per ha in 1998 to 4.65 in 2010. Italy's average yield would increase to 4.03 mt in 2010 from 3.87 in 1998, under an assumption of adequate water supply. Average rice yield of Spain is projected to grow by about 1.4 percent annually during the same period, while average yields in other EU producing countries are expected to increase by 0.7 percent per year. Total EU production is projected to range between 1.7 to nearly 1.9 mmt over the baseline period. Italian rice production is expected to increase steadily from 852 thousand mt in 1999 to 967 thousand mt by the end of the projection period solely because of yield gains. Spain's production is projected to increase to 669 thousand mt in 2010 from 590 thousand in 1999. Production of the rest of EU is projected to increase from 285 thousand mt to 289 thousand over the same period.

As the EU population grows slightly, total rice consumption also is projected to continue growing marginally, i.e., from 2.0 mmt in 1999 to 2.2 mmt by 2010. Per capita consumption increases steadily from 5.48 to 5.88 kg over the same period. Despite reduced import levies and export subsidies, the EU's net imports are projected to decline steadily from 448 thousand mt in 1999 to238 thousand mt by 2010 due to stronger domestic output. Italy's exports, which are driven by available supply and real average medium grain export price, are projected to increase from 408 thousand mt to 552 thousand over the baseline period.

As part of the concessions made to the United States as compensation for the accession of Austria, Finland, and Sweden to the EU, the EU agreed to implement tariff quotas for imports of 38,000 mt of milled rice and 8,000 mt of brown rice from the United States. On July 1, 1995, the EU implemented its Uruguay Round commitment for grains and rice

using a reference price system. The United States gained an agreement with the EU, with the EU committing to implement a system allowing importers of brown rice the possibility to cumulatively recover duty overages that might occur. This agreement was designed as a one-year trial and was implemented on July 1, 1997 (U.S. Department of State, 1997).

Since 1997-98, EU rice growers have received hectare payments up to a certain base area—currently set at 433,123 ha. Domestic demand for short and medium grain rice is covered by domestic production, but production of long grain rice is inadequate to meet local demand. This situation encouraged long grain imports. Demand for fragrant rice varieties from India, Pakistan, and Thailand have increased.

About 67 percent of total EU rice production is medium grain rice. Short and medium grain varieties are traditionally consumed in the southern EU member states, while the rest of EU consumers prefer long grain varieties. The growing consumer preference for long grain rice led to the decline in the share of medium grain rice production over the last couple of years. Long grain rice area increased 21 percent in 1999 from the 1998 level, while medium rice area decreased by 11 percent during the same period.

On trade, India and Pakistan benefit from the EUR 250/mt rebate to the normal import duty for third world countries. This means that basmati rice from India and Pakistan may be effectively imported at zero duty. Effective March 1, 2000, the European Commission reportedly augmented the EU subsidies under the common right restitution system by about 6 percent across the board. This action may be seen to stimulate export sales.

The EU has tightened 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 1997 and 1998, and 13 percent thereafter.

Indonesia

Indonesia was considered an economic success story as recently as mid-1997. Real GDP grew at an average of over 7 percent per year during the decade starting from 1987, with inflation in the single digits; GDP per capita surpassed $1,000 in 1996, compared with $70 in 1965. The rupiah was stable, and foreign capital was pouring in.

The economic crisis that began in July 1997 changed the course of Indonesia's economic path. The country experienced a combination of severe drought, low petroleum prices, regional financial instability, domestic social unrest, and lately, a change in government. Real GDP substantially declined by 13.7 percent in 1998. Per capita GDP declined to $500 from $1100 (U.S. Department of State, 1998). The first major catalyst of the crisis began on July 1, 1997, when Thailand allowed the baht to float against the dollar and other currencies for the first time in 14 years (see related information under the Thailand section above). The baht fell more than 15 percent, and traders, economists, and *The Wall Street Journal* lead articles predicted dire effects on other Asian-Pacific currencies. The Indonesian rupee was R2,450 to the US$ in June 1997; by December the exchange rate fell to R4,000, and by December 1998 it was R7,500. Exchange rate volatility was a big problem for businesses. Annual inflation was running at an estimated 80 percent. Foreign capital had fled, closing off access to new foreign lending, while the business sector struggled to service existing foreign debts at the weaker exchange rate. Dropping employment, rising prices, loss of purchasing power, particularly among lower income groups, caused social unrest. This situation finally led to the resignation on May 21, 1998, of President Suharto, who was replaced by his vice-president, B.J. Habibie.

Some favorable political developments have occurred in Indonesia since President Suharto resigned: press restrictions have been lifted; a peaceful, free, and fair multiparty general election was held on June 1999; and a democratically elected president was installed in October 1999. The new president, K. H. Aburrahman Wahid, is said to be broadly acceptable to all political groupings. The selection of Megawati Soekarnoputri (leader of the party that came in first in the June election) as vice-president added to the cautious optimism about the country.

However, Indonesia still faces daunting eco-

nomic problems. Foreign capital that fled the country during the crisis is moving back only slowly. The business sector is having a tough time servicing foreign debts as a result of the weaker exchange rate. The banking sector is still trying to recover from credibility problems. It should be noted, however, that despite the country's financial problems, there remain underlying potential strengths in the country's economy. Indonesia is the world's fourth largest country, with an emerging middle class that represents a huge and growing potential market.

The second major catalyst of the crisis was drought conditions caused by El Niño. Planting of the main rice crop was delayed by two months until December through February, with yields and area harvested both lower. This led to the largest annual rice imports for any country to date.

The government enforces a system of floor and ceiling prices for certain "strategic" food products such as rice. The country launched a set of economic reforms in November 1997 that reduced the number of such products. These reforms were initiated with encouragement from the IMF. Some goods, such as fertilizer and electricity, enjoy direct government subsidies. The number of items subject to import licenses and other nontariff import barriers such as special licensing requirements are being reduced. While distribution in the domestic market is still restricted, the November 1997 reform allows foreign firms that produce in Indonesia to directly distribute their products domestically; beginning in 2003, such firms may sell their products at the retail level (U.S. Department of State, 1997).

As the third largest rice-producing and rice-consuming country in the world, Indonesia's participation in international rice trade in the past has been 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 and increasingly by industrial development, with significant conversion of highly productive rice areas in Java to housing and industrial use. The government tried to expand rice production by developing 1.0 million ha of new rice area, specifically in Central Kalimantan. The estimated cost of the project was Rp5 trillion. However, the plan did not work out well because 40 percent of the said agricultural land was found to be unsuitable for rice because of thick peat layers. Recent news reports indicate that the government has not abandoned the project, but rather plans to develop other crops instead of entirely rice.

The government also plans to introduce new high-yielding varieties, expand irrigation, and encourage the use of more efficient type of fertilizers. 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 (USDA/FAS, 1997).

Indonesia's rice area is a function of government support and input (fertilizer) prices. However, in 1997 Indonesia's rice crop was substantially affected by the El Niño weather phenomenon, reducing yield by 8.4 percent to 2.64 mt per ha; total production decreased by 4.5 percent to 30.6 mmt compared to 1996. Yields and production recovered in 1998 to 2.71 mt per ha and 32.1 mmt, respectively. In 1999, yields increased by 50 kg/ha, but area declined by 200 thousand ha—resulting in a relatively flat production. Yields are expected to be nearly 3 percent higher in 2000, while area will increase marginally. Over the projection period, the area harvested is expected to increase an average of 24 thousand ha/year to 11.9 million ha; and production will gain a total of 330 thousand mt/year to 36.4 mmt (Table 32 and Figure 42). Because of a strong national commitment to rice research and the adoption of IRRI varieties, yields are projected to increase, from 2.76 mt per ha in 1999 to 3.05 mt by the year 2010.

Per capita use, which has increased over the last several decades, reached nearly 167 kg in 1998, but is expected to decline gradually to 164 kg by the end of the baseline period. 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 grow by 1.2 percent per year over the baseline period. By 2010, consumption is expected to be nearly 41 mmt as a result of population

growth (1.5 percent in 1998, and is projected to decline gradually to 1.2 by the 2010).

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 nontariff barriers and reduce the bound tariff rate to 160 percent by 2004. The El Niño-related crop shortfall caused Indonesia to become the world's top rice importer in 1997, with net imports of nearly 6 mmt, over seven times that of the 1996 level, and a world record.

Last year, in order to stabilize domestic prices and prevent smuggling during the financial crisis, Indonesia allowed private traders to import rice for the first time in three decades. Previous policy allowed only BULOG (the state-run commodity regulator) to import low-grade rice. A new policy, which started on January 1, 2000, allowed both BULOG and private traders to import any kind of rice at a uniform tariff of 6 US cents/kg. The government also imposed a substantial 30 percent tariff on rice imports mainly in response to the domestic producers, who are suffering from low prices reportedly because of the abundance of imported rice.

Under the new administration, BULOG reportedly will no longer intervene significantly in the wholesale market and will limit activity to rice procurement. The agency will continue to import rice to maintain food security, including maintenance of domestic stocks and distribution of rice to civil servants, the military, and the poor. Currently, BULOG is reportedly operating under severe budget constraints.

BULOG revised its Invitation for Bids procedure effective January 20, 2000, as follows:

(1) Quality specifications have been revised—Pakistani rice must be 10 percent broken (vs. 15-20 percent previously), and Chinese, Vietnamese, and Thai rice must be 15 percent brokens (vs. 25 percent previously);

(2) Eighty percent of payment on Letters of Credit will be made after loading of the vessel, and the remaining 20 percent will be paid upon arrival at the discharging port;

(3) Country of origin must be specified in the contract;

(4) The shipment period and volume must be outlined in detail to avoid unexpected delays;

(5) Inspection will be conducted twice—at loading and at discharge; and

(6) BULOG will require a performance bond equivalent to 5 percent of the contract value.

As in the past, the country is expected to remain a source of volatility in the world rice trade, mainly because of weather-related factors. Net imports decreased to 3.9 mmt in 1998, and are estimated to have decreased to 2.7 mmt in 1999 before steadily increasing to 4.6 mmt by 2010. Ending stocks increased to 4.0 mmt in 1998 and are estimated to have decreased to 3.1 mmt in the 1999 marketing year as a result of reduced imports, and expected to stabilize around 3.3 mmt over the next decade (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 1997, 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 (U.S. Department of State, 1997).

Iran's economy grew 2.6 percent in 1997, contracted 0.5 percent in 1998, recovered by 3 percent in 1999, and is expected to grow at a range of 4-5 percent during the baseline period. Iran experienced a high rate of inflation over the last two years (30.2 percent in 1997 and 19.4 percent in 1998). Inflation is estimated to have improved to 16.2 percent in 1999 and is expected to continue declining steadily to 6.5 percent in 2004 and stabilize at that level over the

rest of the baseline period.

Harvested rice area in Iran has recently increased as a result of the government's high domestic price and its support in improving the agricultural market infrastructure (e.g., farm-to-market roads), both of which benefit rice production. The area harvested is projected to increase from 550 thousand ha in 1999 to 652 thousand ha by 2010 (Table 33 and Figure 43). Average yield per ha is projected to improve by 0.6 percent per year over the same period. Likewise, total rice production is projected to grow steadily from 1.6 mmt in 1999 to 2.0 mmt by 2010.

Annual per capita consumption is projected to increase gradually from 37 kg in 1998 to nearly 40 kg by the end of the baseline period. Growth in total rice consumption is projected to continue, increasing from 2.6 mmt in 1998 to 3.5 mmt in 2010, primarily because of population growth of around 2 percent over the same period. Total rice consumption is also a function of real CIF (cost, insurance, freight) rice prices and real GDP.

Iran's government has a monopoly on rice imports. Sale of imported rice in Iran is controlled through issuance of ration coupons. Iran is expected to remain a rice-importing country, with imports increasing from 1.0 mmt in 1998 to just under 1.5 mmt in 2010.

The United States started to relax some restrictions on the export of food to Iran (together with Libya and Sudan) in 1999—a favorable development that augurs well for the possibility of opening U.S. rice exports into Iran. Whether this situation will translate into concrete trade benefits for rice remains to be seen.

Ending stocks are expected to generally range between 500 to 600 thousand mt over the baseline period.

Iraq

A United Nation's near-total trade and air embargo on Iraq and a freeze 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.

Iraq's harvested rice area declined from 140 thousand ha in 1998 to 110 thousand ha in 1999, and is expected to increase slowly to 126 thousand by the end of the baseline period (Table 34 and Figure 44). Yields/ha are projected to increase steadily from 1.36 mt in 1999 to 1.70 mt in 2010. Total production in 1999 is estimated to be 150 thousand mt, down from 200 thousand mt in 1998, but is projected to increase slightly thereafter, reaching 213 thousand by 2010.

Total consumption is projected to increase rapidly as the population grows about 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 870 thousand mt in 1996 from 450 thousand in 1995 as a result of the food-related relaxation of the ban for humanitarian reasons. The consumption levels in 1997 and 1998 were 810 and 925 thousand mt, respectively, and would increase steadily to 1.3 mmt by 2010. Annual per capita consumption is estimated to be 42.6 kg in 1998, and is projected to decline slightly over the baseline period.

The government procures and distributes rice. Net imports are projected to range from 800 thousand mt to 1.1 mmt over the baseline period. Ending stocks are projected to stabilize at 156 thousand mt.

Saudi Arabia

Saudi Arabia prides itself on having a free-market economy. However, while the government tends to encourage commercial enterprise, strict in-

terpretation of Islamic mores serves to limit policy options and opportunities.

The Saudi government has traditionally maintained price controls for basic utilities, energy, and many agricultural products. Water, electricity, and petroleum products are believed to be subsidized, with prices often substantially below the costs of production in order to share the wealth and spur development. The country is in the process of accession to the WTO. The government has reduced subsidies to agriculture, which has resulted in reduced agricultural production available for export (U.S. Department of State, 1997).

Since Saudi Arabia has virtually no rice production, its rice supplies are dependent upon imports. Providing the best-quality rice to consumers at a low price is a major government policy. While growth in per capita consumption is marginal, i.e., from 36 kg in 1998 to 37 kg in 2010, the total consumption forecast shows an increase from 748 thousand mt to 1.2 mmt during the same period. This consumption growth is driven by population, which grows rapidly, at 3.4 percent per year, and by income growth of 2.4 percent per year over most of the baseline period (Table 35 and Figure 45). Consumption is determined by income and prices of imported 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 sold through the open market. The government encourages suppliers to compete in providing the lowest possible import prices.

Japan

Japan's economy, the world's second largest at roughly US$4.2 trillion, is experiencing a significant recession. Japan's current economic slowdown, which began in mid-1991, is the longest in the country's postwar history. Until 1992-93, Japan had never had two consecutive years of less than 3 percent real growth in the postwar period. A surge in asset prices to unsustainable levels and high rates of capital investment in the late 1980s gave way by 1991 to sharply slower growth, the need for corporate restructuring, and balance sheet adjustment by businesses. A substantial fiscal contraction, which began in 1997, has dried domestic demand. The substantially weakened Asian demand for Japanese exports, and concerns about the banking system, also weigh heavily on the economy. Japan's economy is also undergoing serious structural pressures, primarily because of technology-driven global competition (U.S. Department of State, 1997 and 1998).

Japan has a market economy, with prices generally set in accordance with supply and demand. However, because of the high level of fixed and personnel costs, combined with a complex distribution system, gross retail margins are very high—resulting in greater downward "stickiness" in retail prices than in other large market economies. Japan's economy is highly regulated, but the government and the business community recognize that deregulation is needed to spur growth. Japan is the United States' third largest export market after Canada and Mexico, while the United States is the largest market for Japanese exports. However, U.S. exporters still have incomplete access in many sectors of the Japanese market (U.S. Department of State, 1997). While Japan has reduced its formal tariff rates on most imports to relatively low levels, it has maintained nontariff barriers, such as nontransparency, discriminatory standards, and exclusionary business practices, and it tolerates a business environment that protects established companies and restricts the free flow of competitive foreign goods into the Japanese market (U.S. Department of State, 1998).

The domestic rice sector in Japan has been insulated from international markets through high support prices and tight restrictions on rice imports. Under the WTO, Japan is required to import according to established minimum access requirements. The Ministry of Agriculture, Forestry, and Fisheries (MAFF) Minister announced in March 1998 that the minimum access rice system should be Japan's basic stance under the next WTO agricultural negotiations, as opposed to tariffication.[3] At the OECD Ag-

[3] Under market access provisions, Japan may import under minimum access, since imports were less than 5 percent of domestic consumption in the base period 1986-88. Under minimum access, Japan will provide access opportunities for imports equal to 3 percent of the base period consumption in the first-year agreement, increasing to 5 percent by the end of the implementation period. Under tariffication, nontariff border measures are converted to their tariff equivalents. The tariff equivalent is equal to the difference between average world market price and average internal price. Countries then use this price difference to establish either a specific or an ad valorem tariff.

ricultural Ministers meeting, the MAFF minister expressed that international rule should enable Japan to export minimum access rice as food aid. The minimum access requirement for Japan for the 1998 fiscal year totaled 680 thousand mt of rice. For Japanese fiscal year (April 1996-March 1997), the government contracted to purchase 544 thousand metric tons under the Uruguay Round minimum access agreement. The United States captured a little over 50 percent of the minimum access tenders, followed by Thailand and Australia, with 24 and 16 percent of the share, respectively (USDA/FAS, 1998).

A new rice diversion policy was introduced in 1997 for Japan's fiscal year 1998 that will increase the rice diversion program and increase compensation for farmers. The first rice diversion program was initiated in 1969. The primary goal of the 1998 policy is to reduce domestic stock levels. The rice diversion program is expanded from 1997 target of 787 thousand ha to 963 thousand ha in 1998, which is an increase of 176 thousand ha (USDA/FAS, 1998).

The average rice farm in Japan is less than 1 ha. The small farm size has contributed to a high number of part-time farmers, at 80 percent. Most farms are family-owned. The farm operations are highly mechanized with tractors and mechanical transplanters. In 1997, Japan imported 455 thousand mt; and exported 574 thousand mt of rice (including 500 thousand mt of rice food aid to Indonesia apparently aimed at easing the burden of its high stock levels), resulting in net exports of 119 thousand mt. Japan became a net importer again in 1998, with net imports of 450 thousand mt (imports of 650 thousand and exports of 200 thousand, and in 1999 with net imports of 320 thousand mt (imports of 720 thousand and exports of 400 thousand). Over the baseline period, net imports are expected to stabilize at 482 thousand mt (imports equivalent to its minimum access of 682 thousand mt and exports of 200 thousand mt).

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. The area harvested declined to 1.80 million ha in 1998 from 1.95 million ha in 1997. Area is projected to be relatively flat for the next three years and to gradually decline thereafter. To account for higher yields, imports, and limits on storage costs, the rice land diversion program is expected to be managed such that only about 1.5 million ha of rice will be harvested by 2010 (Table 36 and Figure 46).

Japan's rice yields are influenced by high support prices, production costs and new technology. Subsidies to producers of independently-distributed rice are being phased out. Yield per ha is projected to increase steadily from 4.67 mt in 1999 to 5.11 mt by 2010. Following the downward trend in area harvested, production is projected to decrease from 8.4 mmt in 1999 to 7.8 mmt by 2010.

Japan's rice consumption is strongly influenced by a negative income elasticity. The country's per capita use of rice has declined substantially over the past few decades and is expected to continue declining gradually from just under 75 kg in 1999 to 65 kg by the year 2010. Income and population growth rates are expected to decline. Consequently, total consumption is projected to decline steadily to 8.3 mmt in 2010 from 9.4 mmt in 1999.

As a result of bumper rice harvests between 1994 and 1996, current ending stocks are excessively large, reaching 3 mmt in 1997, substantially higher than the target level of 1.5 mmt. Stocks declined to 2.5 mmt in 1998, as MAFF tried to cut the stockpile by exporting rice for food aid and increasing the riceland diversion requirements. Ending stocks are expected to steadily decline from 1.8 mmt in 1999 to 1.1 by 2010.

South Korea

South Korea registered dramatically strong economic growth over the last two decades. This expansion was an offshoot of a growth strategy that relied heavily on government-directed industrial policy and a protected domestic market. That fast-paced growth placed the country's economy as the world's 11th largest in 1996, from the world's third poorest nation in 1953. However, labor activism in 1980s drove up wages faster than productivity growth, causing the country to lose its advantage of low-wage labor to China and Southeast Asian countries. At the same time, it could not compete with Japan for high-tech, top-quality products.

Nevertheless, growth rates averaged 7.6 percent

from 1990-96 as its products found their way to markets worldwide with support from strong domestic demand. However, bankruptcies of several large Korean companies in 1997 indicated serious problems such as misallocation of investment resources, excessive debt, and over-reliance on short-term overseas borrowing by the Korean corporate and banking sectors. In the summer of 1997, following financial crises in Thailand and Indonesia, international investors lost confidence in Korean institutions and refused to roll over loans to Korean banks and corporations. The country suffered a severe foreign-exchange liquidity problem, with the Korean won losing more than 50 percent of its value against the dollar by the end of 1997. With the guidance and monetary support of the IMF, the country was able to implement reform programs and to restructure its financial and corporate sectors.

Politically, this financial crisis set the stage for the upset victory of the opposition figure Kim Dae Jung in the December 1998 presidential election—marking the first peaceful transfer of power to the opposition in Korean history. Using the IMF program as a springboard, the new president began the long and difficult process of restructuring and liberalizing the economy. The financial crisis and the restructuring combined led to a recession in 1998, which is expected to continue into 1999 (U.S. Department of State, 1998).

The Korean economy is notable for the high degree of concentration of capital and industrial output in a small number of conglomerates known locally as "chaebol." The 30 largest chaebols account for about one-third of the total capital of the domestic financial sector and for about 35 percent of all manufacturing. These chaebols are highly leveraged, hence they are susceptible to bankruptcies in periods of economic slowdown (U.S. Department of State, 1997). The financial crisis exposed the weaknesses of the economic model that Korea previously used to achieve its remarkable growth in the past. Current reforms are designed to move Korea's economy toward a more market-based system. Laws now require greater transparency in corporate, banking, and financial institutions. This development augurs well for the Korean economy.

Korea's economy is based on private ownership of the means of production and distribution, with basic pricing decisions left to the private sector. Governmental intervention, however, has historically been used to guide the direction of economic development. This includes policy loans and discretionary enforcement of regulatory policies.

Korea has lowered its average tariff rate to 7.9 percent. The typical trade barriers in Korea are mostly nontariff related, i.e., nontransparent regulations subject to the discretion of officials. These cover licensing, inspections, and standards, among others. Import licensing requirements were removed on all goods effective January 1, 1997, except for roughly 80 items—mostly agricultural products that are included in the "negative list." The Korean government's restriction on the use of credit to finance imports is a significant barrier to U.S. exports to the country.

An encouraging development was the country's accession to the WTO Government Procurement Agreement on January 1, 1997. While the use of tax exemptions to promote exports is declining, a number of government programs directly support the country's export industries. These include customs duty rebates for raw material imports used in the production of exports, short-term export loans for small and medium-sized enterprises, rebates on the value-added tax, a special consumption tax for export products, and corporate income tax benefits for costs related to the promotion of overseas markets, among others (U.S. Department of State, 1997). A review of some key demographic changes over the last few years may offer a better understanding of the Korean rice industry. From 1970 through 1995, there was rapid rural-to-urban migration, 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 because of the limited off-farm income opportunities (USDA/FAS, 1998).

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.

In 1997, the Korean government purchased 1,224 thousand mt, which are limited by an Aggregate Measure of Support (AMS) commitment under the WTO. Approximately 96 percent of Korea's AMS is for rice. In 1997, the AMS commitment was 2,286.5 billion Korean won and was 1,951.7 billion won in 1998. This will decrease until 2004, when the bound rate (the maximum AMS allowed by WTO established under the Uruguay Round) will be 1,490 billion won (USDA/FAS, 1998).

Despite these policies, the harvested rice area in South Korea is projected to decline annually by 1.4 percent, from 1.07 million ha in 1999 to 874 thousand ha by 2010 (Table 37 and Figure 47). One factor causing this decline is the decreasing level of government support prices in real terms. Yields, which are driven by improvements in technology, are projected to increase gradually to 5.3 mt per ha by 2010 from 4.9 mt in 1999. Both 1996 and 1997 were record yields for medium grain rice, which was due to ideal weather conditions throughout the year. The decline in area, however, will cause total production to decline to 4.6 mmt by the end of the baseline period from 5.3 mmt in 1999. The government will try to alleviate the effects of declining area by developing high-yield varieties. Currently two new varieties having favorable potential are SUWON 405 and MILYANG 103, with test yields of 7.11 mt and 6.86 mt per ha, respectively (USDA/FAS, 1998). The objective is reportedly to develop a super-rice hybrid by 2004 with a yield of 10 mt per ha.

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 of rice land also more than tripled, from 395 to 1,426. In order 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 107 kg in 1999 to just under 95 kg by 2010, a 1.2 percent annual decline. This decline is due to higher incomes (the country's GDP is expected to grow within the range of 5.2 to 5.7 percent over the baseline period, after declining 5.8 percent in 1998 and recovering by 5.4 percent in 1999), and higher real retail prices. Consumer prices are expected to increase by 4.8 percent per year during most of the projection period. As per capita use declines and as growth in the population increases more slowly (1.0 percent in 1999, and gradually slowing to 0.6 percent by 2010), total consumption is projected to decrease slightly, from 5.0 mmt in 1999 to 4.9 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 WTO, South Korea has agreed to increase rice imports from 1 to 2 percent of domestic consumption for five 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 has been 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 77 thousand mt in 1997 and 113 thousand mt in 1998. Imports are projected to decrease to 108 thousand mt in the 1999 marketing year and to increase steadily to 205 thousand mt by 2004 and beyond. In 1997, 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. Ending stocks are expected to decrease slightly to 1.1 mmt in 2010 from 1.4 mmt in 1999

Taiwan

Taiwan's economy has been characterized by rapid growth and stability over the last four and a half decades, with real GDP growing at an average of 8.5 percent. The Asian financial crisis slowed Taiwan's real growth to about 4.8 percent in 1998, from 6.8 percent in 1997. Taiwan held the third largest foreign-exchange reserves in the world (after Japan and the People's Republic of China) at US$90 billion. Rising labor costs have long led many manufacturers in labor-intensive industries to move offshore—mainly to Southeast Asia and mainland China. Falling official savings and growing public expenditure have caused domestic public debt to increase steadily. The Taiwan authorities rely mainly on domestic bonds and bank loans to finance major expenditures. Owing to austerity measures aimed at controlling the government budget deficit in recent years, outstanding public debt as a percentage of GNP is expected to decline to 17 percent in 1999 from 21 percent in 1997. The growing demands for improved infrastructure and social welfare spending, including a national health insurance plan initiated in 1995, have put great pressure on Taiwan's budget.

Taiwan aims to accede to the WTO in the near future. As part of the accession process, Taiwan and the United States signed a landmark bilateral WTO agreement in February 1998. The agreement includes both immediate market access and phased-in commitments, and will provide substantially increased access for U.S. goods, services, and agricultural exports to Taiwan. Taiwan is also an active member of the Asia Pacific Economic Cooperation (APEC) forum.

Taiwan has a floating exchange rate system in which the banks set rates independently. The government, however, controls the largest banks authorized to deal in foreign exchange. Taiwan began implementing tariff reductions in July 1997 (U.S. Department of State, 1997). In May 1998, Taiwan began implementing tariff cuts on 1,130 items. Tariff reductions on 15 agricultural products took effect in July 1998. The current average nominal tariff rate is 8.3 percent, while the trade-weighted rate is 3.2 percent.

Taiwan plans to reduce supports for rice (along with other selected crops) over the next five years. On February 20 1998, the U.S.–Taiwan Comprehensive Market Access Agreement for Taiwan's accession to the WTO was signed.

Taiwan's Rice Diversion Program was succeeded by the four-year Paddy and Upland Utilization Adjustment Program, implemented in July 1997. The objective of this policy is to balance supply and demand of rice. The price guarantee programs currently in place will continue for both the first and second rice crops. Farmers will also be compensated for rotating rice crops with other crops or for setting land aside (USDA/FAS, 1998).

Rice area harvested increased slightly to 368 thousand ha in 1999 from 358 thousand in 1998, but would decline gradually thereafter to 215 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/ha, on the other hand, are projected to increase steadily from 3.66 mt in 1998 to 4.57 mt by 2010 (Table 38 and Figure 48). 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 1.3 mmt in 1998 to less than 1.0 mmt by the year 2010.

Per capita consumption declines from nearly 62 kg in 1998 to just under 46 kg by 2010, causing total consumption to decrease from 1.4 mmt to 1.1 mmt during the same period, as per capita incomes increase. Taiwan's population growth will be slightly lower than South Korea's until 2002, at 0.9 percent; but would be slightly higher than South Korea's from 2004 and beyond. However, the population of both countries, would grow at a decreasing rate during the same period.

There are few subsidy and tax policies for exports. Taiwan's low levels of rice and sugar exports enjoy indirect subsidies through guaranteed purchase prices higher than world prices. The government offers guaranteed prices for a portion of rice and other

cereal crops produced by farmers. 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 the world price.

Taiwan was a net rice exporter in 1998 and is expected to remain so in 1999 and 2000. Based on an assumption of its membership in the WTO, Taiwan is expected to be a net importer of rice starting in 2001, importing 132 thousand mt—a level assumed throughout the baseline period. Ending stocks are expected to be under 200 thousand mt over the baseline period.

Canada

Canada has an affluent, high-tech industrial economy—resembling that of the United States in terms of per capita output, market-oriented economic system, and pattern of production. Fueled by domestic demand, the country's economy grew by 3.8 percent in 1997. In fiscal year 1997-98 (April to March), the country recorded its first surplus in 28 years. Growth slowed in 1998 at under 2.0 percent. While consumer spending remained strong, production cutbacks caused inventory to decrease substantially, and business investment and external demand weakened. Canada's short-term outlook has been revised downward because of the impact of the recent Asian financial crisis. Projected growth in 1999 is under 2.0 percent.

Geographically, Canada and the United States have a common interest—the two countries share a 5,500-mile border. In 1995, a Shared Border Accord was announced by the two heads of state that provides a framework to find a balance between commercial facilitation and law enforcement. Canada remains as the foremost export market and single largest trading and investment partner of the United States. Total two-way trade in goods and services was approximately US$365 billion in 1997, comprising 80 percent of Canada's total global trade.

The Canadian dollar is a fully convertible currency, and exchange rates are determined by supply-and-demand conditions in the exchange market. Prices for most goods and services are established by the market.

On January 1, 1989, Canada and the United States started to implement the US-CFTA, a free-trade agreement to eliminate over a 10-year period all tariff and nontariff barriers to trade between the two countries. The US-CFTA was suspended on January 1, 1994, with the inauguration of NAFTA, which extends the US-CFTA to Mexico and expands its coverage to include services, investment, and government procurement. As of January 1, 1998, Canada has eliminated all tariffs between the United States and Canada, except for supply-managed products like poultry and dairy products. However, nontariff barriers at both the federal and provincial levels continue to impede access, or retard export growth, of U.S. goods and services to Canada.

Canada does not produce rice; hence it depends entirely on imports to supply its domestic rice needs. Per capita rice consumption, which is a function of per capita GDP and rice import price, ranges from 8.2 to nearly 10.2 kg/year over the baseline period (Table 39 and Figure 49). Total consumption is projected to grow from 240 thousand mt in 1998 to 347 thousand mt by 2010, an annual growth of just under 3 percent. The United States supplies about 70 to 75 percent of Canadian rice imports.

South Africa

South Africa is a middle-income, developing country with well-developed financial, legal, communications, energy, and transport sectors; a stock exchange that ranks among the 20 largest in the world; and a modern infrastructure supporting an efficient distribution of goods to major urban centers throughout the region. Nearly five years since the historic first multiracial elections in 1994, South Africa remains the most advanced, broadly based, and productive economy in Africa. After four years of real GDP decline (1988-1992), the South African economy entered a period of real growth from 1994 through 1998 at 2.5, 2.8, 3.2, 1.7, and 0.5 (estimate) percent, respectively (U.S. Department of State, 1998).

South Africa, however, faces serious developmental issues resulting from decades of apartheid-era policies. That unfortunate era was characterized by inefficient use of human resources, underinvest-

ment in human capital, labor rigidities, large expenditures for overlapping government layers and facilities, wide-scale government intervention in the economy, and international sanctions that resulted in lack of foreign investment and imported goods. Priorities set by the government are black economic empowerment, promotion of enterprises (small, medium, and micro), extension of telecommunications, transportation, and other infrastructure links to unserved rural areas, and substantial job creation to offset the rapid population growth.

South Africa's macroeconomic strategy, which was released in 1996, showed the government's commitment to open markets, privatization, and a favorable investment climate. The country also expressed commitment to its WTO obligations, indicating its slow but steady move toward a free-market economy.

South Africa depends on imports to supply its domestic rice requirements. Per capita rice consumption is projected to range from 10.7 to 11.7 kg/year over the 1998-2010 period (Table 40 and Figure 50). Per capita consumption is a function of per capita GDP and rice import price. Total consumption is projected to grow from 450 thousand mt in 1998 to 554 thousand mt by 2010, an annual growth of 1.8 percent.

Until 1982, 80 to 90 percent of South African rice imports came from the United States. The importance of the United States as a rice supplier to the country has declined substantially since then, reaching a share of just 14 percent in 1997. India and Thailand were the major suppliers of rice for South Africa in 1997—surpassing the United States.

Mexico

The Mexican economy, which experienced a strong recovery in 1996 and 1997, began to taper off in 1998 and is expected to slow down further in 1999. Following growth of 7.0 percent in 1997, the country's GDP is estimated to have grown under 5.0 percent in 1998. Mexico's consumer boom during the first 10 months of 1998 slowed substantially in November, as higher interest rates, a weakening currency, and a domestic fuel price increase reduced the population's disposable income. Fiscal expenditures were cut by the government three times in 1998 in response to weak oil prices. One cause to worry is the country's dependence on oil at a time when prices remain low; this will likely result in only modest growth in 1999. Exports have been the engine of the country's growth. Mexico accomplished this by aggressive market opening through bilateral and multilateral trade agreements that have created new markets for Mexican products, while allowing more foreign competition. Two-way trade with the United States has continued to grow and is estimated to be in the range of $180-$190 billion. The country's trade surplus with the United States is steadily decreasing and could even become a deficit in 1999 or 2000. Controlling inflation is the principal objective announced by the Bank of Mexico (the country's central bank), which indicates that monetary policy was tight in 1999.

Mexico abandoned its exchange band mechanism in December 1994 in favor of a free-floating exchange rate. After losing more than half its value relative to the dollar in 1995, the peso stabilized in 1996 and through most of 1997. However, since the last quarter of 1997, the peso has depreciated more than 25 percent, in response to weakened financial flows to emerging markets in the wake of the Asian financial crisis. The country has largely achieved the objectives laid out in the emergency economic program developed to cope with the 1995 peso crisis. Mexico's debt situation has improved since 1997, and the country has successfully returned to international capital markets.

The Mexican government has been working to decrease regulations in the economy. In 1993, legislation was introduced to promote greater competition, limit monopolistic behavior, and prohibit practices that restrain trade. More than 1000 parastatal companies have been privatized or eliminated since 1986, and the current administration is continuing the privatization efforts. NAFTA provisions opened Mexico to greater U.S. and Canadian investment by assuring U.S. and Canadian companies national treatment, the right to international arbitration, and the right to transfer funds without restrictions. NAFTA also eliminated some barriers to investment in Mexico such as trade balancing and domestic content requirements.

Harvested rice area in Mexico is projected to remain in the range of 90-100 thousand ha over the baseline period (Table 41 and Figure 51). Rice area is influenced by a guaranteed rice market price and wheat farm prices. Some immediate concerns are increased input costs, low producer prices in relation to other crops, relatively cheaper imports, and lack of water in the northwestern rice-producing regions. Virtually all rice area in the major growing regions is irrigated.

Average yield is expected to grow at 1.4 percent per year to 3.79 mt in 2010, from 3.13 mt per ha in 1998. Improvements in yield are mostly technology-induced, i.e., through the use of fertilizers and hybrid seeds. Total production is projected to increase from 313 thousand mt in 1998 to 378 thousand mt in 2010. While domestically produced rough rice is of good quality, some less efficient milling operations produce lower quality milled rice.

Per capita consumption is expected to be 6.0 kg in 1999—still one of the lowest in Latin America. A slight increase is projected over the baseline period, reaching 6.4 kg by 2010. Factors affecting per capita consumption are per capita GDP, rice retail price, and wheat retail price.

The variety of consumer-ready rice mixes in Mexican grocery stores has reportedly increased over the past few years. Consumer acceptance is improving as a result of the variety of flavors and the ease of preparation. Milled rice is an affordable food choice for many segments of the Mexican population. Imported rice mixes, while expensive, are popular among upper-income Mexicans. Net imports are projected to steadily grow by around 2 percent annually, from 306 thousand mt in 1998 to 386 thousand by the end of the baseline period. The U.S. supplies well over 90 percent of Mexican rice imports. Over the baseline period, ending stocks are estimated to be in the range of 23-31 percent of consumption—a level consistent with historical average.

In the early 1990s, because of world price relationships, Mexican millers preferred to import milled rice and package it rather than run their mills to process imported rough rice. This situation changed over the last few years as the government tries to increase and maintain rural employment and make domestic rough rice more price competitive. The Mexican government, through NAFTA, maintains a higher tariff on milled rice (8 percent) than on rough and brown rice (4 percent). This tariff differential is aimed at increasing paddy imports by millers while decreasing milled imports.

Price competitiveness has been the primary concern for importers, followed by quality. Strong exports of U.S. rice to Mexico are expected to continue as long as U.S. prices remain competitive relative to Asian and South American rice. Another advantage for U.S. rice is the consistent availability of reliable large exportable supplies. While Uruguay is trying to gain market share in Mexico's rice imports, Mexico's phytosanitary concerns remain a constraint. To maintain a strong foothold in the Mexican rice market, U.S. exporters should strive to pursue active market development efforts that may include, but are not limited to, branded promotions and nutritional information campaigns. These activities should be timely, considering that milling margins are no longer protected by the government.

The absolute ban on imports of Asian rice has been dropped by Mexico, as provided for by the WTO. Starting in 1997, Asian rice access to Mexico is subject to the detailed risk analysis indicating that the applicant country is free of certain rice pests. As the United States and Mexico eliminate their respective tariffs on rice over a 10-year period under NAFTA, U.S. rice is expected to become increasingly competitive relative to non-NAFTA countries.

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 uncertainties brought about by the food shortage in North Korea. Other countries that can, time and again, cause uncertainties in the rice market owing to unexpected weather-related imports include Bangladesh and the Philippines.

In late December 1997, for instance, the Philippines had to purchase large quantities of rice because of drought brought about by El Niño. The Phil-

ippines doubled its rice imports in 1997 to 1.3 mmt compared to 682 thousand mt in 1996. Philippine imports further increased in 1998 to 2.0 mmt but are expected to decrease to 850 thousand mt in the 1999 marketing year. The strong import demand from the Philippines, as well as from Indonesia, during that period caused international prices to rise slightly despite continued weakness in the Thai currency.

Because of crop shortfall, Bangladesh also increased its rice imports in 1997 to 1.1 mmt from 46 thousand mt in 1996 . The country more than doubled its imports in 1998 at 2.5 mmt but is expected to reduce purchases in 1999 to 1.0 mmt.

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 1999 was 29.2 million ha and is projected to increase slightly to 31.1 million ha by 2010—an annual growth rate of about 0.6 percent. Yields are expected to increase steadily from 1.72 mt per ha in 1999 to 1.86 mt by the end of the baseline period (Table 42 and Figure 52). As a result of gains in both area and yields, total production is projected to grow by 1.4 percent annually, from 50.1 mmt in 1999 to 57.9 mmt by 2010.

Total consumption is projected to increase to 73.5 mt in 2010 from 63.4 mmt in 1999. The ROW imports are projected to be in the range of 12 to 16 mmt over the baseline period. Ending stocks are expected to remain around 6 mmt during the same period.

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Table 1. World Rice Supply and Utilization

Variable	Unit / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	152338	152992	153135	153312	153410	153499	153631	153597	153713	153821	153988	154154	154388
Yield	(mt/ha)	2.59	2.61	2.61	2.63	2.65	2.68	2.72	2.74	2.77	2.80	2.83	2.86	2.89
Production	(1000 mt)	393952	399443	399392	402621	406884	411264	417136	420754	425387	430236	435504	440724	446094
Total Consumption	(1000 mt)	389238	397369	401383	405534	409539	413368	417693	421452	425638	429837	434191	438515	443023
Net Exports	(1000 mt)	23292	19563	21197	21825	22217	22615	23219	23683	24353	25039	25837	26625	27484
Net Imports	(1000 mt)	23292	19563	21197	21825	22217	22615	23219	23683	24353	25039	25837	26625	27484
Ending Stocks	(1000 mt)	59602	61676	59685	56772	54117	52014	51456	50759	50508	50907	52220	54429	57500

Table 2. Total World Rice Trade (Combined Medium and Long Grain)

Country	Units / Yea	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EXPORTERS	(1000 mt)	25546	21926	23573	24337	24821	25284	25921	26428	27113	27796	28583	29371	30226
United States	(1000 mt)	2681	2760	2846	2740	2823	2781	2853	2845	2883	2870	2901	2918	2950
Thailand	(1000 mt)	6679	5801	5885	6817	6816	6825	6928	6990	7091	7219	7373	7544	7759
Pakistan	(1000 mt)	1850	2000	2091	2136	2150	2164	2179	2181	2197	2212	2235	2258	2284
Myanmar	(1000 mt)	56	150	197	245	292	339	385	434	484	534	586	639	692
Vietnam	(1000 mt)	4495	3928	4005	4119	4347	4543	4714	4867	5064	5237	5413	5579	5745
China	(1000 mt)	2708	2588	1981	1521	1398	1411	1428	1448	1502	1583	1673	1746	1820
India	(1000 mt)	3340	1151	2843	2913	3025	3139	3254	3384	3524	3675	3839	4022	4206
Australia	(1000 mt)	675	500	590	584	602	618	634	654	672	691	710	729	748
Egypt	(1000 mt)	260	421	453	451	450	449	448	447	447	446	446	446	446
Italy+OtherEU	(1000 mt)	1209	1097	1164	1211	1248	1274	1285	1295	1293	1295	1296	1300	1301
Japan	(1000 mt)	200	400	200	200	200	200	200	200	200	200	200	200	200
Argentina	(1000 mt)	649	495	593	674	714	756	798	841	886	931	977	1024	1072
Uruguay	(1000 mt)	744	635	727	727	755	785	814	842	871	902	935	968	1003
IMPORTERS	(1000 mt)	25546	21926	23573	24337	24821	25284	25921	26428	27113	27796	28583	29371	30226
United States	(1000 mt)	330	346	362	377	392	407	422	436	455	474	492	510	529
Thailand	(1000 mt)	1	2	2	2	2	2	2	3	3	3	4	4	4
China	(1000 mt)	474	481	592	664	702	725	728	746	742	718	684	661	634
Japan	(1000 mt)	650	720	682	682	682	682	682	682	682	682	682	682	682
Indonesia	(1000 mt)	3900	2681	3344	3219	3271	3341	3454	3600	3774	3916	4098	4319	4583
Iraq	(1000 mt)	781	850	827	851	877	903	929	956	982	1008	1034	1061	1087
Iran	(1000 mt)	1000	1200	984	1096	1219	1251	1283	1315	1348	1382	1417	1452	1487
Saudi Arabia	(1000 mt)	748	720	796	828	859	892	928	962	998	1035	1073	1112	1153
European Union	(1000 mt)	1612	1545	1582	1577	1571	1566	1564	1559	1557	1553	1549	1544	1539
South Korea	(1000 mt)	113	108	103	128	154	180	205	205	205	205	205	205	205
Taiwan	(1000 mt)	-52	-147	-50	132	132	132	132	132	132	132	132	132	132
Australia	(1000 mt)	40	39	57	58	60	62	63	65	67	68	70	72	73
Brazil	(1000 mt)	935	625	836	861	928	997	1051	1117	1154	1199	1241	1265	1281
Mexico	(1000 mt)	306	338	307	313	322	330	341	349	357	364	372	379	386
Canada	(1000 mt)	240	253	251	264	273	283	294	302	311	320	329	338	347
South Africa	(1000 mt)	500	535	447	503	508	517	533	532	540	545	550	552	557
ROW	(1000 mt)	13968	11633	12451	12782	12869	13015	13308	13467	13806	14191	14649	15085	15548

Table 3. World Rice Net Trade

Country	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
NET EXPORTERS	(1000 mt)	23292	19563	21197	21825	22217	22615	23219	23683	24353	25039	25837	26625	27484
United States	(1000 mt)	2351	2414	2484	2363	2431	2374	2431	2408	2428	2396	2409	2407	2422
Thailand	(1000 mt)	6678	5800	5883	6815	6814	6823	6926	6988	7088	7216	7370	7540	7755
Pakistan	(1000 mt)	1850	2000	2091	2136	2150	2164	2179	2181	2197	2212	2235	2258	2284
Myanmar	(1000 mt)	56	150	197	245	292	339	385	434	484	534	586	639	692
Vietnam	(1000 mt)	4495	3928	4005	4119	4347	4543	4714	4867	5064	5237	5413	5579	5745
China	(1000 mt)	2234	2107	1389	857	696	686	699	701	760	865	989	1085	1186
India	(1000 mt)	3340	1151	2843	2913	3025	3139	3254	3384	3524	3675	3839	4022	4206
Australia	(1000 mt)	635	461	533	525	542	557	571	589	605	623	640	657	674
Egypt	(1000 mt)	260	421	453	451	450	449	448	447	447	446	446	446	446
Argentina	(1000 mt)	649	495	593	674	714	756	798	841	886	931	977	1024	1072
Uruguay	(1000 mt)	744	635	727	727	755	785	814	842	871	902	935	968	1003
NET IMPORTERS	(1000 mt)	23292	19563	21197	21825	22217	22615	23219	23683	24353	25039	25837	26625	27484
Japan	(1000 mt)	450	320	482	482	482	482	482	482	482	482	482	482	482
Indonesia	(1000 mt)	3900	2681	3344	3219	3271	3341	3454	3600	3774	3916	4098	4319	4583
Iraq	(1000 mt)	781	850	827	851	877	903	929	956	982	1008	1034	1061	1087
Iran	(1000 mt)	1000	1200	984	1096	1219	1251	1283	1315	1348	1382	1417	1452	1487
Saudi Arabia	(1000 mt)	748	720	796	828	859	892	928	962	998	1035	1073	1112	1153
European Union	(1000 mt)	403	448	418	366	323	292	279	264	263	258	253	244	238
South Korea	(1000 mt)	113	108	103	128	154	180	205	205	205	205	205	205	205
Taiwan	(1000 mt)	-52	-147	-50	132	132	132	132	132	132	132	132	132	132
Brazil	(1000 mt)	935	625	836	861	928	997	1051	1117	1154	1199	1241	1265	1281
Mexico	(1000 mt)	306	338	307	313	322	330	341	349	357	364	372	379	386
Canada	(1000 mt)	240	253	251	264	273	283	294	302	311	320	329	338	347
South Africa	(1000 mt)	500	535	447	503	508	517	533	532	540	545	550	552	557
Rest of World	(1000 mt)	13968	11633	12451	12782	12869	13015	13308	13467	13806	14191	14649	15085	15548

Table 4. World Long Grain Rice Trade

Country	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EXPORTERS	(1000 mt)	22449	18470	20521	21413	21861	22263	22855	23312	23943	24558	25269	25986	26767
United States	(1000 mt)	2222	2197	2383	2225	2261	2198	2260	2232	2256	2229	2245	2243	2256
Thailand	(1000 mt)	6679	5801	5885	6817	6816	6825	6928	6990	7091	7219	7373	7544	7759
Pakistan	(1000 mt)	1850	2000	2091	2136	2150	2164	2179	2181	2197	2212	2235	2258	2284
Myanmar	(1000 mt)	56	150	197	245	292	339	385	434	484	534	586	639	692
Vietnam	(1000 mt)	4495	3928	4005	4119	4347	4543	4714	4867	5064	5237	5413	5579	5745
India	(1000 mt)	3340	1151	2843	2913	3025	3139	3254	3384	3524	3675	3839	4022	4206
EU excl. Italy	(1000 mt)	789	689	710	721	732	738	737	745	745	747	747	750	749
Argentina	(1000 mt)	649	495	593	674	714	756	798	841	886	931	977	1024	1072
Uruguay	(1000 mt)	744	635	727	727	755	785	814	842	871	902	935	968	1003
China	(1000 mt)	1625	1424	1090	837	769	776	785	796	826	871	920	960	1001
IMPORTERS	(1000 mt)	22449	18470	20521	21413	21861	22263	22855	23312	23943	24558	25269	25986	26767
United States	(1000 mt)	330	346	362	377	392	407	422	436	455	474	492	510	529
Thailand	(1000 mt)	1	1	1	1	1	2	2	2	2	2	3	3	3
China	(1000 mt)	474	481	592	664	702	725	728	746	742	718	684	661	634
Indonesia	(1000 mt)	3900	2681	3344	3219	3271	3341	3454	3600	3774	3916	4098	4319	4583
Iraq	(1000 mt)	781	850	827	851	877	903	929	956	982	1008	1034	1061	1087
Iran	(1000 mt)	1000	1200	984	1096	1219	1251	1283	1315	1348	1382	1417	1452	1487
Saudi Arabia	(1000 mt)	748	720	796	828	859	892	928	962	998	1035	1073	1112	1153
European Union	(1000 mt)	1612	1545	1582	1577	1571	1566	1564	1559	1557	1553	1549	1544	1539
Australia	(1000 mt)	40	39	57	58	60	62	63	65	67	68	70	72	73
Brazil	(1000 mt)	935	625	836	861	928	997	1051	1117	1154	1199	1241	1265	1281
Mexico	(1000 mt)	306	338	307	313	322	330	341	349	357	364	372	379	386
Canada	(1000 mt)	240	253	251	264	273	283	294	302	311	320	329	338	347
South Africa	(1000 mt)	500	535	447	503	508	517	533	532	540	545	550	552	557
ROW	(1000 mt)	11582	8858	10134	10800	10877	10988	11263	11371	11656	11973	12356	12720	13109

Table 5. World Medium Grain Rice Trade

Country	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EXPORTERS	(1000 mt)	3097	3456	3052	2924	2960	3021	3065	3116	3170	3239	3314	3385	3459
United States	(1000 mt)	459	562	463	515	562	583	593	612	627	641	656	674	694
Australia	(1000 mt)	675	500	590	584	602	618	634	654	672	691	710	729	748
Egypt	(1000 mt)	260	421	453	451	450	449	448	447	447	446	446	446	446
Italy	(1000 mt)	420	408	454	490	516	536	547	551	548	548	549	550	552
Japan	(1000 mt)	200	400	200	200	200	200	200	200	200	200	200	200	200
China	(1000 mt)	1083	1165	892	685	629	635	643	651	676	712	753	786	819
IMPORTERS	(1000 mt)	3097	3456	3052	2924	2960	3021	3065	3116	3170	3239	3314	3385	3459
Thailand	(1000 mt)	0	0	0	0	0	1	1	1	1	1	1	1	1
Japan	(1000 mt)	650	720	682	682	682	682	682	682	682	682	682	682	682
South Korea	(1000 mt)	113	108	103	128	154	180	205	205	205	205	205	205	205
Taiwan	(1000 mt)	-52	-147	-50	132	132	132	132	132	132	132	132	132	132
Others (residual)	(1000 mt)	2386	2775	2317	1982	1992	2027	2046	2096	2150	2219	2294	2365	2438

Table 6. World Rice Prices and Price Relationships

Country	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Long Grain Rice, High Quality														
Thai 100%B fob	US$/mt	284	237	261	261	267	272	268	282	288	297	306	320	330
Thai 5% fob	US$/mt	273	228	251	251	257	262	258	272	277	286	295	308	318
Thai 5% fob (1985$)	US$/mt	180	147	158	154	155	154	148	152	152	153	154	157	158
US No. 2, fob Houston	US$/mt	369	291	313	325	332	336	335	347	354	363	372	384	394
US No. 2 - Thai 5%	US$/mt	96	63	62	74	74	75	77	76	76	76	77	76	76
Long Grain Rice, Low Quality														
Thai 35% fob	US$/mt	236	190	206	211	219	225	222	234	240	248	256	267	273
US Wheat No. 2, fob Gulf	US$/mt	119	112	132	135	139	144	142	147	150	153	157	160	161
'Wheat/Thai35% Price Ratio	Ratio in %	0.50	0.59	0.64	0.64	0.64	0.64	0.64	0.63	0.62	0.62	0.61	0.60	0.59
Thai 35% - US Wheat	US$/mt	117	78	75	76	80	82	80	87	90	95	100	107	112
Medium Grain Rice														
U.S. No.2 MG Rice fob CA	US$/mt	470	458	423	417	418	414	408	408	406	406	405	406	406
MG fob CA - LG fob Houston	US$/mt	101	167	110	92	87	77	72	61	52	43	33	22	12

Table 7. Thailand Rice Supply and Utilization

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	9833	9840	9770	9786	9750	9711	9671	9582	9528	9486	9455	9428	9426
Yield	(mt/ha)	1.54	1.61	1.57	1.60	1.62	1.64	1.67	1.69	1.71	1.73	1.75	1.78	1.80
Production	(1000 mt)	15180	15850	15343	15664	15815	15962	16106	16168	16286	16425	16585	16750	16962
Per-capita Use	(kg)	148.24	148.49	148.43	147.84	147.54	146.47	145.29	144.26	143.30	142.38	141.43	140.41	139.36
Total Consumption	(1000 mt)	8900	9000	9079	9124	9184	9195	9196	9204	9213	9222	9225	9221	9211
Exports	(1000 mt)	6679	5801	5885	6817	6816	6825	6928	6990	7091	7219	7373	7544	7759
Net Exports	(1000 mt)	6678	5800	5883	6815	6814	6823	6926	6988	7088	7216	7370	7540	7755
Ending Stocks	(1000 mt)	653	1703	2083	1809	1626	1571	1555	1532	1516	1504	1494	1484	1480

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

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
YIELD (rough basis)														
Actual	(lb/ac)	5669	5908	6062	6061	6106	6178	6232	6303	6363	6430	6492	6557	6621
Program	(lb/ac)	4827	4827	4827	4827	4827	4827	4827	4827	4827	4827	4827	4827	4827
HARVESTED ACREAGE														
Program Area/Contract Area	(1000 ac)	4157.0	4157.2	4157.2	4157.2	4157.2	4157.2	4157.2	4157.2	4157.2	4157.2	4157.2	4157.2	4157.2
Total Harvested Area	(1000 ac)	3317.0	3562.0	3283.0	3292.4	3317.6	3272.6	3358.6	3293.3	3347.1	3317.4	3357.2	3359.2	3389.0
SUPPLY (rough basis)	(mil. cwt)	226.6	243.6	246.5	245.2	248.8	247.6	253.4	253.5	257.8	258.8	262.3	264.8	268.6
Production	(mil. cwt)	188.1	210.5	199.0	199.6	202.6	202.2	209.3	207.6	213.0	213.3	217.9	220.3	224.4
Beginning Stocks	(mil. cwt)	28.1	22.2	36.0	33.8	33.8	32.6	30.8	32.2	30.5	30.5	28.9	28.5	27.5
Imports	(mil. cwt)	10.5	11.0	11.4	11.9	12.3	12.8	13.3	13.7	14.3	14.9	15.5	16.1	16.7
DOMESTIC USE (rough basis)	(mil. cwt)	119.1	120.1	123.0	125.1	127.2	129.2	131.3	133.4	136.5	139.5	142.5	145.4	148.5
Food	(mil. cwt)	87.3	89.7	94.0	97.0	100.0	102.9	105.9	108.8	111.8	114.7	117.6	120.4	123.3
Seed	(mil. cwt)	4.4	4.3	4.1	4.1	4.0	4.1	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Brewing	(mil. cwt)	16.0	16.0	16.0	16.0	16.2	16.3	16.4	16.5	16.7	16.8	16.9	17.0	17.2
Residual	(mil. cwt)	11.4	10.0	9.0	8.0	7.0	6.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
EXPORTS	(mil. cwt)	85.3	87.5	89.6	86.3	88.9	87.6	89.9	89.6	90.8	90.4	91.4	91.9	92.9
TOTAL USE	(mil. cwt)	204.4	207.6	212.7	211.4	216.1	216.8	221.2	223.0	227.3	229.9	233.8	237.3	241.4
ENDING STOCKS	(mil. cwt)	22.2	36.0	33.8	33.8	32.6	30.8	32.2	30.5	30.5	28.9	28.5	27.5	27.2
PRICES														
Loan Rate	(US$/cwt)	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50
Season Ave. Farm Price	(US$/cwt)	8.89	6.14	6.24	6.55	6.58	6.98	6.78	7.12	7.08	7.37	7.47	7.72	7.72
Long Grain Farm Price	(US$/cwt)	8.56	5.25	5.70	6.25	6.15	6.67	6.35	6.78	6.69	7.05	7.15	7.43	7.39
Medium Grain Farm Price	(US$/cwt)	9.87	8.59	7.45	7.28	7.69	7.72	7.83	7.95	8.02	8.13	8.24	8.39	8.52
LG-MG Margin	(US$/cwt)	-1.31	-3.34	-1.75	-1.04	-1.54	-1.05	-1.48	-1.17	-1.34	-1.08	-1.09	-0.96	-1.13
Export Price, FOB Houston (U.S. No. 2)	(US$/cwt)	16.73	13.20	14.19	14.75	15.04	15.26	15.20	15.75	16.05	16.45	16.85	17.41	17.88
Medium Grain Price, FOB CA (U.S. No. 2)	(US$/cwt)	21.32	20.77	19.20	18.91	18.97	18.78	18.49	18.52	18.42	18.40	18.37	18.42	18.41
AMTA Payment Rate	(US$/cwt)	2.92	2.82	2.60	2.10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
MLA Payment Rate	(US$/cwt)	1.45	2.82	2.82										
World Price (US$/cwt)	(US$/cwt)	7.37	4.30	5.21	5.21	5.39	5.51	5.41	5.78	5.95	6.20	6.44	6.80	7.08
EXPP-SAFP Margin	(US$/cwt)	3.90	4.36	5.27	5.39	5.63	5.29	5.52	5.58	5.94	5.93	6.18	6.39	6.85
INCOME FACTORS														
Production Market Value	(mil. US$)	1672	1293	1242	1308	1334	1411	1419	1479	1507	1572	1629	1700	1733
AMTA/MLA Payments	(mil. US$)	745	930	923	358	348	348	348	348	348	348	348	348	348
Marketing Loan/Certificates	(mil. US$)	0	354	196	197	172	152	173	114	90	49	15	0	0
Total Income	(mil. US$)	2417	2577	1881	1863	1854	1912	1940	1941	1945	1969	1992	2048	2081
Market Returns Above Variable Cost	(US$/ac)	131.75	-20.62	-9.20	1.89	1.19	25.30	10.07	31.64	27.12	44.61	49.73	64.17	69.12
Total Returns Above Variable Cost	(US$/ac)	356.35	339.87	185.38	170.37	157.90	178.22	165.30	171.86	157.92	164.34	157.80	167.76	171.80

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

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
YIELD (rough basis)	(lb/ac)	5430	5629	5589	5610	5675	5734	5808	5874	5937	5998	6062	6125	6189
HARVESTED ACREAGE	(1000 ac)	2608.0	2738.0	2462.1	2505.9	2560.1	2475.4	2562.2	2492.0	2538.2	2504.8	2537.5	2532.2	2551.3
SUPPLY (rough basis)	(mil. cwt)	165.7	179.1	179.8	175.1	178.8	176.8	182.3	182.1	185.9	186.6	189.9	192.0	195.2
Production	(mil. cwt)	141.6	154.3	137.6	140.6	145.3	141.9	148.8	146.4	150.7	150.2	153.8	155.1	157.9
Beginning Stocks	(mil. cwt)	15.6	15.1	32.0	23.8	22.4	23.2	21.4	23.1	22.0	22.6	21.8	22.1	21.8
Imports	(mil. cwt)	8.5	9.8	10.2	10.7	11.1	11.6	12.1	12.5	13.1	13.7	14.3	14.9	15.5
DOMESTIC USE + Residual	(mil. cwt)	79.9	78.6	80.9	82.6	84.4	86.2	88.0	89.7	92.2	94.7	97.1	99.6	102.1
EXPORTS	(mil. cwt)	70.7	68.5	75.1	70.1	71.2	69.2	71.2	70.3	71.1	70.2	70.7	70.6	71.0
TOTAL USE + Residual	(mil. cwt)	150.6	147.1	156.0	152.7	155.6	155.4	159.1	160.0	163.2	164.8	167.8	170.2	173.2
ENDING STOCKS	(mil. cwt)	15.1	32.0	23.8	22.4	23.2	21.4	23.1	22.0	22.6	21.8	22.1	21.8	22.0
PRICES														
Season Average Farm Price	(US$/cwt)	8.56	5.25	5.70	6.25	6.15	6.67	6.35	6.78	6.69	7.05	7.15	7.43	7.39
Export Price, FOB Houston (U.S. No. 2)	(US$/cwt)	16.74	13.20	14.19	14.75	15.04	15.26	15.20	15.75	16.05	16.45	16.85	17.41	17.88
PRODUCTION MARKET VALUE	(mil. US$)	1212.5	809.6	784.7	878.3	893.2	946.2	944.9	992.2	1007.7	1058.9	1100.3	1153.0	1166.5

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

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
YIELD (rough basis)	(lb/ac)	6625	6824	7482	7498	7562	7554	7597	7638	7697	7761	7821	7881	7937
HARVESTED ACREAGE	(1000 ac)	709.0	824.0	820.9	786.4	757.5	797.2	796.4	801.3	808.8	812.6	819.7	827.0	837.8
SUPPLY (rough basis)	(mil. cwt)	60.7	64.5	67.2	70.7	70.5	71.4	71.6	72.0	72.5	72.7	73.0	73.4	74.0
Production	(mil. cwt)	46.4	56.4	61.4	59.0	57.3	60.2	60.5	61.2	62.3	63.1	64.1	65.2	66.5
Beginning Stocks	(mil. cwt)	12.3	6.9	4.6	10.5	12.0	10.0	9.9	9.6	9.0	8.5	7.7	7.0	6.3
Imports	(mil. cwt)	2.0	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
DOMESTIC USE + Residual		39.2	41.5	42.1	42.4	42.8	43.1	43.4	43.7	44.3	44.8	45.4	45.9	46.4
EXPORTS	(mil. cwt)	14.6	18.5	14.6	16.2	17.7	18.4	18.7	19.3	19.8	20.2	20.7	21.2	21.9
TOTAL USE + Residual	(mil. cwt)	53.8	60.0	56.7	58.7	60.5	61.4	62.1	63.0	64.0	65.0	66.0	67.1	68.2
ENDING STOCKS	(mil. cwt)	6.9	4.6	10.5	12.0	10.0	9.9	9.6	9.0	8.5	7.7	7.0	6.3	5.7
PRICES														
Season Average Farm Price	(US$/cwt)	9.87	8.59	7.45	7.28	7.69	7.72	7.83	7.95	8.02	8.13	8.24	8.39	8.52
Medium Grain Price, FOB CA (U.S. No.2)	(US$/cwt)	21.32	20.77	19.20	18.91	18.97	18.78	18.49	18.52	18.42	18.40	18.37	18.42	18.41
PRODUCTION MARKET VALUE	(mil. US$)	458.2	484.7	457.7	429.6	440.6	464.9	473.9	486.6	499.4	512.8	528.4	547.0	566.7

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

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	1342	1441	1328	1332	1342	1324	1359	1332	1354	1342	1358	1359	1371
Yield	(mt/ha)	4.41	4.61	4.76	4.76	4.79	4.85	4.89	4.95	4.99	5.05	5.10	5.15	5.20
Production	(1000 mt)	5911	6643	6320	6336	6432	6419	6646	6591	6762	6773	6920	6994	7125
Imports	(1000 mt)	330	346	362	377	392	407	422	436	455	474	492	510	529
Food Use	(1000 mt)	2744	2829	2985	3079	3176	3266	3364	3455	3550	3641	3733	3823	3916
Seed Use	(1000 mt)	138	136	129	130	127	130	126	128	126	127	127	127	127
Brewer Use	(1000 mt)	503	504	507	509	514	517	522	525	529	533	537	541	545
Total Consumption	(1000 mt)	3744	3785	3907	3972	4039	4104	4170	4236	4333	4428	4524	4618	4714
Per Capita Use	(kg)	13.85	13.88	14.21	14.33	14.45	14.56	14.68	14.79	15.01	15.22	15.43	15.62	15.82
Exports	(1000 mt)	2681	2760	2846	2740	2823	2781	2853	2845	2883	2870	2901	2918	2950
Residual	(1000 mt)	358	315	286	254	222	191	159	127	127	127	127	127	127
Total Use	(1000 mt)	6425	6544	6753	6712	6862	6885	7024	7080	7216	7298	7425	7536	7665
Ending Stocks	(1000 mt)	689	1132	1061	1063	1024	965	1010	957	958	906	894	862	851

Table 12. Arkansas Rice Supply by Type

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Long Grain Area	(1000 ac)	1323.0	1394.0	1302.2	1313.0	1345.0	1338.0	1369.7	1348.6	1374.4	1366.9	1386.2	1389.9	1403.5
Long Grain Yield	(pounds/ac)	5740	5840	5771	5847	5925	6003	6083	6164	6229	6294	6360	6426	6494
Long Grain Production	(mil. cwt)	75.9	81.4	75.1	76.8	79.7	80.3	83.3	83.1	85.6	86.0	88.2	89.3	91.1
Medium Grain Area	(1000 ac)	202.0	251.0	236.1	227.0	211.7	226.7	228.8	232.9	238.0	241.4	246.2	251.1	257.3
Medium Grain Yield	(pounds/ac)	6178	6229	6250	6149	6201	6253	6305	6357	6414	6476	6542	6614	6691
Medium Grain Production	(mil. cwt)	12.5	15.6	14.8	14.0	13.1	14.2	14.4	14.8	15.3	15.6	16.1	16.6	17.2
Total Area	(1000 ac)	1525.0	1645.0	1538.4	1540.0	1556.6	1564.7	1598.5	1581.5	1612.4	1608.3	1632.4	1641.0	1660.7
Average Yield	(pounds/ac)	5798	5899	5844	5892	5962	6039	6115	6192	6256	6321	6387	6455	6524
Total Production	(mil. cwt)	88.4	97.0	89.9	90.7	92.8	94.5	97.7	97.9	100.9	101.7	104.3	105.9	108.3

Table 13. Louisiana Rice Supply by Type

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Long Grain Area	(1000 ac)	590.0	581.0	531.9	550.2	555.3	548.9	554.2	543.6	547.1	541.2	543.1	540.5	540.7
Long Grain Yield	(pounds/ac)	4530	5000	5027	4876	4920	4965	5012	5061	5118	5175	5232	5289	5346
Long Grain Production	(mil. cwt)	26.7	29.0	26.7	26.8	27.3	27.3	27.8	27.5	28.0	28.0	28.4	28.6	28.9
Medium Grain Area	(1000 ac)	30.0	34.8	31.0	26.5	26.5	38.8	39.8	41.4	43.7	45.2	47.6	50.2	53.7
Medium Grain Yield	(pounds/ac)	4600	5070	4656	4681	4725	4779	4826	4875	4931	4995	5069	5154	5253
Medium Grain Production	(mil. cwt)	1.4	1.8	1.4	1.2	1.3	1.9	1.9	2.0	2.2	2.3	2.4	2.6	2.8
Total Area	(1000 ac)	620.0	615.8	563.0	576.6	581.8	587.7	593.9	585.0	590.8	586.4	590.7	590.7	594.5
Average Yield	(pounds/ac)	4533	5004	5007	4867	4911	4953	4999	5048	5104	5161	5219	5278	5338
Total Production	(mil. cwt)	28.1	30.8	28.2	28.1	28.6	29.1	29.7	29.5	30.2	30.3	30.8	31.2	31.7

Table 14. Texas Rice Supply

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total Area	(1000 ac)	283.0	259.0	221.2	234.7	247.5	224.0	230.9	217.2	221.8	213.4	215.2	211.1	210.7
Average Yield	(pounds/ac)	5599	6030	5698	5780	5825	5877	5937	5991	6031	6069	6108	6147	6188
Total Production	(mil. cwt)	15.9	15.6	12.6	13.6	14.4	13.2	13.7	13.0	13.4	12.9	13.1	13.0	13.0

Table 15. Missouri Rice Supply

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total Area	(1000 ac)	140.0	184.0	160.1	160.0	165.6	163.2	167.7	162.7	166.2	163.9	166.4	166.3	168.0
Average Yield	(pounds/ac)	5200	5400	5346	5399	5452	5505	5559	5612	5671	5735	5805	5883	5968
Total Production	(mil. cwt)	7.3	9.9	8.6	8.6	9.0	9.0	9.3	9.1	9.4	9.4	9.7	9.8	10.0

Table 16. Mississippi Rice Supply

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total Area	(1000 ac)	268.0	323.0	246.7	248.2	246.7	201.4	239.6	219.8	228.8	219.5	226.5	224.5	228.5
Average Yield	(pounds/ac)	5800	5650	5903	5959	6014	6069	6125	6180	6249	6314	6373	6428	6477
Total Production	(mil. cwt)	15.5	18.2	14.6	14.8	14.8	12.2	14.7	13.6	14.3	13.9	14.4	14.4	14.8

Table 17. California Rice Supply

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total Area	(1000 ac)	478.0	534.8	553.7	532.9	519.3	531.6	527.9	527.0	527.1	525.9	526.0	525.8	526.8
Average Yield	(pounds/ac)	6990	7300	8166	8212	8261	8312	8365	8421	8506	8589	8669	8746	8820
Total Production	(mil. cwt)	33.4	39.0	45.2	43.8	42.9	44.2	44.2	44.4	44.8	45.2	45.6	46.0	46.5

Table 18. China Rice Supply and Utilization

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	31214	31300	31135	31026	30944	30882	30834	30784	30746	30715	30692	30674	30660
Yield	(mt/ha)	4.46	4.50	4.49	4.51	4.54	4.57	4.62	4.64	4.69	4.74	4.80	4.85	4.91
Production	(1000 mt)	139100	141000	139810	139793	140394	141048	142385	142892	144086	145618	147390	148871	150560
Per Capita Use	(kg)	110.23	110.31	110.25	110.19	110.20	110.01	110.01	109.77	109.65	109.51	109.40	109.25	109.16
Total Consumption	(1000 mt)	137050	138278	139242	140138	141068	141702	142552	143064	143733	144372	145062	145719	146484
Total Exports	(1000 mt)	2708	2588	1981	1521	1398	1411	1428	1448	1502	1583	1673	1746	1820
Long Grain	(1000 mt)	1625	1424	1090	837	769	776	785	796	826	871	920	960	1001
Medium Grain	(1000 mt)	1083	1165	892	685	629	635	643	651	676	712	753	786	819
Imports	(1000 mt)	474	481	592	664	702	725	728	746	742	718	684	661	634
Net Exports	(1000 mt)	2234	2107	1389	857	696	686	699	701	760	865	989	1085	1186
Ending Stocks	(1000 mt)	26539	27153	26333	25131	23761	22421	21554	20681	20274	20654	21994	24060	26950

Table 19. India Rice Supply and Utilization

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total Area Harvested	(1000 ha)	44600	44500	44919	44933	45002	45020	45028	45017	44997	45017	45037	45063	45105
East	(1000 ha)	19408	19364	19468	19461	19453	19444	19433	19422	19412	19404	19397	19391	19386
North	(1000 ha)	9199	9178	9385	9389	9457	9476	9484	9469	9439	9442	9439	9436	9440
South	(1000 ha)	8041	8023	8086	8074	8055	8042	8030	8021	8015	8005	7996	7988	7978
West	(1000 ha)	7952	7934	7980	8008	8036	8059	8081	8105	8131	8165	8204	8248	8301
Average Yield	(mt/ha)	1.93	1.94	1.93	1.96	1.99	2.03	2.08	2.11	2.14	2.17	2.20	2.24	2.27
East	(mt/ha)	1.61	1.61	1.58	1.60	1.63	1.67	1.74	1.78	1.82	1.86	1.90	1.93	1.97
North	(mt/ha)	2.38	2.41	2.41	2.44	2.49	2.53	2.55	2.58	2.60	2.63	2.66	2.68	2.72
South	(mt/ha)	2.79	2.82	2.81	2.84	2.87	2.90	2.96	2.98	3.01	3.04	3.06	3.12	3.15
West	(mt/ha)	1.31	1.34	1.32	1.35	1.38	1.41	1.44	1.47	1.50	1.52	1.55	1.58	1.61
Total Production	(1000 mt)	86000	86500	86725	87888	89557	91197	93461	94876	96211	97635	99056	100797	102367
East	(1000 mt)	31170	31219	30832	31211	31781	32505	33874	34593	35314	36037	36761	37487	38213
North	(1000 mt)	21925	22094	22587	22879	23505	23939	24206	24415	24583	24836	25073	25311	25671
South	(1000 mt)	22457	22588	22743	22957	23151	23361	23746	23936	24132	24318	24505	24946	25131
West	(1000 mt)	10448	10599	10563	10841	11120	11393	11634	11932	12181	12445	12717	13053	13352
Average Per capita use	(kg)	82.48	83.48	83.66	83.56	83.33	83.05	82.89	82.79	82.74	82.71	82.71	82.72	82.76
East	(kg)	160.93	162.60	163.09	162.93	162.43	161.74	161.32	161.05	160.87	160.74	160.66	160.62	160.60
North	(kg)	17.42	18.14	18.39	18.45	18.42	18.38	18.33	18.30	18.29	18.31	18.36	18.45	18.57
South	(kg)	110.01	111.10	110.96	110.80	110.68	110.56	110.56	110.58	110.58	110.58	110.58	110.58	110.58
West	(kg)	38.25	38.77	38.85	38.74	38.52	38.27	38.14	38.08	38.05	38.06	38.07	38.11	38.15
Total Consumption	(1000 mt)	81160	83550	85136	86431	87586	88664	89867	91120	92414	93732	95078	96447	97841
East	(1000 mt)	42001	43163	44018	44697	45277	45799	46387	47008	47655	48314	48985	49666	50356
North	(1000 mt)	3996	4232	4364	4448	4514	4575	4634	4695	4762	4837	4920	5014	5119
South	(1000 mt)	24957	25636	26034	26423	26818	27214	27636	28056	28474	28890	29306	29722	30138
West	(1000 mt)	10206	10519	10720	10863	10977	11076	11210	11361	11524	11692	11866	12045	12229
Exports	(1000 mt)	3350	1151	2843	2913	3025	3139	3254	3384	3524	3675	3839	4022	4206
Ending Stocks	(1000 mt)	12000	13799	12546	11090	10036	9430	9771	10143	10416	10643	10783	11110	11430

Table 20. Pakistan Rice Supply and Utilization

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	2424	2500	2502	2507	2511	2515	2521	2523	2524	2524	2525	2527	2531
Yield	(mt/ha)	1.93	2.04	1.95	2.00	2.02	2.04	2.06	2.08	2.10	2.12	2.15	2.17	2.20
Production	(1000 mt)	4674	5100	4881	5002	5061	5122	5185	5243	5296	5349	5417	5487	5562
Per Cap Use	(kg)	19.14	19.19	19.37	19.37	19.36	19.36	19.35	19.35	19.34	19.34	19.33	19.33	19.32
Total Consumption	(1000 mt)	2587	2650	2734	2792	2850	2907	2965	3021	3077	3133	3189	3245	3300
Net Exports	(1000 mt)	1850	2000	2091	2136	2150	2164	2179	2181	2197	2212	2235	2258	2284
Ending Stocks	(1000 mt)	359	809	865	939	1001	1051	1093	1134	1156	1159	1152	1136	1114

Table 21. Myanmar Rice Supply and Utilization

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	5600	5800	5792	5852	5869	5899	5927	5945	5987	6019	6056	6092	6133
Yield	(mt/ha)	1.66	1.70	1.68	1.70	1.72	1.74	1.76	1.78	1.80	1.82	1.84	1.86	1.88
Production	(1000 mt)	9300	9860	9749	9957	10097	10260	10421	10568	10759	10937	11125	11315	11516
Per-capita Use	(kg)	196.08	194.04	193.73	194.09	193.74	193.86	193.57	192.77	192.56	192.43	192.48	192.42	192.52
Total Consumption	(1000 mt)	9276	9330	9464	9630	9762	9918	10051	10158	10295	10437	10589	10735	10891
Net Exports	(1000 mt)	56	150	197	245	292	339	385	434	484	534	586	639	692
Ending Stocks	(1000 mt)	223	603	691	774	816	819	804	780	761	726	676	617	550

Table 22. Vietnam Rice Supply and Utilization

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total Area Harvested	(1000 ha)	7575	7600	7618	7677	7699	7724	7741	7748	7773	7789	7807	7824	7845
Mekong Delta	(1000 ha)	3469	3481	3498	3541	3559	3577	3589	3595	3613	3626	3640	3654	3671
Rest of Vietnam	(1000 ha)	4106	4119	4120	4136	4141	4147	4152	4153	4160	4163	4167	4170	4174
Yield Average	(mt/ha)	2.65	2.67	2.70	2.73	2.77	2.81	2.85	2.90	2.94	2.98	3.02	3.07	3.11
Production	(1000 mt)	20108	20300	20583	20940	21326	21721	22100	22452	22854	23232	23615	23991	24371
Per Capita Use	(kg)	204.70	211.53	211.22	211.48	210.72	210.50	210.37	210.14	209.98	209.83	209.71	209.59	209.52
Total Consumption	(1000 mt)	15613	16372	16579	16822	16979	17179	17386	17585	17790	17995	18202	18412	18626
Net Exports	(1000 mt)	4495	3928	4005	4119	4347	4543	4714	4867	5064	5237	5413	5579	5745
Ending Stocks	(1000 mt)	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 23. Australia Rice Supply and Utilization

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	152	130	133	136	138	140	142	143	145	147	149	151	152
Yield	(mt/ha)	6.54	6.15	6.34	6.42	6.50	6.59	6.68	6.77	6.87	6.96	7.05	7.14	7.23
Production	(1000 mt)	994	800	845	871	896	921	946	971	996	1022	1048	1075	1101
Per Capita Use	(kg)	17.73	18.10	18.29	18.47	18.65	18.84	19.03	19.22	19.41	19.60	19.80	20.00	20.20
Total Consumption	(1000 mt)	330	340	347	353	360	366	373	379	386	392	399	406	413
Imports	(1000 mt)	40	39	57	58	60	62	63	65	67	68	70	72	73
Exports	(1000 mt)	675	500	590	584	602	618	634	654	672	691	710	729	748
Net Exports	(1000 mt)	635	461	533	525	542	557	571	589	605	623	640	657	674
Ending Stocks	(1000 mt)	99	97	62	55	49	47	49	52	57	64	73	85	99

Table 24. Egypt Rice Supply and Utilization

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	504	630	572	563	560	561	561	561	563	564	565	567	569
Yield	(mt/ha)	5.25	5.75	5.93	6.04	6.16	6.26	6.36	6.45	6.54	6.62	6.71	6.79	6.87
Production	(1000 mt)	2645	3625	3392	3402	3451	3511	3568	3618	3679	3735	3791	3847	3905
Per Capita Use	(kg)	40.88	42.40	42.61	42.51	42.65	42.92	42.96	42.92	42.88	42.89	42.69	42.46	42.22
Total Consumption	(1000 mt)	2700	2852	2918	2963	3026	3098	3154	3204	3253	3306	3343	3377	3408
Net Exports	(1000 mt)	260	421	453	451	450	449	448	447	447	446	446	446	446
Ending Stocks	(1000 mt)	194	546	567	554	529	492	459	425	405	388	391	415	466

Table 25. Argentina Rice Supply and Utilization

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	289	210	248	271	280	289	298	307	317	328	338	349	361
Yield	(mt/ha)	3.74	2.86	3.48	3.52	3.56	3.60	3.64	3.69	3.73	3.77	3.82	3.86	3.91
Production	(1000 mt)	1080	600	864	955	995	1039	1085	1133	1183	1236	1291	1349	1409
Per capita use	(kg)	6.89	6.80	6.90	6.99	7.08	7.16	7.24	7.33	7.41	7.50	7.59	7.68	7.77
Total Consumption	(1000 mt)	250	250	257	264	270	277	283	290	297	304	311	319	326
Net Exports	(1000 mt)	649	495	593	674	714	756	798	841	886	931	977	1024	1072
Ending Stocks	(1000 mt)	233	88	102	119	130	136	140	141	142	143	146	152	164

Table 26. Uruguay Rice Supply and Utilization

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	205	185	193	195	199	204	209	214	219	224	229	234	238
Yield	(mt/ha)	4.37	4.16	4.25	4.27	4.30	4.34	4.39	4.44	4.49	4.54	4.60	4.66	4.73
Production	(1000 mt)	895	770	820	830	857	887	918	949	981	1016	1052	1089	1128
Per capita use	(kg)	27.40	28.73	29.74	29.90	30.01	30.25	30.68	31.15	31.55	32.01	32.53	33.12	33.78
Total Consumption	(1000 mt)	90	95	99	100	102	103	105	108	110	112	115	118	121
Net Exports	(1000 mt)	744	635	727	727	755	785	814	842	871	902	935	968	1003
Ending Stocks	(1000 mt)	91	131	125	128	128	128	126	125	125	127	129	133	137

Table 27. Brazil Rice Supply and Utilization

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total Area Harvested	(1000 ha)	3680	3665	3670	3592	3501	3432	3365	3297	3248	3190	3140	3099	3061
Irrigated	(1000 ha)	1000	1015	1087	1100	1107	1117	1127	1134	1144	1154	1164	1173	1184
Upland	(1000 ha)	2680	2649	2583	2492	2394	2315	2239	2163	2103	2036	1977	1926	1878
Average Yield	(mt/ha)	2.10	2.02	2.08	2.14	2.18	2.23	2.27	2.32	2.36	2.41	2.46	2.51	2.56
Irrigated	(mt/ha)	3.92	3.93	4.06	4.11	4.15	4.19	4.23	4.27	4.30	4.34	4.38	4.42	4.45
Upland	(mt/ha)	1.42	1.29	1.25	1.27	1.28	1.28	1.29	1.30	1.31	1.32	1.33	1.35	1.36
Total Production	(1000 mt)	7735	7398	7631	7689	7645	7643	7645	7640	7676	7691	7722	7772	7832
Irrigated	(1000 mt)	3923	3988	4410	4515	4590	4678	4763	4838	4925	5010	5096	5181	5270
Upland	(1000 mt)	3812	3410	3221	3175	3055	2965	2882	2801	2750	2681	2626	2591	2562
Per capita use	(kg)	48.17	48.06	48.25	48.24	48.16	48.06	47.96	47.86	47.78	47.71	47.66	47.62	47.61
Total Consumption	(1000 mt)	8180	8260	8386	8476	8550	8619	8686	8752	8818	8884	8952	9021	9092
Net Imports	(1000 mt)	935	625	836	861	928	997	1051	1117	1154	1199	1241	1265	1281
Ending Stocks	(1000 mt)	920	682	763	838	861	882	892	897	910	916	927	944	965

Table 28. European Union Rice Supply and Utilization

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	408	396	399	402	406	409	412	412	413	413	413	413	414
Yield	(mt/ha)	4.29	4.36	4.38	4.40	4.43	4.45	4.48	4.51	4.54	4.57	4.59	4.62	4.65
Production	(1000 mt)	1749	1727	1749	1773	1797	1821	1845	1859	1872	1885	1898	1912	1925
Per Capita Use	(kg)	5.34	5.48	5.53	5.56	5.60	5.63	5.67	5.70	5.74	5.78	5.81	5.85	5.88
Total Consumption	(1000 mt)	1996	2051	2072	2087	2102	2116	2130	2144	2156	2168	2180	2191	2202
Imports	(1000 mt)	1612	1545	1582	1577	1571	1566	1564	1559	1557	1553	1549	1544	1539
Exports	(1000 mt)	1209	1097	1164	1211	1248	1274	1285	1295	1293	1295	1296	1300	1301
Net Imports	(1000 mt)	403	448	418	366	323	292	279	264	263	258	253	244	238
Ending Stocks	(1000 mt)	808	932	1027	1078	1096	1093	1086	1065	1044	1019	991	955	917

Table 29. Italy Rice Supply

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	223	221	226	230	233	237	240	240	240	240	240	240	240
Yield	(mt/ha)	3.87	3.85	3.87	3.88	3.90	3.91	3.93	3.95	3.96	3.98	4.00	4.01	4.03
Production	(1000 mt)	863	852	872	891	909	926	942	947	951	955	959	963	967
Exports (Japonica)	(1000 mt)	420	408	454	490	516	536	547	551	548	548	549	550	552

Table 30. Spain Rice Supply

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	113	112	112	112	112	113	113	113	114	114	114	114	115
Yield	(mt/ha)	4.74	5.27	5.32	5.37	5.42	5.48	5.53	5.58	5.63	5.68	5.74	5.79	5.84
Production	(1000 mt)	536	590	596	602	610	617	624	632	639	647	654	662	669

Table 31. Other EU Rice Supply

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested (EU-Ita-Sp)	(1000 ha)	72	63	62	61	60	60	59	59	59	59	59	59	59
Yield (EU-Ita-Sp)	(mt/ha)	4.86	4.53	4.56	4.59	4.63	4.66	4.69	4.72	4.76	4.79	4.82	4.85	4.88
Production (EU-Ita-Sp)	(1000 mt)	350	285	281	279	278	278	279	280	281	283	285	287	289
Exports (EU-Ita), Indica	(1000 mt)	789	689	710	721	732	738	737	745	745	747	747	750	749

Table 32. Indonesia Rice Supply and Utilization

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	11850	11650	11671	11706	11748	11788	11823	11852	11875	11892	11905	11911	11912
Yield	(mt/ha)	2.71	2.76	2.83	2.87	2.89	2.91	2.94	2.96	2.98	3.00	3.02	3.04	3.05
Production	(1000 mt)	32100	32101	33033	33566	33968	34356	34720	35058	35370	35658	35919	36155	36363
Per-capita Use	(kg)	166.73	165.19	165.20	165.17	165.06	164.82	164.66	164.56	164.50	164.26	164.08	163.98	163.99
Total Consumption	(1000 mt)	35504	35701	36223	36738	37232	37694	38170	38655	39142	39576	40020	40476	40947
Net Imports	(1000 mt)	3900	2681	3344	3219	3271	3341	3454	3600	3774	3916	4098	4319	4583
Ending Stocks	(1000 mt)	4025	3106	3260	3306	3314	3317	3321	3324	3327	3324	3322	3319	3317

Table 33. Iran Rice Supply and Utilization

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	600	550	563	574	585	594	604	612	621	629	637	644	652
Yield	(mt/ha)	3.08	2.82	2.91	2.93	2.95	2.97	2.99	3.01	3.03	3.04	3.06	3.08	3.10
Production	(1000 mt)	1850	1550	1640	1684	1725	1765	1804	1841	1878	1914	1950	1985	2020
Per Capita Use	(kg)	36.98	37.67	38.78	38.89	38.98	39.07	39.17	39.25	39.33	39.41	39.48	39.55	39.62
Total Consumption	(1000 mt)	2550	2650	2788	2860	2932	3004	3075	3145	3215	3285	3355	3426	3495
Net Imports	(1000 mt)	1000	1200	984	1096	1219	1251	1283	1315	1348	1382	1417	1452	1487
Ending Stocks	(1000 mt)	621	721	558	477	489	501	513	524	536	547	559	571	583

Table 34. Iraq Rice Supply and Utilization

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	140	110	112	114	116	117	118	120	121	122	123	124	126
Yield	(mt/ha)	1.43	1.36	1.36	1.40	1.43	1.46	1.49	1.52	1.56	1.59	1.63	1.66	1.70
Production	(1000 mt)	200	150	153	160	165	171	177	182	188	194	201	207	213
Per Capita Use	(kg)	42.58	42.35	42.32	42.30	42.26	42.21	42.17	42.09	42.03	41.95	41.88	41.81	41.74
Total Consumption	(1000 mt)	925	950	980	1011	1042	1073	1106	1137	1170	1202	1235	1267	1300
Net Imports	(1000 mt)	781	850	827	851	877	903	929	956	982	1008	1034	1061	1087
Ending Stocks	(1000 mt)	106	156	156	156	156	156	156	156	156	156	156	156	156

Table 35. Saudi Arabia Rice Supply and Utilization

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Per Capita Use	(kg)	35.99	35.80	35.78	35.98	36.10	36.24	36.46	36.51	36.63	36.72	36.82	36.87	36.94
Total Consumption	(1000 mt)	748	770	796	828	859	892	928	962	998	1035	1073	1112	1153
Net Imports	(1000 mt)	748	720	796	828	859	892	928	962	998	1035	1073	1112	1153
Ending Stocks	(1000 mt)	74	24	24	24	24	24	24	24	24	24	24	24	24

Table 36. Japan Rice Supply and Utilization

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	1801	1789	1783	1785	1750	1727	1699	1669	1640	1611	1582	1554	1525
Yield	(mt/ha)	4.53	4.67	4.81	4.84	4.87	4.90	4.93	4.96	4.99	5.02	5.05	5.08	5.11
Production	(1000 mt)	8154	8351	8568	8635	8522	8461	8374	8278	8185	8091	7997	7899	7799
Per capita use	(kg)	72.26	74.88	73.72	72.64	71.62	70.68	69.85	69.04	68.27	67.53	66.81	66.10	65.39
Total Consumption	(1000 mt)	9100	9449	9321	9202	9087	8982	8886	8791	8698	8604	8510	8413	8314
Exports	(1000 mt)	200	400	200	200	200	200	200	200	200	200	200	200	200
Imports	(1000 mt)	650	720	682	682	682	682	682	682	682	682	682	682	682
Net Imports	(1000 mt)	450	320	482	482	482	482	482	482	482	482	482	482	482
Ending Stocks	(1000 mt)	2554	1776	1505	1420	1337	1297	1267	1237	1206	1174	1143	1111	1079

Table 37. South Korea Rice Supply and Utilization

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	1059	1067	977	957	961	949	935	925	916	907	897	886	874
Yield	(mt/ha)	4.82	4.94	5.02	5.04	5.07	5.10	5.12	5.15	5.18	5.21	5.24	5.27	5.30
Production	(1000 mt)	5100	5266	4902	4827	4873	4834	4788	4767	4746	4726	4700	4667	4629
Per capita use	(kg)	108.54	106.70	106.51	105.70	104.49	103.31	102.04	100.81	99.62	98.50	97.31	96.06	94.74
Total Consumption	(1000 mt)	5038	5003	5043	5053	5042	5030	5010	4990	4969	4949	4923	4892	4854
Imports	(1000 mt)	113	108	103	128	154	180	205	205	205	205	205	205	205
Exports	(1000 mt)	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Imports	(1000 mt)	113	108	103	128	154	180	205	205	205	205	205	205	205
Ending Stocks	(1000 mt)	980	1350	1311	1213	1198	1182	1165	1148	1130	1113	1095	1076	1056

Table 38. Taiwan Rice Supply and Utilization

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	358	368	322	289	257	245	237	232	226	222	219	216	215
Yield	(mt/ha)	3.66	3.89	4.09	4.14	4.24	4.29	4.32	4.35	4.40	4.45	4.49	4.53	4.57
Production	(1000 mt)	1311	1429	1319	1195	1090	1051	1026	1007	995	987	983	981	980
Per capita use	(kg)	61.62	59.88	57.90	56.01	54.02	51.90	50.27	49.01	48.05	47.30	46.72	46.28	45.94
Total Consumption	(1000 mt)	1350	1324	1292	1262	1228	1190	1163	1143	1130	1121	1116	1114	1113
Net Imports	(1000 mt)	-52	-147	-50	132	132	132	132	132	132	132	132	132	132
Ending Stocks	(1000 mt)	175	133	109	175	169	162	157	153	150	148	146	145	144

Table 39. Canadian Rice Supply and Utilization

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Per Capita Use	(kg)	7.91	8.23	8.08	8.43	8.64	8.86	9.13	9.28	9.49	9.68	9.88	10.05	10.24
Total Consumption	(1000 mt)	240	253	251	264	273	283	294	302	311	320	329	338	347
Net Imports	(1000 mt)	240	253	251	264	273	283	294	302	311	320	329	338	347

Table 40. South Africa Rice Supply and Utilization

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Per Capita Use	(kg)	10.51	10.74	10.32	10.90	11.11	11.24	11.45	11.45	11.51	11.56	11.62	11.63	11.67
Total Consumption	(1000 mt)	450	466	454	485	500	511	525	529	536	541	547	550	554
Net Imports	(1000 mt)	500	535	447	503	508	517	533	532	540	545	550	552	557
Ending Stocks	(1000 mt)	194	263	256	273	281	287	296	298	302	305	308	310	312

Table 41. Mexico Rice Supply and Utilization

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	100	91	92	93	94	94	95	96	97	97	98	99	100
Yield	(mt/ha)	3.13	3.32	3.41	3.46	3.50	3.54	3.57	3.61	3.64	3.68	3.72	3.75	3.79
Production	(1000 mt)	313	301	313	321	328	334	339	346	352	358	365	372	378
Per Capita Use	(kg)	5.9	6.0	6.1	6.1	6.2	6.2	6.2	6.3	6.3	6.3	6.4	6.4	6.4
Total Consumption	(1000 mt)	585	605	621	635	649	664	680	695	709	723	737	751	765
Net Imports	(1000 mt)	306	338	307	313	322	330	341	349	357	364	372	379	386
Ending Stocks	(1000 mt)	159	193	191	192	192	193	193	193	193	192	192	191	190
Border price	(1000 mt)	409.5	319.8	340.6	350.7	354.0	355.8	350.9	363.6	370.4	379.8	389.0	402.0	412.8
Retail price	(1000 mt)	1013.6	859.4	782.8	819.6	844.2	854.4	854.2	864.3	887.6	908.1	930.5	957.5	986.2

Table 42. ROW Rice Supply and Utilization

Variable	Units / Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Area Harvested	(1000 ha)	28604	29171	29334	29520	29697	29876	30054	30225	30406	30583	30762	30940	31120
Yield	(mt/ha)	1.73	1.72	1.73	1.73	1.75	1.77	1.78	1.80	1.81	1.82	1.84	1.85	1.86
Production	(1000 mt)	49553	50123	50754	51132	51889	52740	53598	54316	55031	55754	56480	57211	57946
Total Consumption	(1000 mt)	60874	63385	63395	64044	64816	65798	66939	67840	68886	69993	71176	72348	73549
Net Imports	(1000 mt)	13968	11633	12451	12782	12869	13015	13308	13467	13806	14191	14649	15085	15548
Ending Stocks	(1000 mt)	7904	6275	6086	5956	5898	5856	5824	5766	5718	5669	5623	5571	5516

Appendix Table 1. Population

Country	Year												
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	(Percentage Change from Previous Year)												
United States	0.890	0.870	0.850	0.830	0.820	0.810	0.800	0.800	0.800	0.800	0.810	0.810	0.820
Thailand	0.990	0.950	0.920	0.890	0.870	0.850	0.820	0.800	0.770	0.740	0.710	0.680	0.650
Pakistan	2.230	2.210	2.190	2.150	2.090	2.040	1.990	1.930	1.890	1.850	1.810	1.760	1.720
Myanmar	1.680	1.640	1.600	1.570	1.550	1.530	1.500	1.480	1.460	1.450	1.430	1.410	1.400
Vietnam	1.480	1.410	1.340	1.300	1.280	1.270	1.260	1.240	1.220	1.210	1.210	1.200	1.200
China	0.870	0.810	0.750	0.690	0.650	0.620	0.600	0.580	0.570	0.570	0.580	0.590	0.610
India	1.750	1.710	1.680	1.640	1.610	1.580	1.550	1.510	1.490	1.460	1.440	1.420	1.400
Australia	0.950	0.920	0.890	0.860	0.830	0.810	0.780	0.760	0.740	0.720	0.700	0.690	0.670
Egypt	1.890	1.850	1.810	1.790	1.770	1.740	1.700	1.670	1.640	1.610	1.590	1.550	1.520
Argentina	1.310	1.300	1.300	1.290	1.280	1.270	1.250	1.220	1.200	1.180	1.160	1.140	1.110
Uruguay	0.710	0.720	0.730	0.740	0.750	0.750	0.750	0.740	0.730	0.720	0.710	0.690	0.680
Japan	0.190	0.200	0.200	0.190	0.170	0.150	0.120	0.080	0.050	0.010	-0.030	-0.070	-0.110
Indonesia	1.510	1.490	1.460	1.440	1.410	1.390	1.360	1.330	1.300	1.260	1.230	1.200	1.160
Iraq	3.260	3.240	3.230	3.210	3.180	3.150	3.100	3.060	3.010	2.950	2.890	2.820	2.760
Iran	2.100	2.020	2.170	2.330	2.270	2.200	2.130	2.060	2.010	1.980	1.950	1.910	1.860
Saudi Arabia	3.470	3.460	3.450	3.440	3.430	3.430	3.430	3.440	3.440	3.450	3.450	3.450	3.450
European Union	0.150	0.140	0.120	0.100	0.080	0.060	0.030	0.000	-0.030	-0.060	-0.090	-0.110	-0.140
South Korea	1.020	1.010	0.990	0.970	0.930	0.890	0.850	0.810	0.770	0.730	0.700	0.660	0.620
Taiwan	0.940	0.940	0.930	0.920	0.900	0.890	0.870	0.850	0.830	0.800	0.770	0.740	0.710
Brazil	1.280	1.210	1.130	1.080	1.050	1.020	0.990	0.960	0.930	0.900	0.870	0.850	0.820
Canada	1.110	1.080	1.040	1.010	0.980	0.950	0.930	0.910	0.890	0.870	0.850	0.840	0.820
Mexico	1.800	1.770	1.730	1.690	1.660	1.620	1.590	1.550	1.510	1.480	1.450	1.420	1.390
South Africa	1.480	1.380	1.280	1.180	1.090	1.000	0.910	0.810	0.720	0.630	0.530	0.460	0.400
Italy	-0.080	-0.080	-0.090	-0.100	-0.120	-0.150	-0.180	-0.220	-0.260	-0.300	-0.340	-0.380	-0.420
Spain	0.070	0.090	0.100	0.100	0.090	0.070	0.040	0.020	-0.010	-0.040	-0.080	-0.110	-0.150
Hong Kong	2.440	2.090	1.750	1.540	1.430	1.320	1.210	1.100	0.990	0.890	0.790	0.690	0.600

Appendix Table 2. Real Gross Domestic Product (GDP)

Country	Year												
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	(Percentage Change from Previous Year)												
United States	3.900	4.100	2.000	2.900	2.700	2.700	2.500	2.400	2.500	2.600	2.600	2.600	2.600
Thailand	-8.100	1.600	2.900	4.300	5.500	5.800	5.600	5.500	5.400	5.300	5.300	5.300	5.300
Pakistan	4.700	4.300	5.000	5.500	5.700	6.000	6.400	6.200	6.000	5.800	5.800	5.800	5.800
Myanmar	2.470	2.470	2.470	2.470	2.470	2.470	2.470	2.470	2.470	2.470	2.470	2.470	2.470
Vietnam	4.400	4.400	5.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000
China	7.800	7.100	6.300	6.700	7.300	7.400	7.700	7.500	7.300	7.100	7.100	7.100	7.100
India	4.600	5.500	6.000	6.600	6.500	6.700	6.500	6.300	6.100	6.000	6.000	6.000	6.000
Australia	4.700	4.300	5.000	5.500	5.700	6.000	6.400	6.200	6.000	5.800	5.800	5.800	5.800
Egypt	5.000	5.500	5.700	5.900	6.000	6.100	6.200	6.000	5.800	5.600	5.600	5.600	5.600
Argentina	4.200	-2.800	5.900	5.400	5.400	5.000	5.000	4.900	4.800	4.700	4.700	4.700	4.700
Uruguay	4.500	-1.200	5.600	4.500	4.500	4.700	5.000	4.900	4.800	4.700	4.700	4.700	4.700
Japan	-2.900	0.800	1.100	2.000	2.400	1.800	1.700	1.700	1.700	1.700	1.700	1.900	2.000
Indonesia	-13.700	-3.500	3.200	4.300	6.100	6.200	6.000	5.800	5.600	5.400	5.400	5.400	5.400
Iran	-0.500	3.000	4.000	4.500	4.800	5.000	5.300	5.000	4.800	4.600	4.600	4.600	4.600
Saudi Arabia	-1.300	1.700	4.700	3.400	3.400	3.300	2.400	2.400	2.400	2.400	2.400	2.400	2.400
European Union	2.700	1.900	2.600	2.500	2.600	2.600	2.500	2.500	2.500	2.500	2.500	2.500	2.500
South Korea	-5.800	5.400	5.600	5.700	5.600	5.500	5.500	5.400	5.300	5.200	5.200	5.200	5.200
Taiwan	4.800	4.900	5.800	6.200	6.200	6.300	6.400	6.300	6.200	6.100	6.100	6.100	6.100
Brazil	0.200	0.000	3.500	3.900	4.000	4.000	4.100	4.000	3.900	3.800	3.800	3.800	3.800
Canada	3.100	3.400	2.600	2.800	2.800	2.800	2.700	2.700	2.700	2.700	2.700	2.700	2.700
Mexico	4.800	3.000	4.600	4.600	4.900	5.100	5.400	5.300	5.200	5.100	5.100	5.100	5.100
South Africa	0.100	1.600	3.100	2.600	3.100	2.400	2.200	2.200	2.200	2.200	2.200	2.200	2.200
Italy	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Spain	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hong Kong	-5.100	-1.000	1.400	3.000	3.800	4.700	4.800	4.600	4.400	4.200	4.200	4.200	4.200

Year										
2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
(Percentage Change from Previous Year)										
1.800	1.700	2.000	1.900	1.900	1.900	1.900	1.900	1.900	1.900	1.900
3.700	4.900	4.500	4.100	3.700	3.600	3.500	3.500	3.500	3.500	3.500
8.900	9.400	9.300	9.500	9.500	9.200	9.200	8.900	8.900	8.700	8.700
5.660	5.660	5.660	5.660	5.660	5.660	5.660	5.660	5.660	5.660	5.660
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1.200	1.700	2.100	2.400	4.600	4.500	4.400	4.300	4.200	4.100	4.000
7.500	7.300	6.900	6.900	6.900	6.600	6.300	6.000	5.900	5.900	5.900
1.800	2.300	2.700	1.700	2.000	2.000	2.000	2.000	2.000	2.000	2.000
5.900	5.500	5.800	5.900	5.900	5.800	5.700	5.600	5.600	5.600	5.600
0.700	1.600	1.300	0.600	1.500	1.500	1.500	1.500	1.500	1.500	1.500
3.500	14.800	13.100	11.500	10.400	10.200	10.000	9.800	9.800	9.800	9.800
0.300	0.800	0.500	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700
6.000	11.000	8.200	7.600	7.300	7.300	7.200	7.200	7.100	7.100	7.000
0.400	9.100	8.000	7.000	6.500	6.400	6.300	6.000	6.000	6.000	6.000
2.500	2.400	3.500	3.100	3.200	3.100	3.100	3.100	3.100	3.100	3.100
0.000	1.400	1.900	1.900	1.900	1.900	1.900	1.900	1.900	1.900	1.900
5.600	4.900	4.400	4.300	3.900	3.800	3.700	3.700	3.700	3.700	3.700
2.100	2.600	2.800	2.500	2.500	2.400	2.300	2.300	2.300	2.300	2.300
7.100	6.300	5.000	4.100	3.100	3.100	3.100	3.100	3.100	3.100	3.100
1.100	1.600	1.600	1.700	1.800	1.700	1.700	1.600	1.500	1.500	1.400
6.100	13.400	9.700	14.700	14.000	13.700	13.500	13.500	13.500	13.500	13.500
7.200	8.300	7.300	6.600	6.300	6.200	6.100	6.000	6.000	6.000	6.000
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3.200	5.000	5.700	6.400	6.500	6.400	6.300	6.200	6.200	6.200	6.200

Year										
2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
(Percentage Change from Previous Year)										
2.300	2.500	2.400	2.400	2.400	2.400	2.400	2.400	2.400	2.400	2.400
4.300	5.000	5.100	5.300	4.800	4.800	4.800	4.800	4.800	4.800	4.800
9.300	9.700	9.300	9.400	9.400	9.400	9.400	9.400	9.400	9.400	9.400
6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000
6.000	7.000	7.000	7.000	7.000	7.000	7.000	7.000	7.000	7.000	7.000
3.400	3.700	4.100	4.400	5.500	5.500	5.500	5.500	5.500	5.500	5.500
7.700	7.500	7.100	7.300	7.200	7.200	7.200	7.200	7.200	7.200	7.200
3.200	3.300	2.500	2.400	2.400	2.400	2.400	2.400	2.400	2.400	2.400
5.800	6.200	6.300	6.400	6.500	6.500	6.500	6.500	6.500	6.500	6.500
1.300	1.400	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500
7.700	7.600	7.500	7.500	7.300	7.300	7.300	7.300	7.300	7.300	7.300
1.000	0.700	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800
4.500	9.800	6.700	6.500	6.200	6.200	6.200	6.200	6.200	6.200	6.200
4.200	4.200	4.200	4.200	4.200	4.200	4.200	4.200	4.200	4.200	4.200
3.400	9.500	8.100	7.500	6.500	6.500	6.500	6.500	6.500	6.500	6.500
2.600	2.100	1.600	1.500	1.900	1.900	1.900	1.900	1.900	1.900	1.900
2.000	2.000	2.100	2.100	2.100	2.100	2.100	2.100	2.100	2.100	2.100
3.600	4.900	4.800	4.800	4.800	4.800	4.800	4.800	4.800	4.800	4.800
1.900	3.000	3.100	3.200	3.200	3.200	3.200	3.200	3.200	3.200	3.200
5.400	4.300	3.200	3.100	3.000	3.000	3.000	3.000	3.000	3.000	3.000
1.400	1.500	1.600	1.700	1.800	1.800	1.800	1.800	1.800	1.800	1.800
4.100	12.200	11.400	10.700	10.300	10.300	10.300	10.300	10.300	10.300	10.300
8.600	8.700	8.700	8.200	7.700	7.700	7.700	7.700	7.700	7.700	7.700
1.800	1.800	1.900	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
1.900	1.900	1.900	1.900	1.800	1.800	1.800	1.800	1.800	1.800	1.800
3.000	3.900	4.000	6.800	7.000	7.000	7.000	7.000	7.000	7.000	7.000

Appendix Table 5. Exchange Rate*

Country	Year												
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	(Percentage Change from Previous Year)												
Thailand	33.800	-11.700	1.600	2.700	3.800	4.000	3.900	3.800	3.700	3.700	3.700	3.700	3.700
Pakistan	12.600	10.600	8.400	6.400	5.800	5.800	5.800	5.600	5.600	5.400	5.400	5.200	5.200
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
Vietnam	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
China	-0.100	0.000	8.800	1.000	0.900	0.800	0.700	0.600	0.500	0.400	0.300	0.200	0.100
India	14.000	5.100	4.300	4.100	4.100	3.900	3.800	3.700	3.600	3.500	3.500	3.500	3.500
Australia	18.000	-5.000	-6.000	-4.200	-0.700	-0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700
Egypt	0.000	6.200	1.400	1.400	1.400	1.300	0.800	0.800	0.800	0.800	0.800	0.800	0.800
Argentina	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Uruguay	10.500	10.000	9.200	8.800	8.200	7.800	7.600	7.400	7.200	7.200	7.200	7.000	7.000
Japan	8.200	-8.300	-1.900	-4.900	-1.900	-1.500	-0.800	-0.700	-0.600	-0.500	-0.500	-0.500	-0.500
Indonesia	244.200	-21.500	-10.600	-0.600	3.200	3.100	3.200	3.200	3.200	3.100	3.100	3.000	3.000
Iraq	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	-0.100	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000
Saudi Arabia	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
European Union	1.500	2.000	-6.600	-3.200	-0.300	-0.200	-0.200	-0.200	-0.200	-0.200	-0.200	-0.200	-0.200
South Korea	47.300	-15.300	-3.000	-2.300	-1.000	0.400	1.100	1.000	0.900	0.900	0.900	0.900	0.900
Taiwan	16.500	-1.100	-8.500	-9.500	-3.700	-0.100	0.100	0.000	0.000	0.000	0.000	0.000	0.000
Brazil	7.700	59.000	5.700	1.700	1.300	1.000	0.800	0.800	0.800	0.800	0.800	0.800	0.800
Canada	7.100	-0.200	-2.600	0.100	-1.300	-1.300	-0.800	-0.800	-0.600	-0.400	-0.200	-0.200	-0.100
Mexico	15.400	11.000	11.500	11.200	8.700	7.600	6.600	6.600	6.600	6.400	6.400	6.400	6.400
South Africa	20.100	13.300	10.600	10.100	7.800	5.800	6.000	5.900	5.800	5.800	5.800	5.800	5.800
Italy	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Spain	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hong Kong	0.000	0.100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

* Relative to the U.S. dollar.

Fig. 1. GDP Growth, Major Rice Exporters, 1997-2010

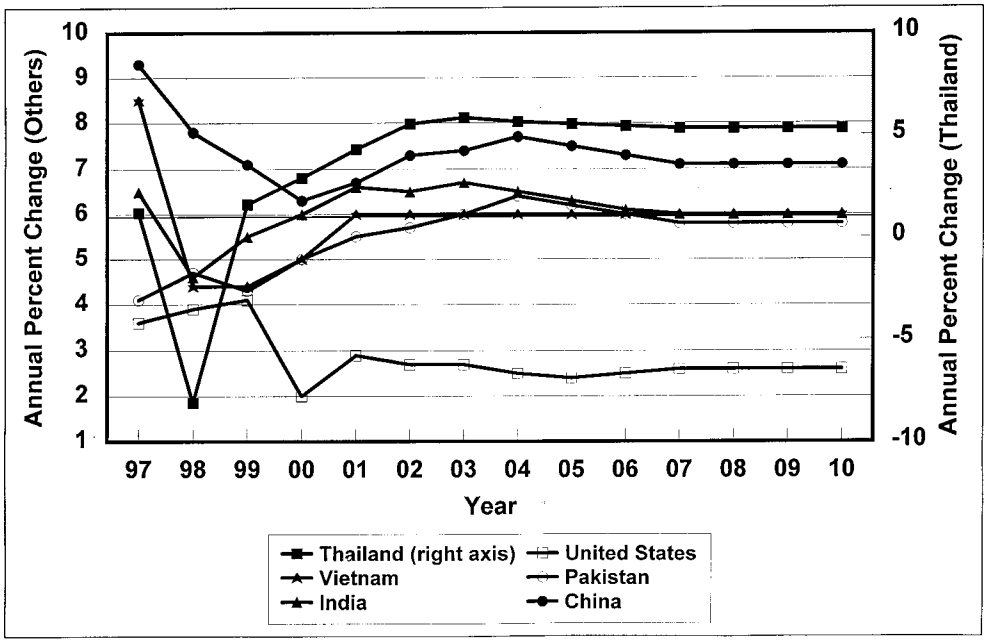


Fig. 2. GDP Growth, Major Rice Importers, 1997-2010

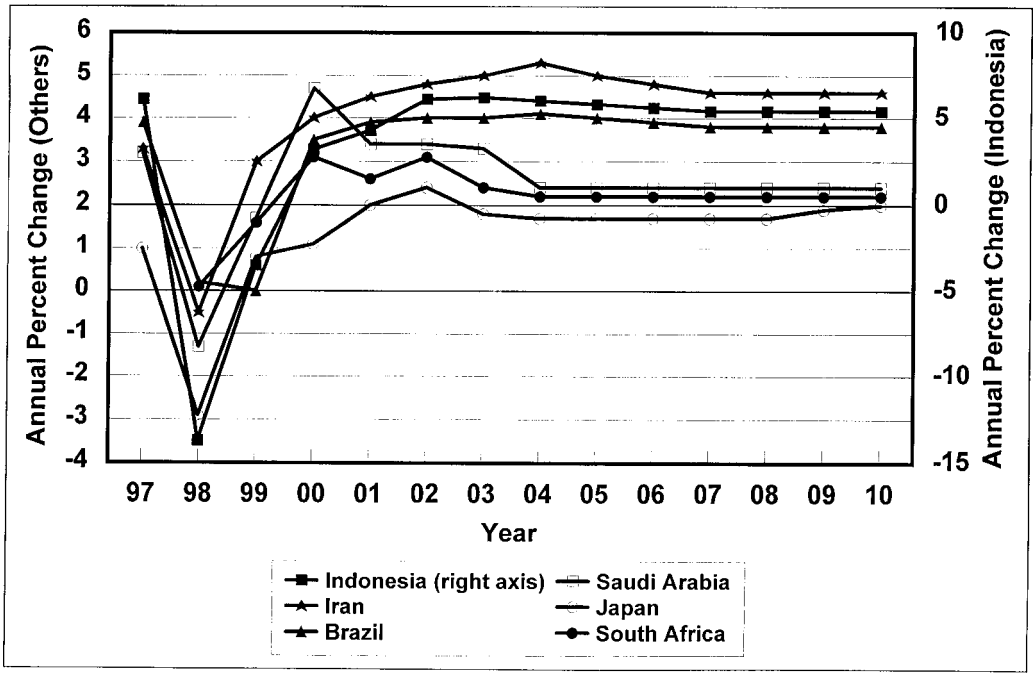


Fig. 3. U.S. Rice Market and Policy Prices and Payments, 1986-2010

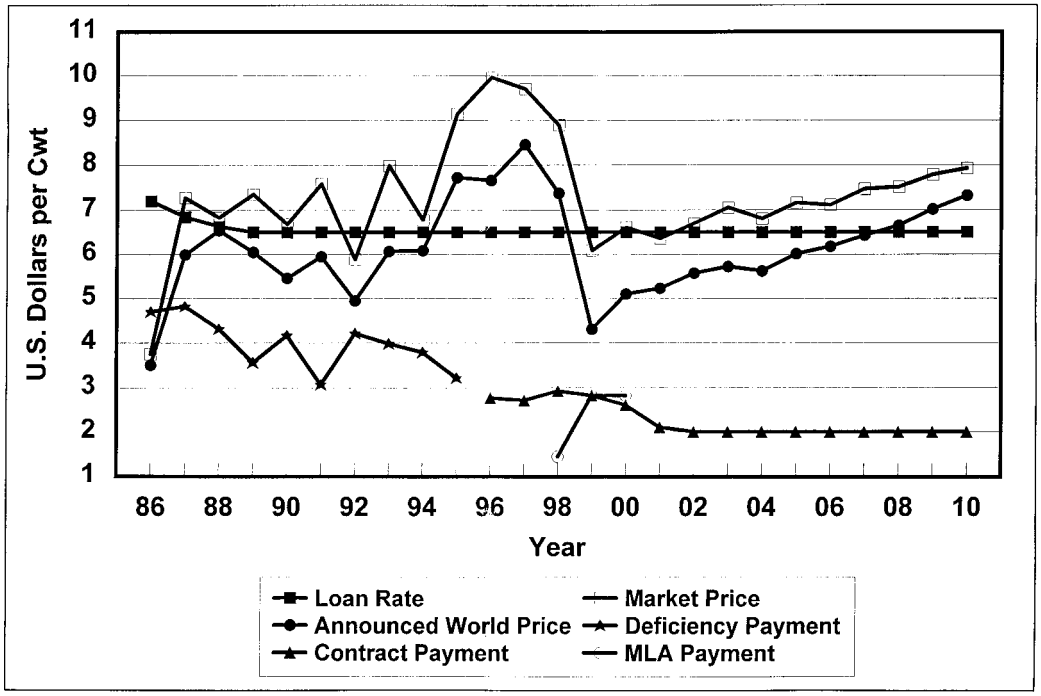


Fig. 4. Population Growth, Major Rice Exporters, 1997-2010

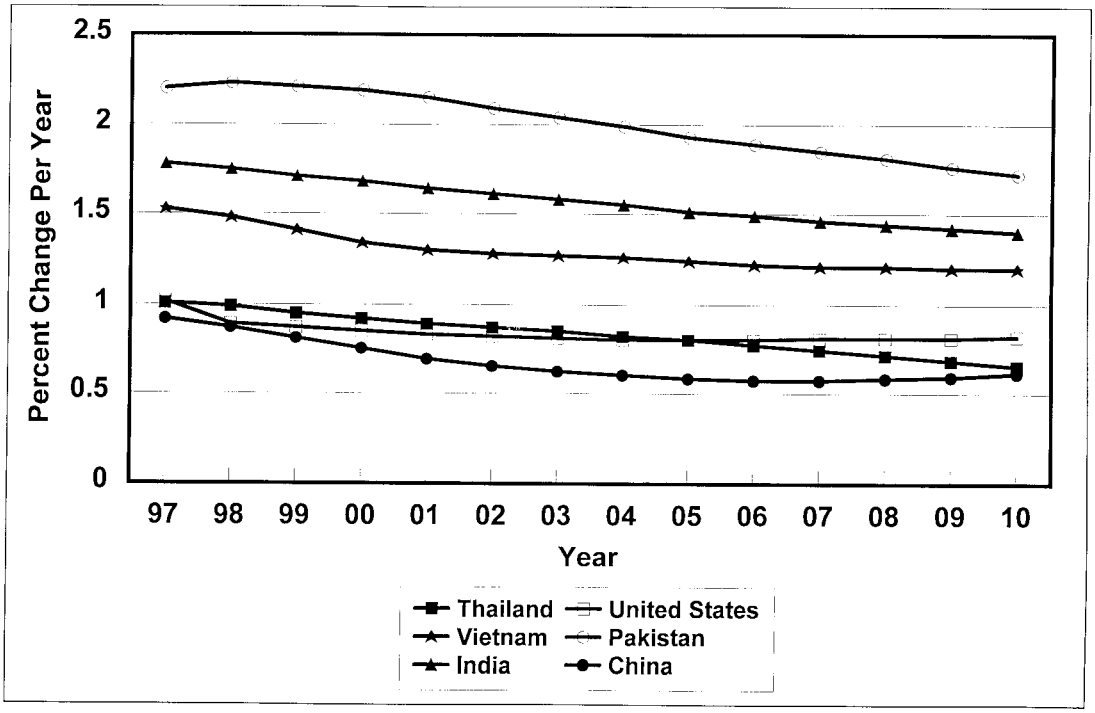


Fig. 5. Population Growth, Major Rice Importers, 1997-2010

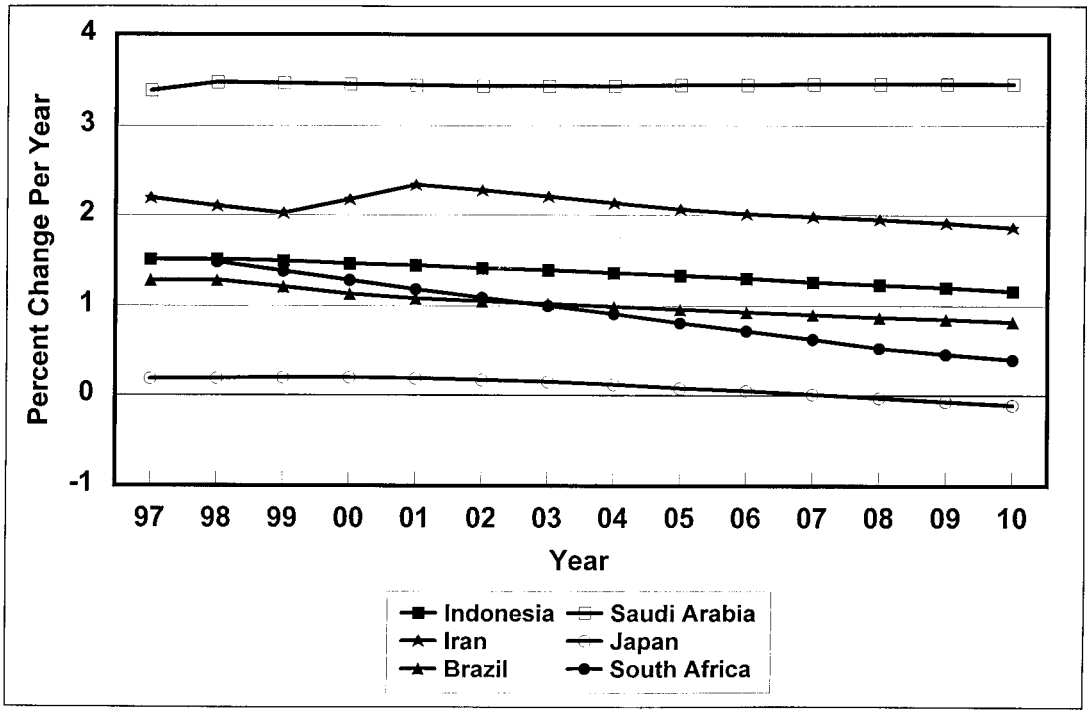


Fig. 6. AGRM 2000 Projections: World Rice

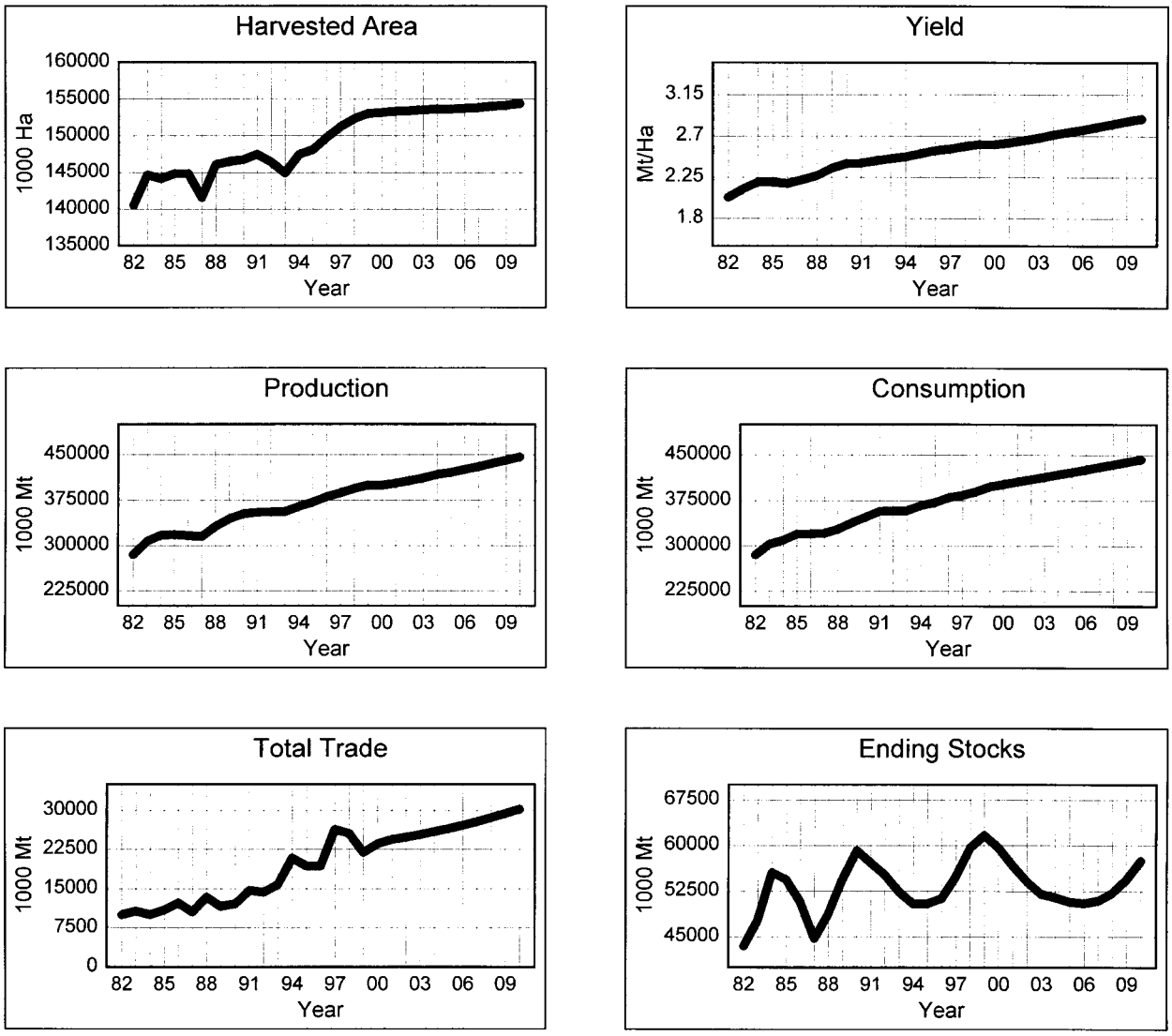


Fig. 7. World Rice Consumption: Annual Growth Rates

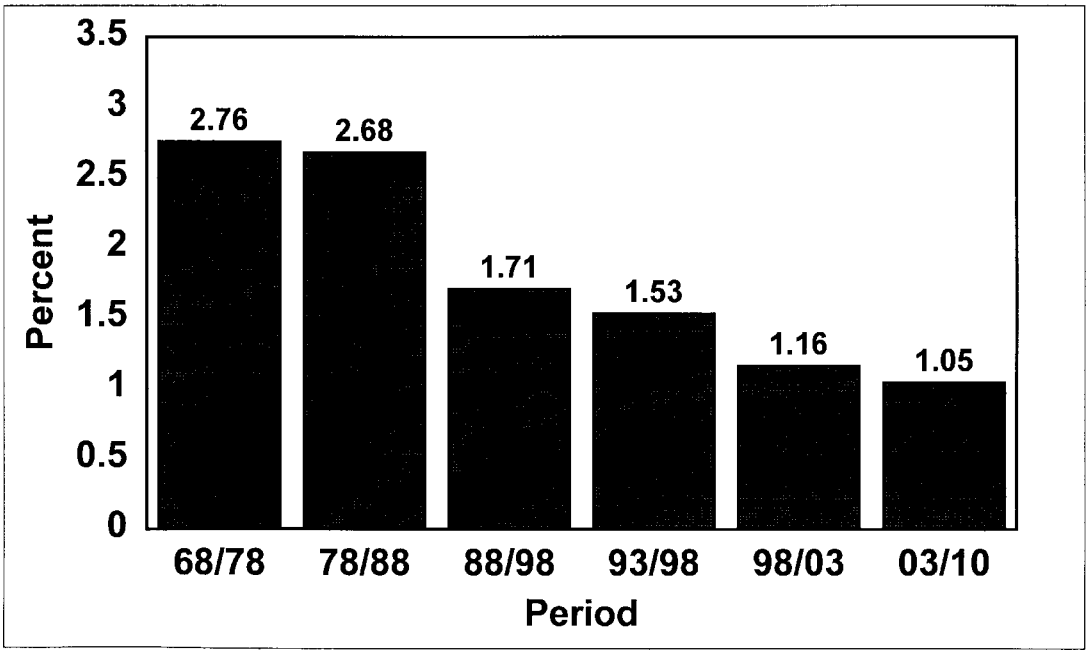


Fig. 8. World Rice Area: Annual Growth Rates

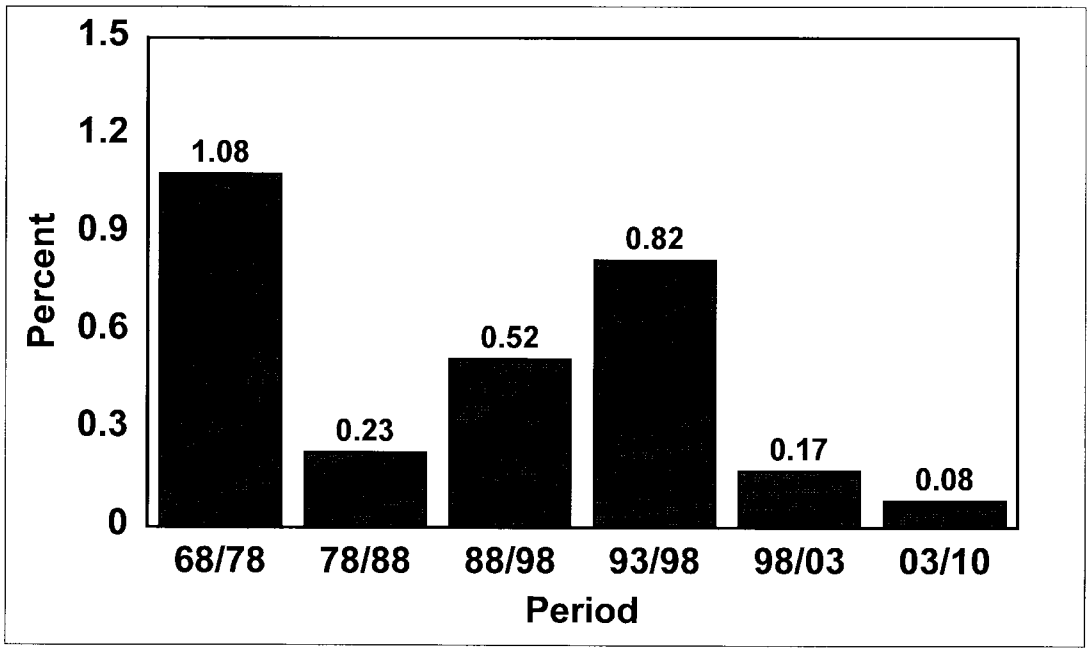


Fig. 9. World Rice Yield: Annual Growth Rates

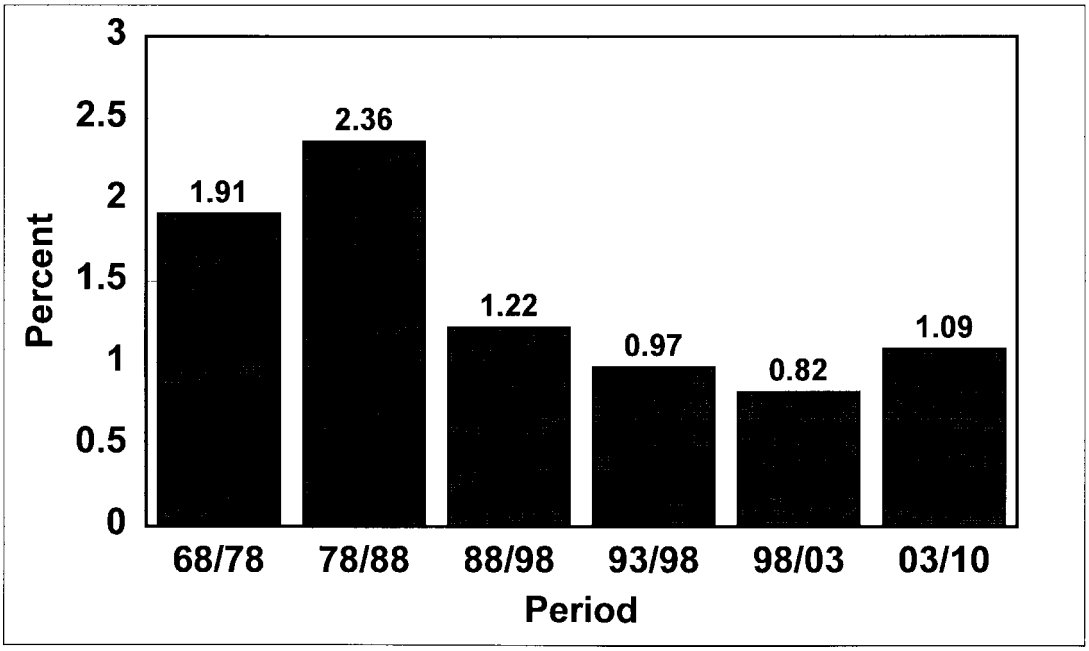


Fig. 10. World Rice Production: Annual Growth Rates

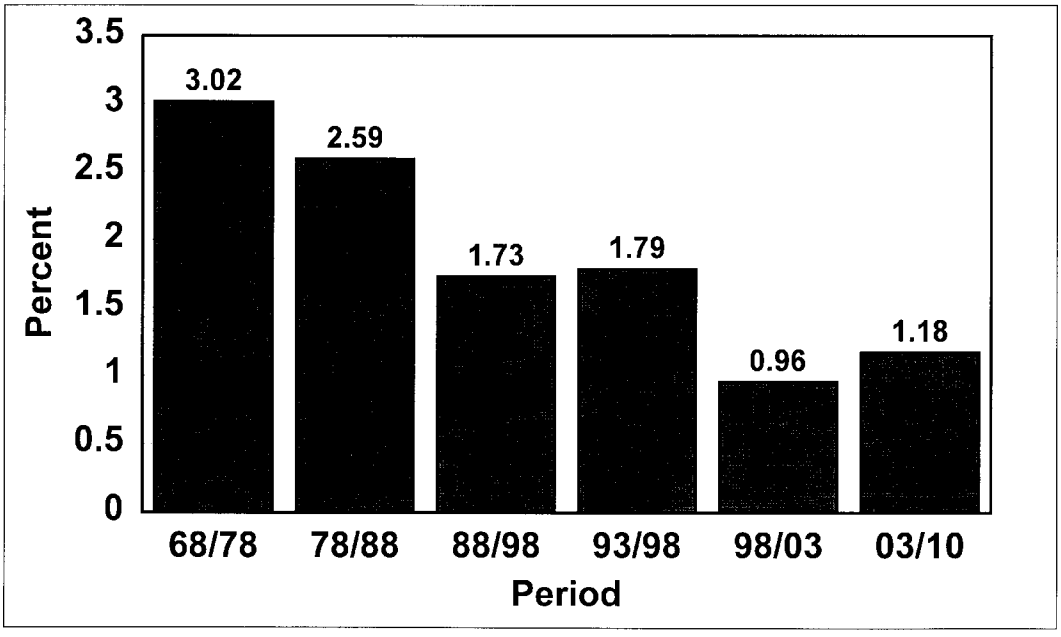


Fig. 11. World Rice Trade: Annual Growth Rates

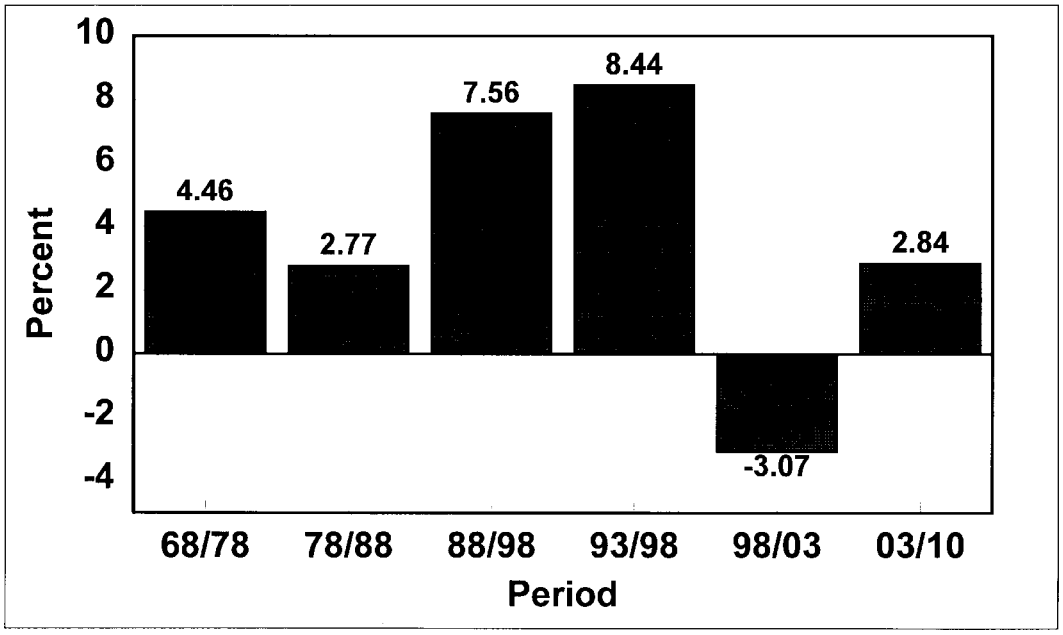


Fig. 12. Major ROW (rest-of-the-world) Importers, 1990-99

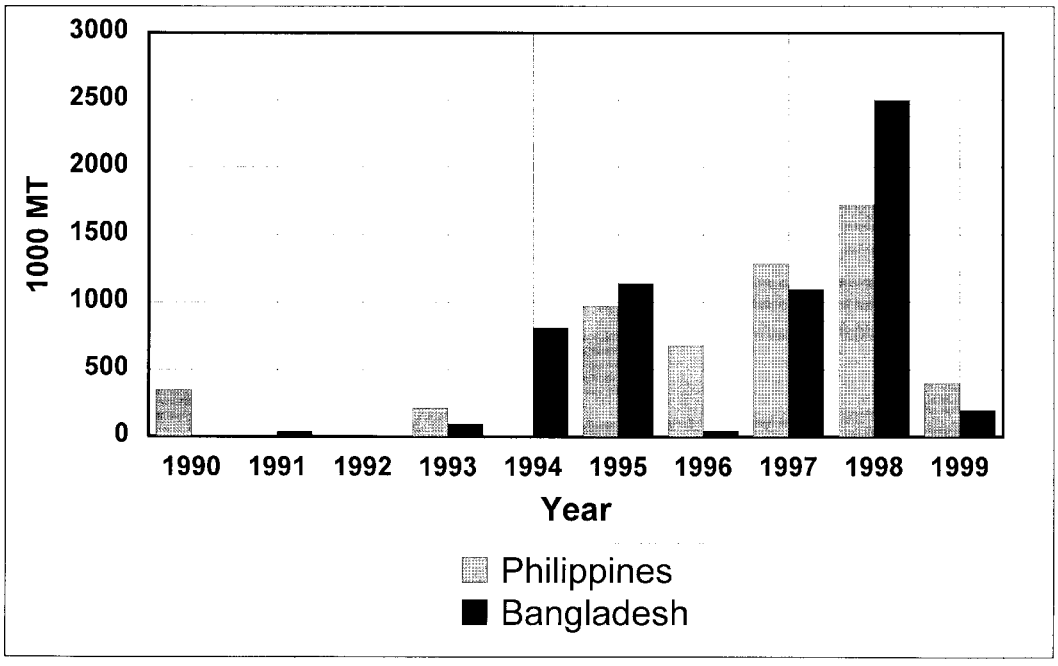


Fig. 13. World Rice Stocks: Annual Growth Rates

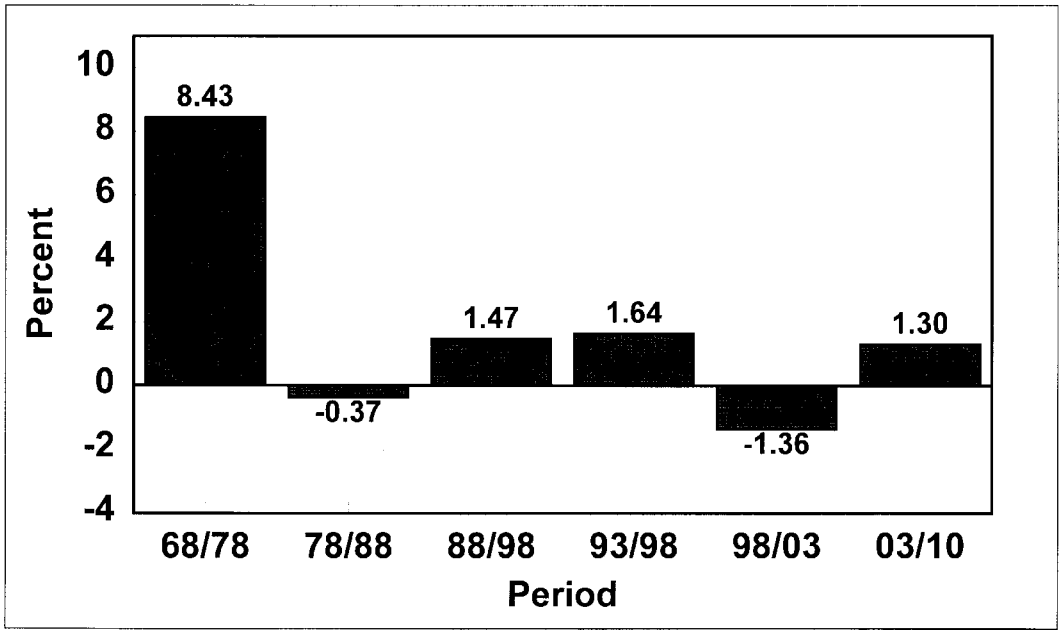


Fig. 14. AGRM 2000 Projections: World Rice Price

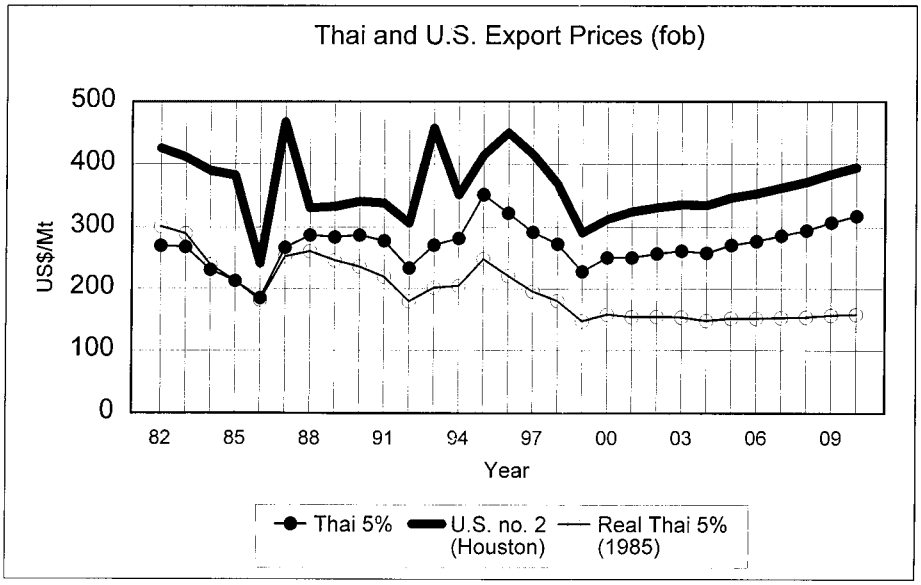


Fig. 15. AGRM 2000 Projections: Rice Prices

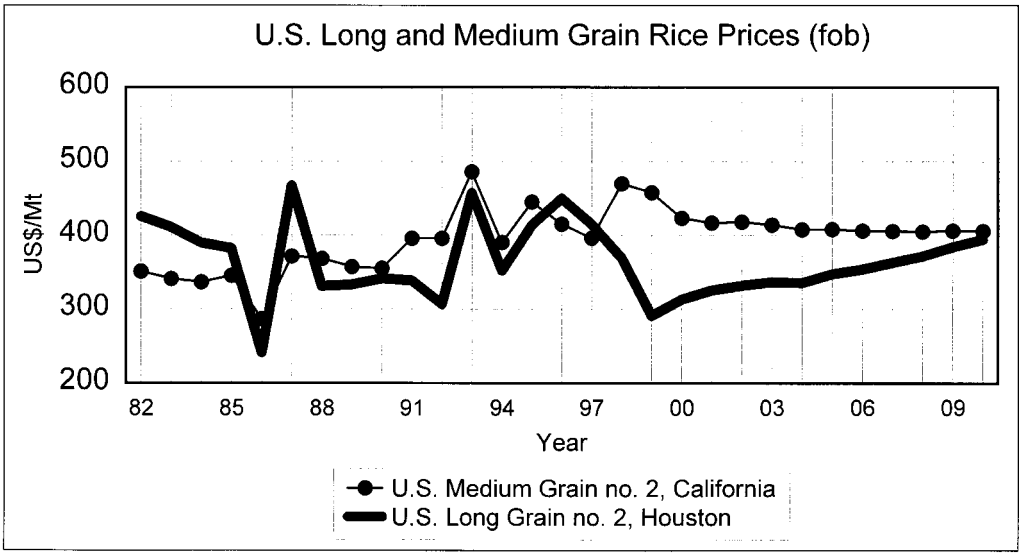


Fig. 16. AGRM 2000 Projections: Rice and Wheat Prices

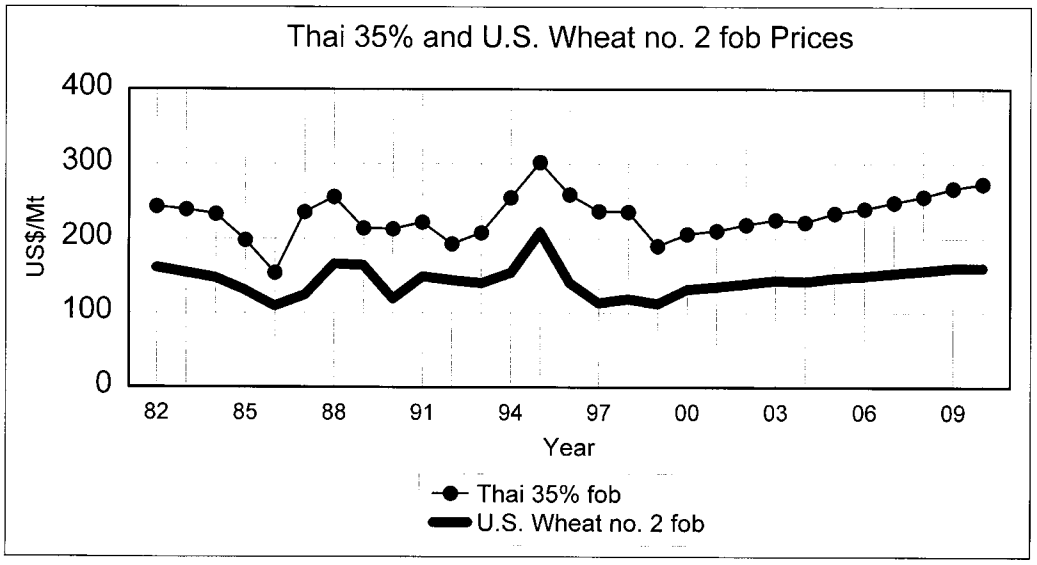


Fig. 17. AGRM 2000 Projections: Thailand Rice

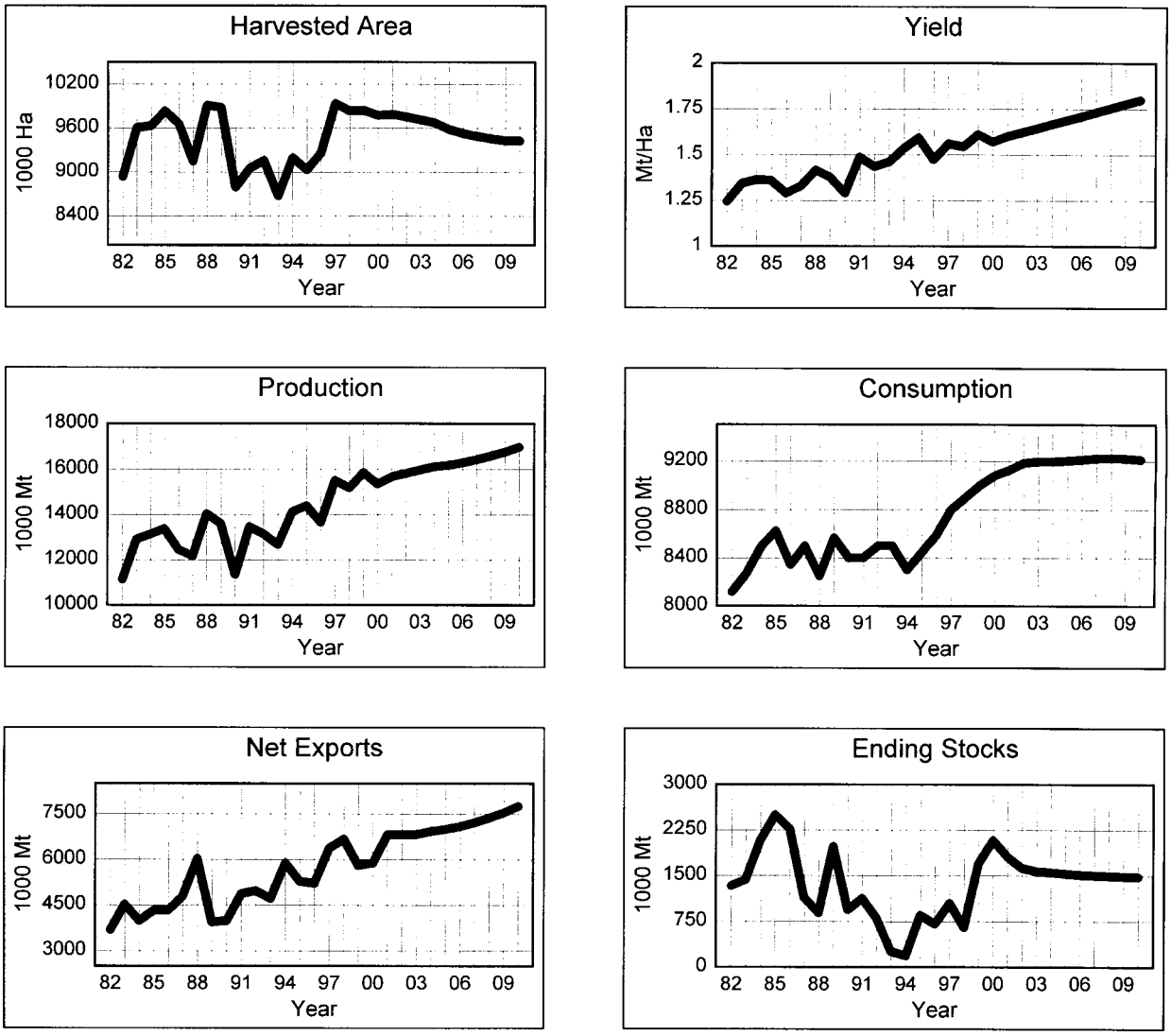


Fig. 18. AGRM 2000 Projections: U.S. Rice Supply

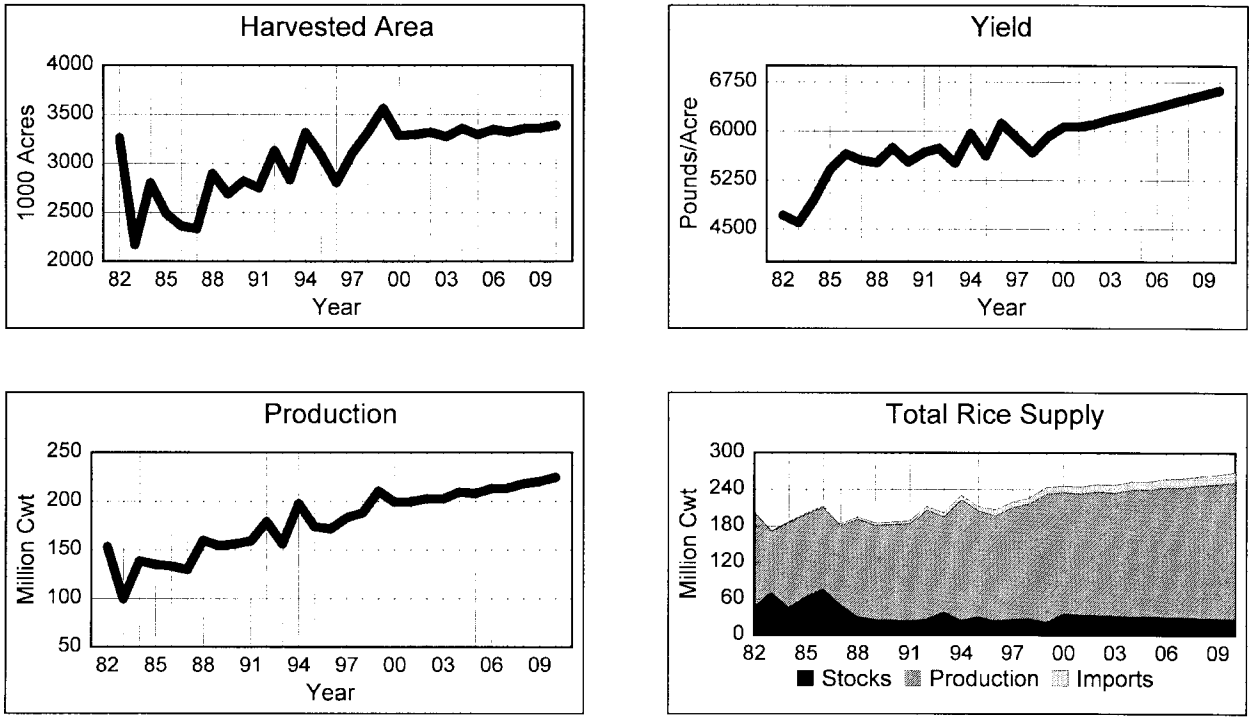


Fig. 19. AGRM 2000 Projections: U.S. Harvested Area by State

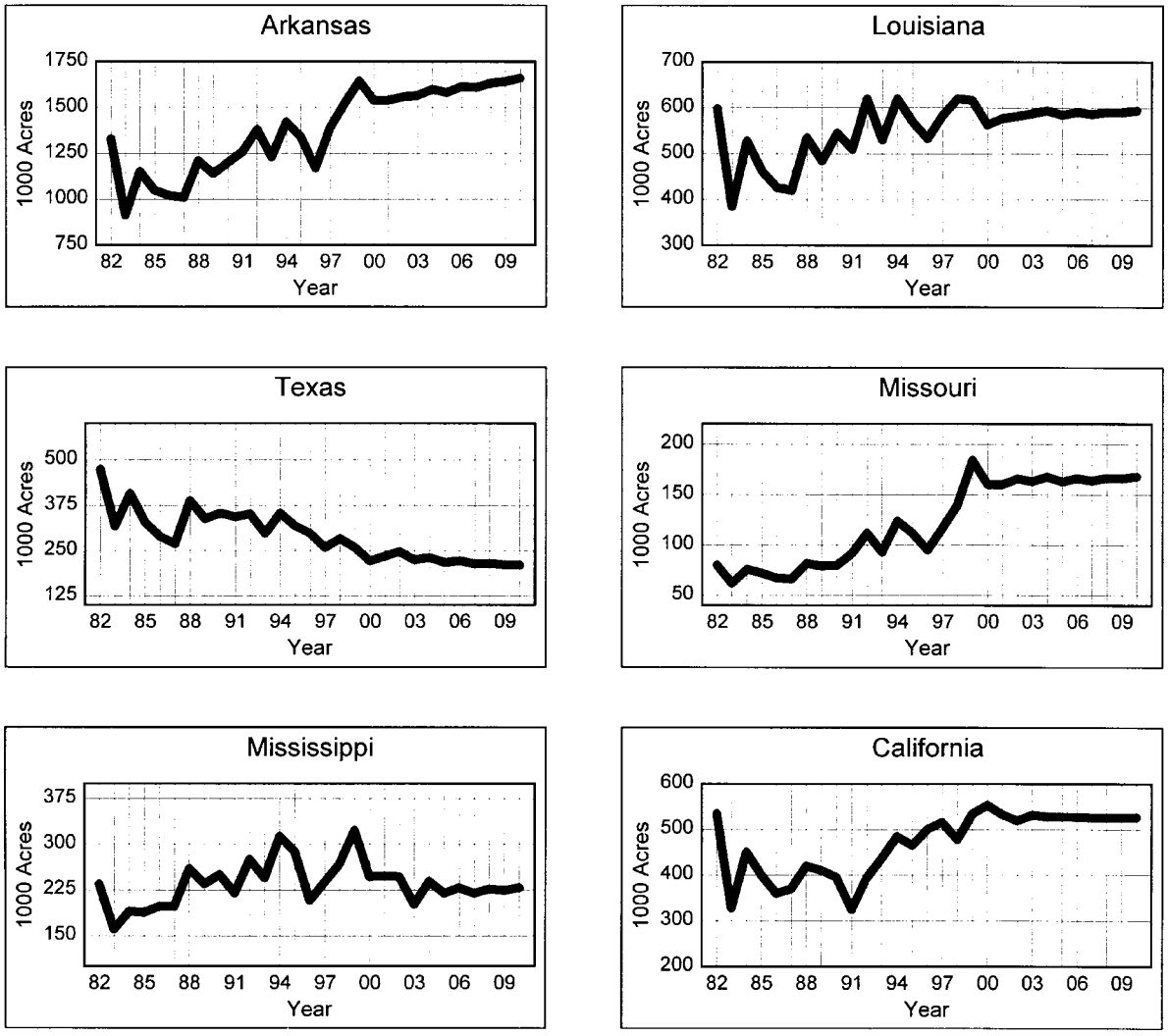


Fig. 20. AGRM 2000 Projections: Arkansas Rice Supply by Type

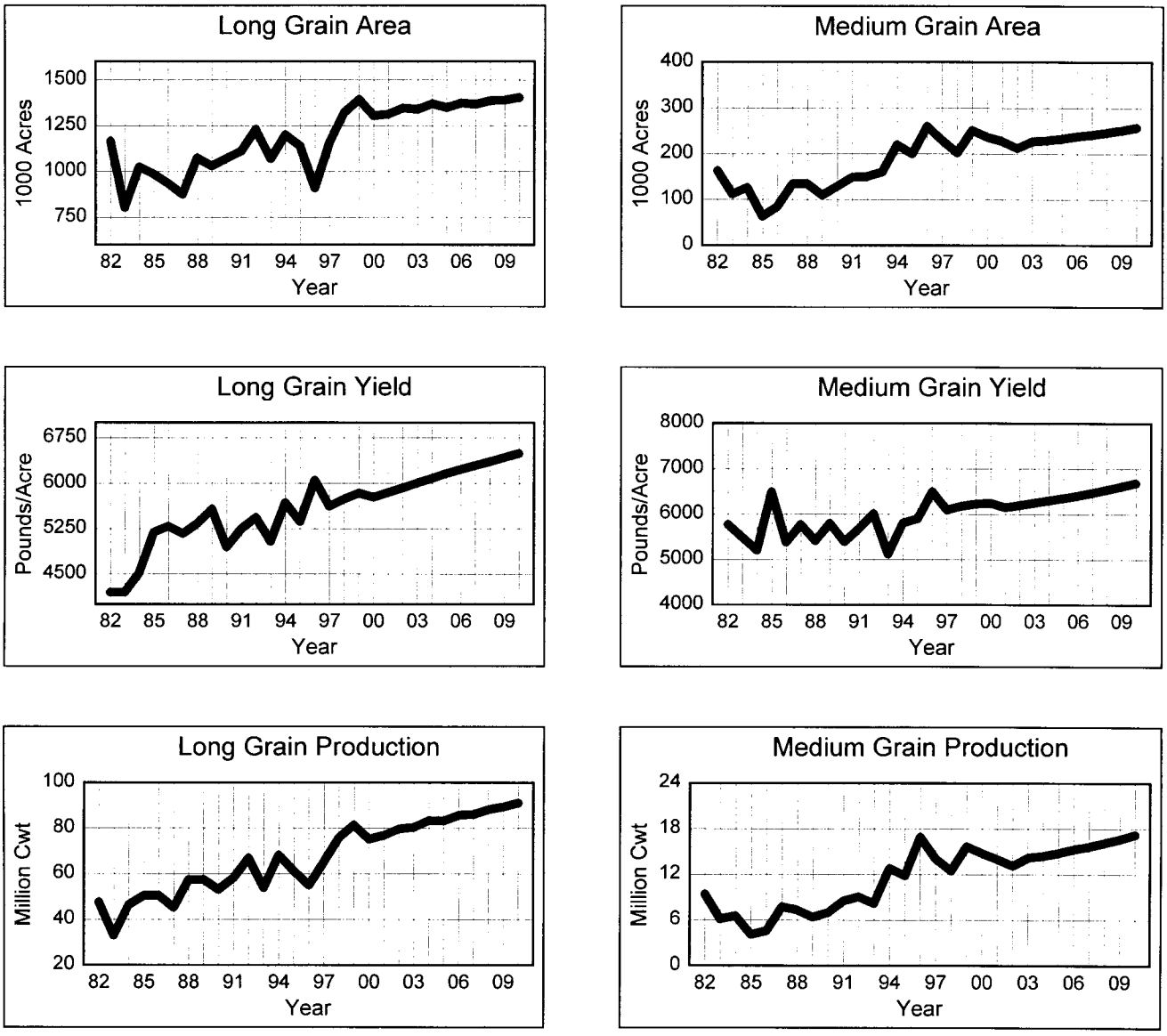


Fig. 21. AGRM 2000 Projections: Louisiana Rice Supply by Type

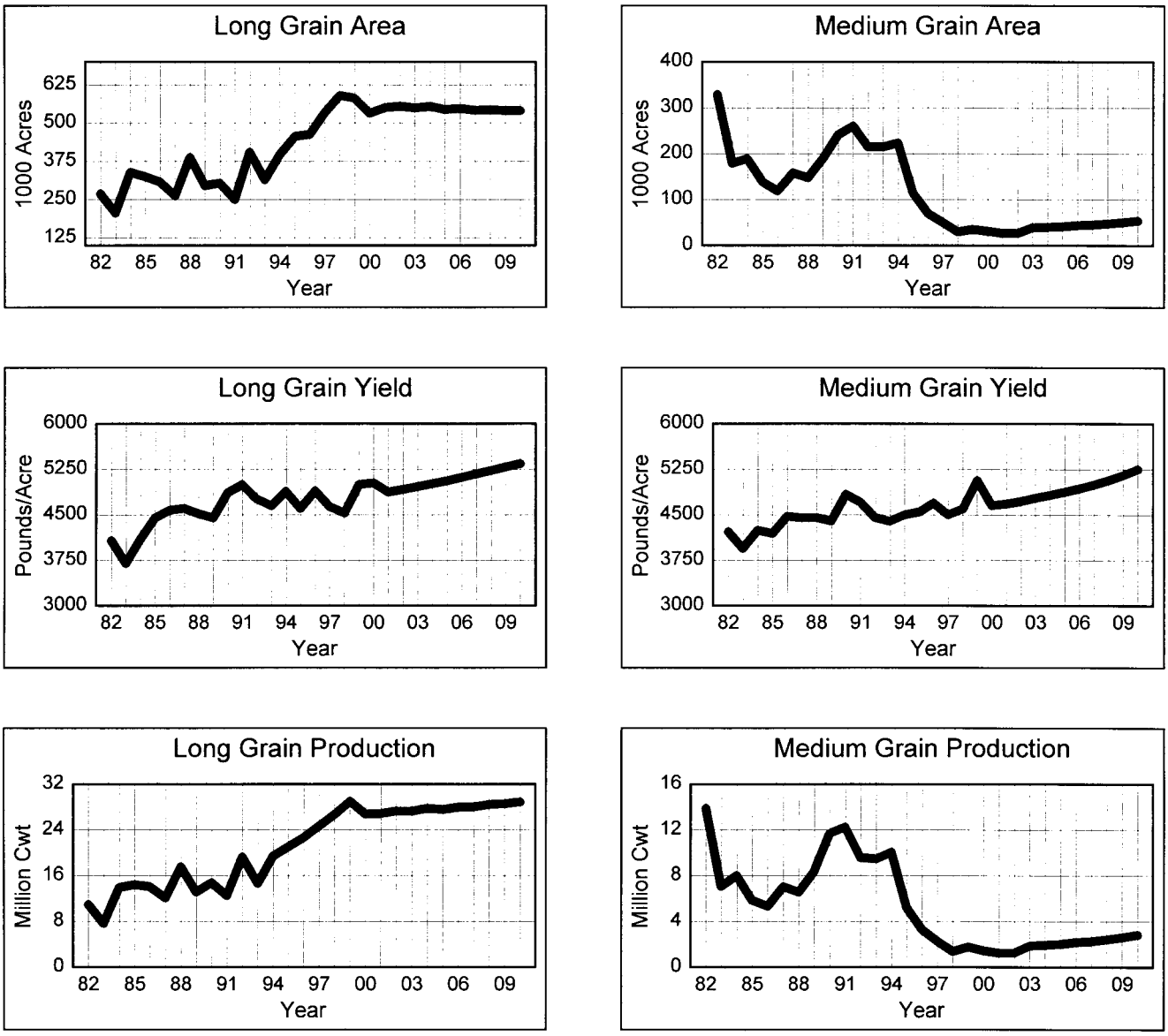


Fig. 22. AGRM 2000 Projections: U.S. Rice Yield by State

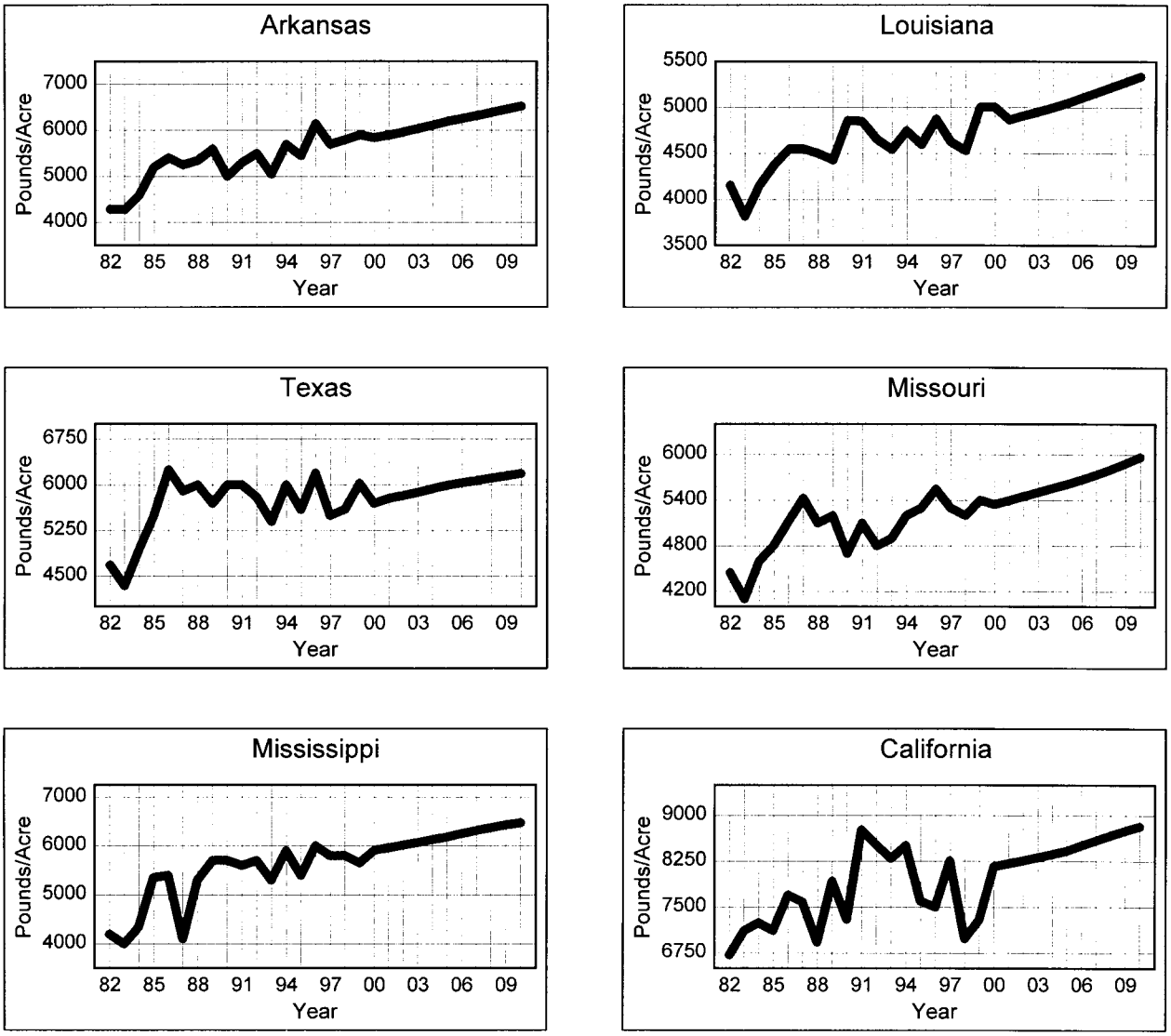


Fig. 23. AGRM 2000 Projections: U.S. Rice Production by State

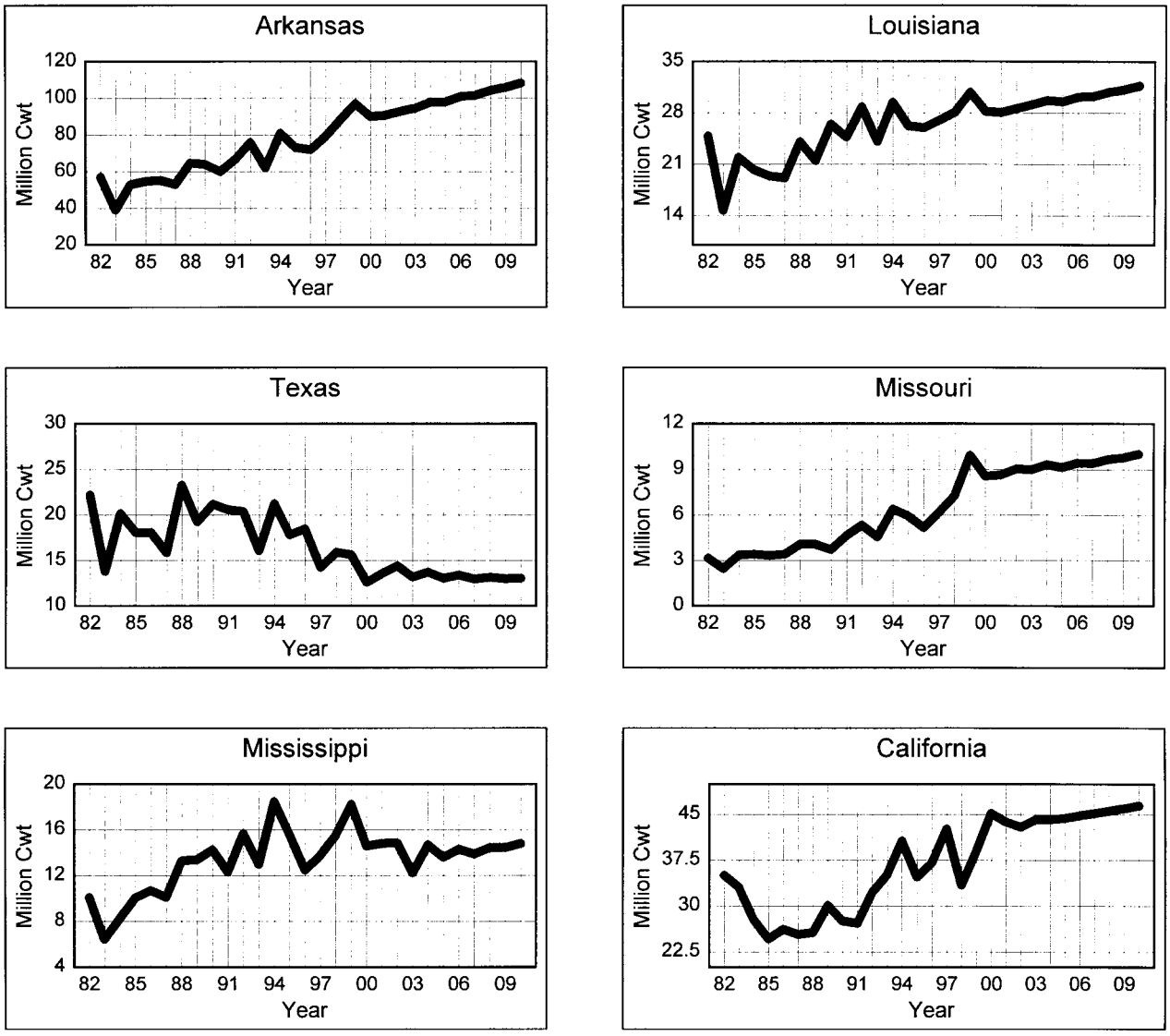


Fig. 24. AGRM 2000 Projections: Detailed U.S. Total Rice Use

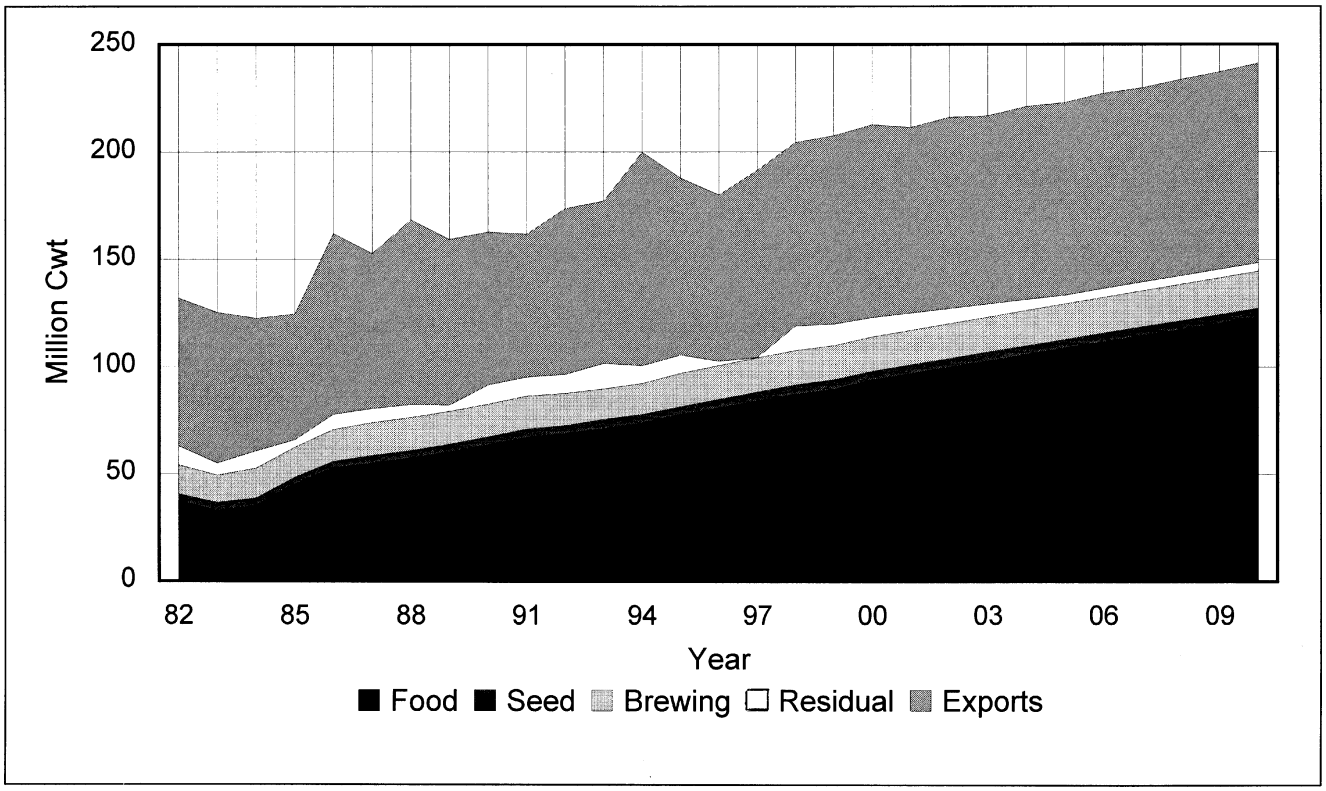


Fig. 25. AGRM 2000 Projections: U.S. Rice Trade and Stocks

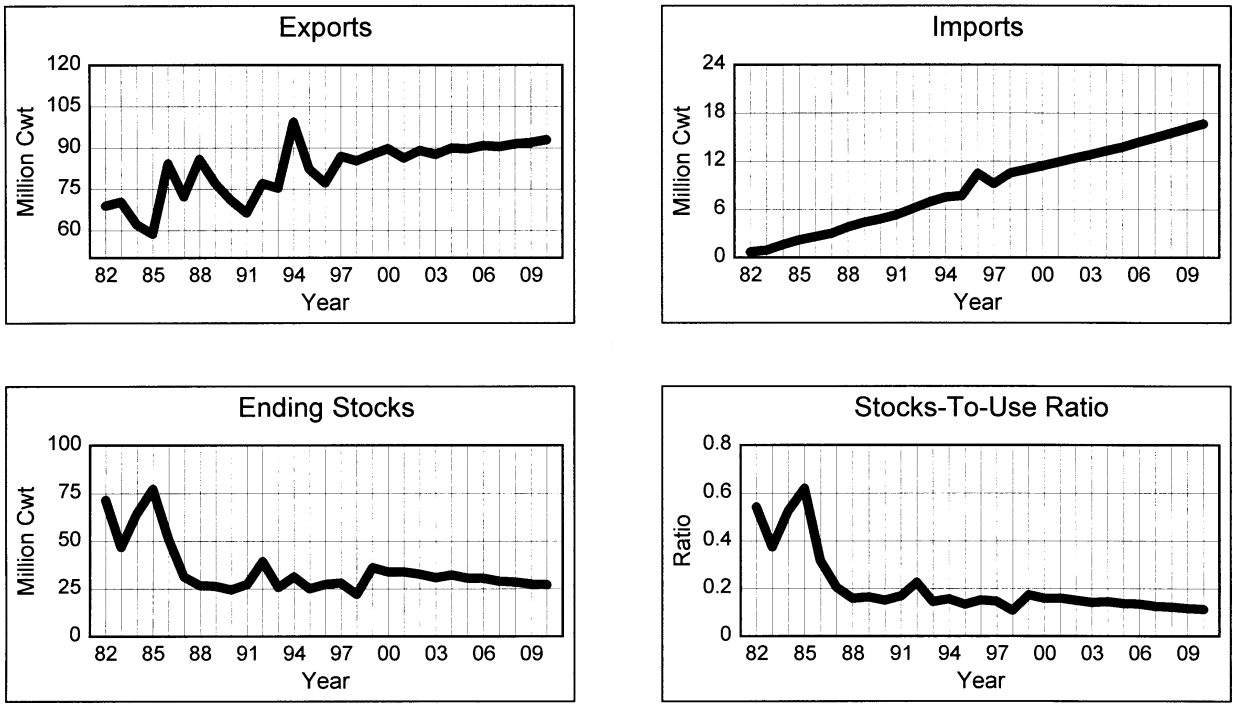


Fig. 26. AGRM 2000 Projections: Nominal and Real U.S. Rice Prices

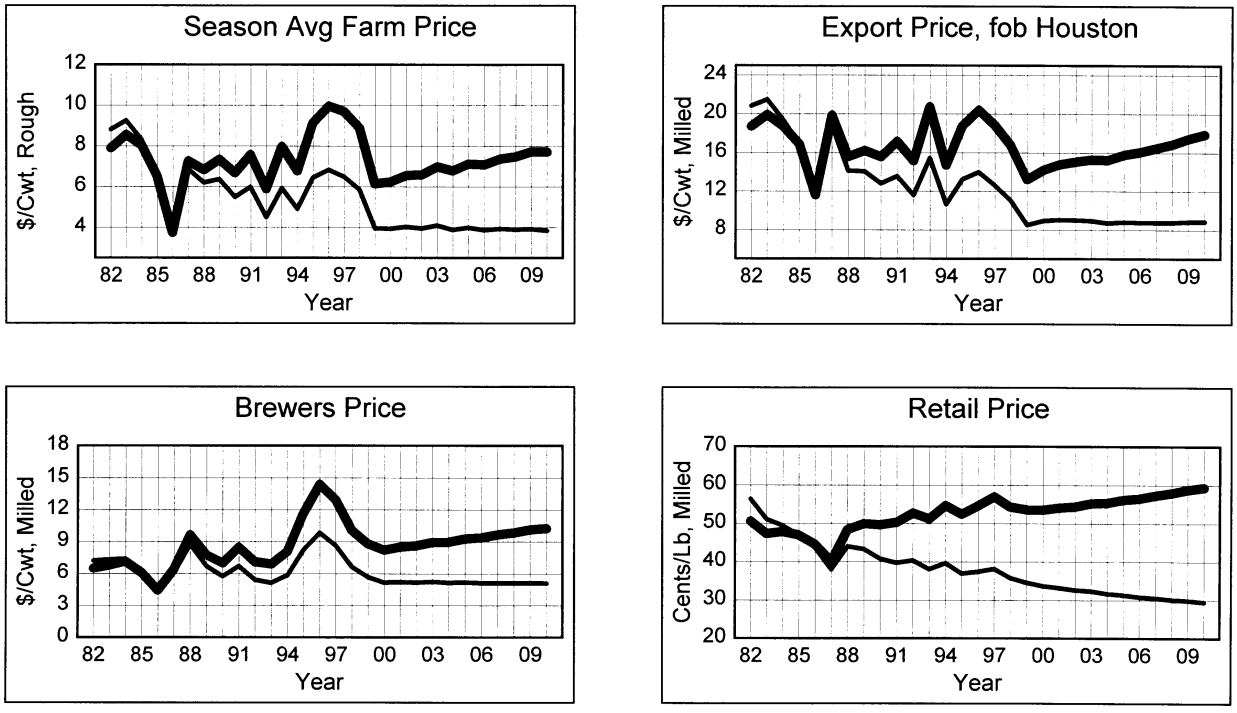


Fig. 27. AGRM 2000 Projections: U.S. Rice Season Average Farm Price by Type

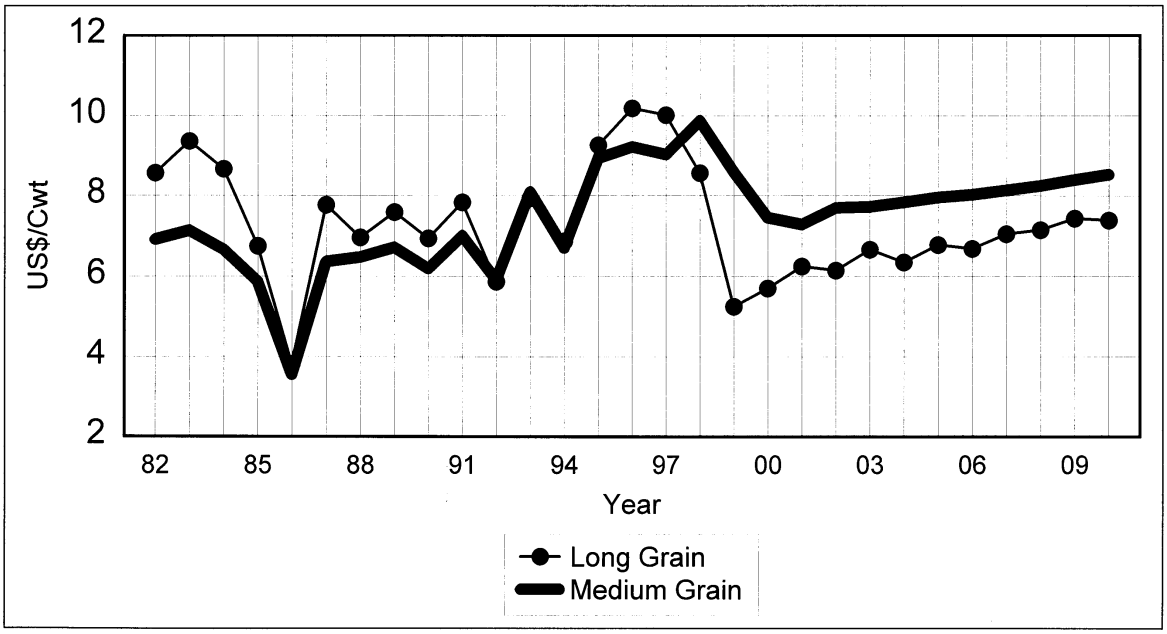


Fig. 28. AGRM 2000 Projections: China Rice

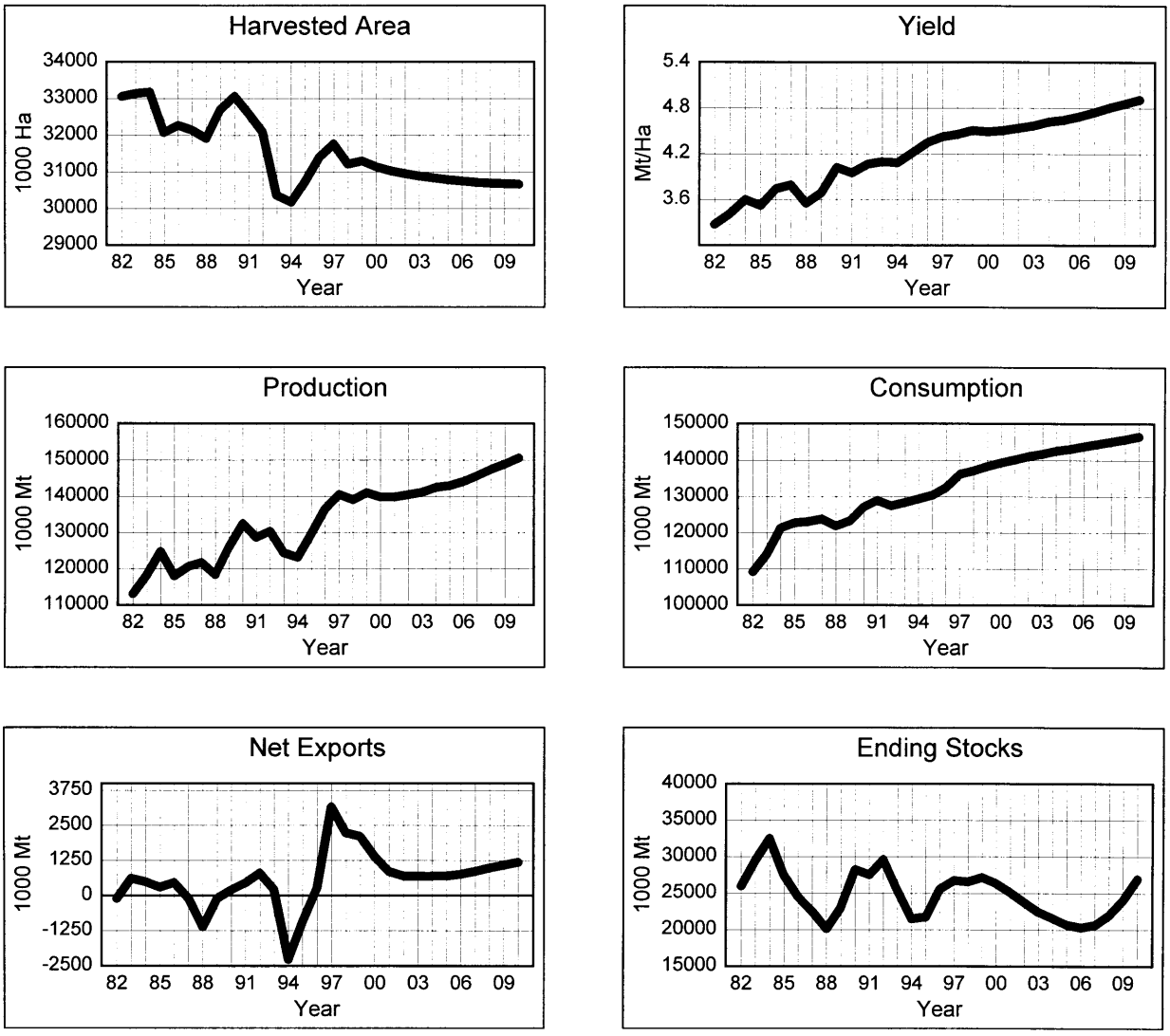


Fig. 29. AGRM 2000 Projections: India Rice

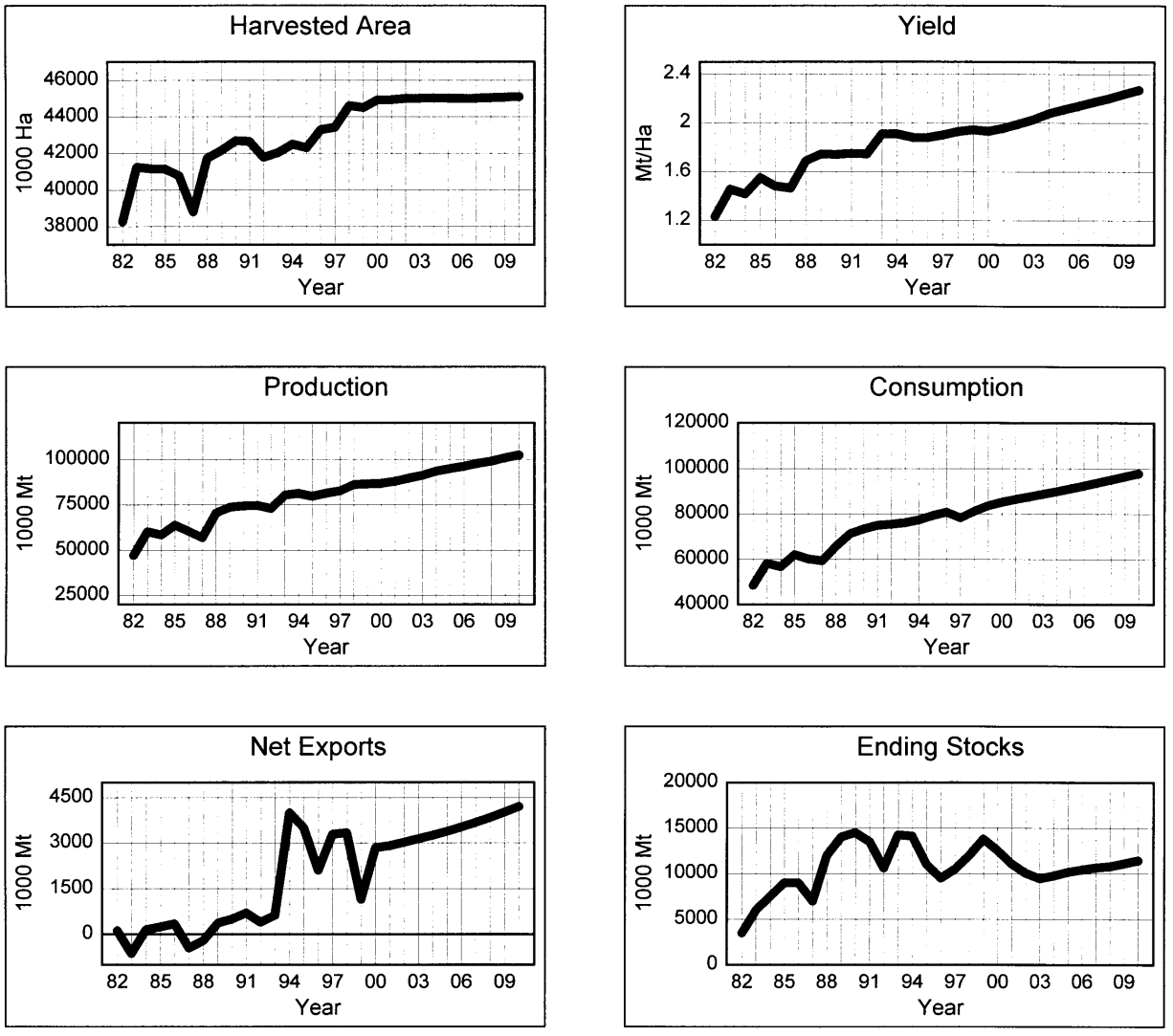


Fig. 30. AGRM 2000 Projections:Pakistan Rice

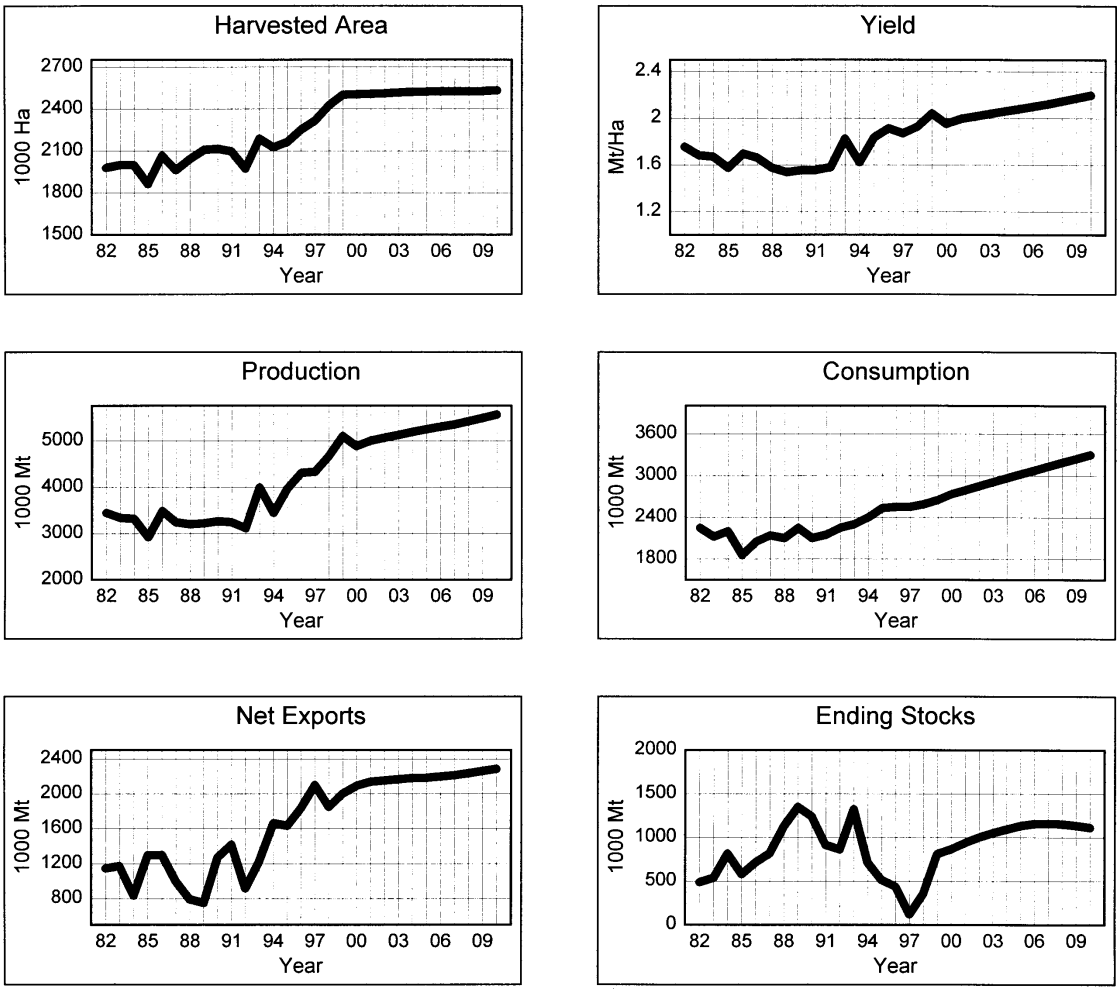


Fig. 31. AGRM 2000 Projections: Myanmar Rice

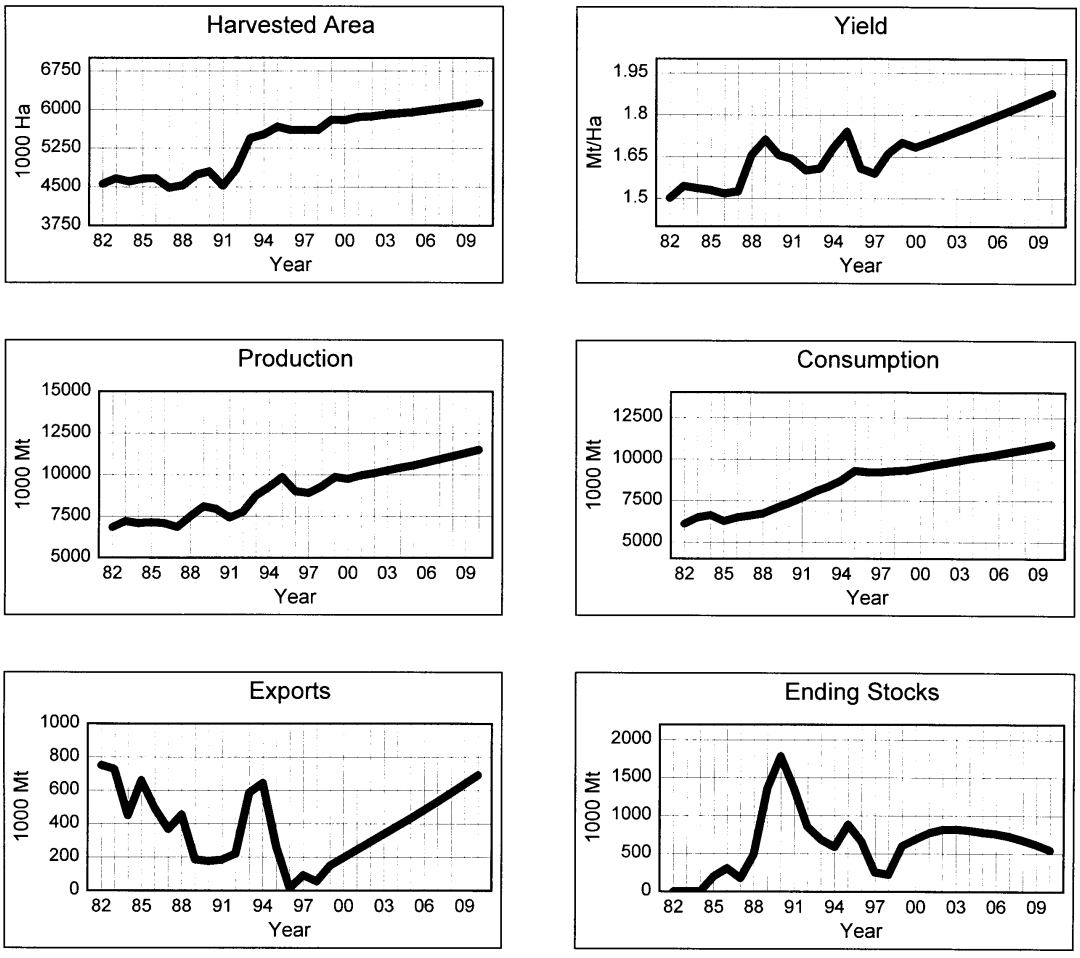


Fig. 32. AGRM 2000 Projections: Vietnam Rice

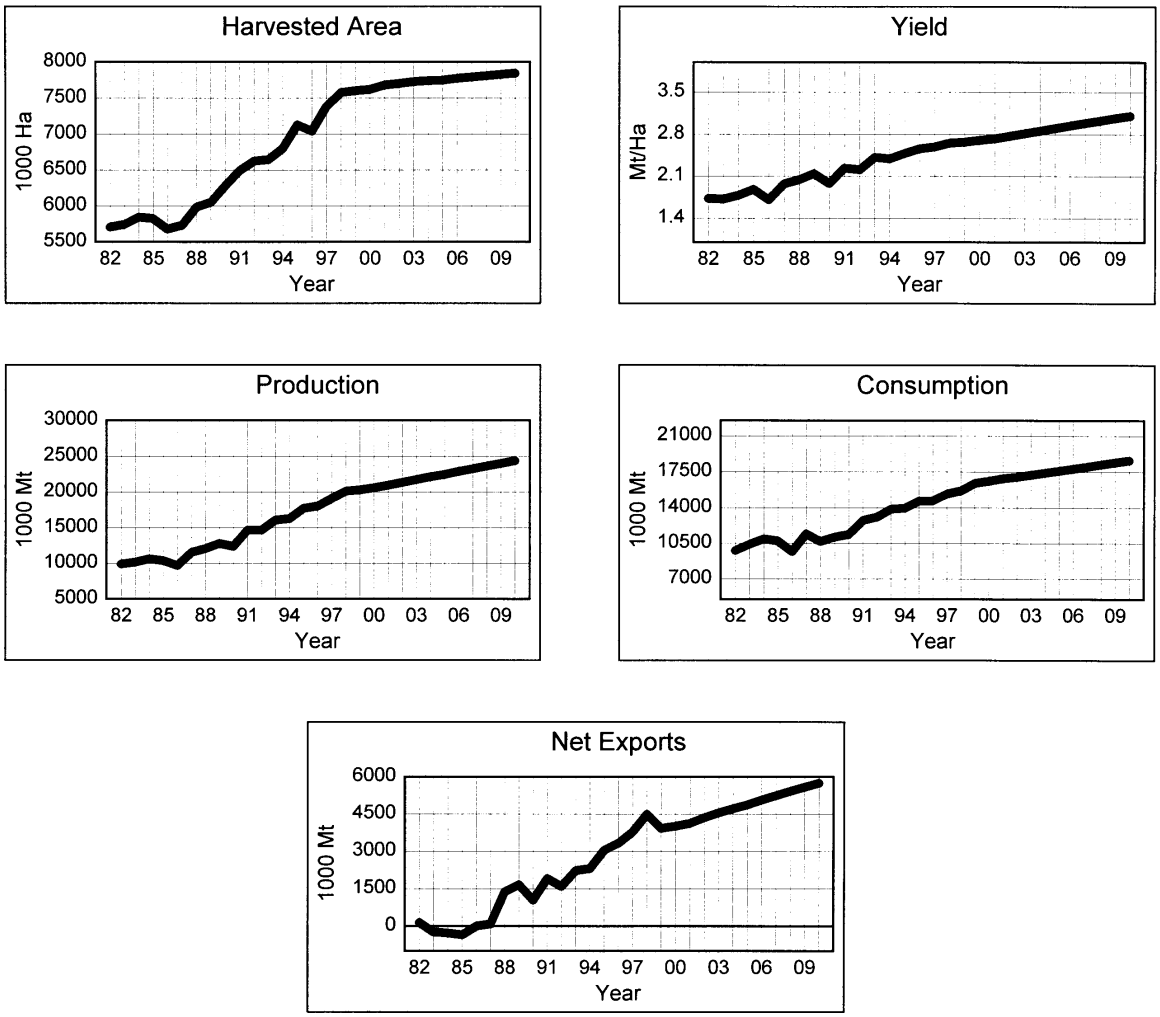


Fig. 33. AGRM 2000 Projections: Australia Rice

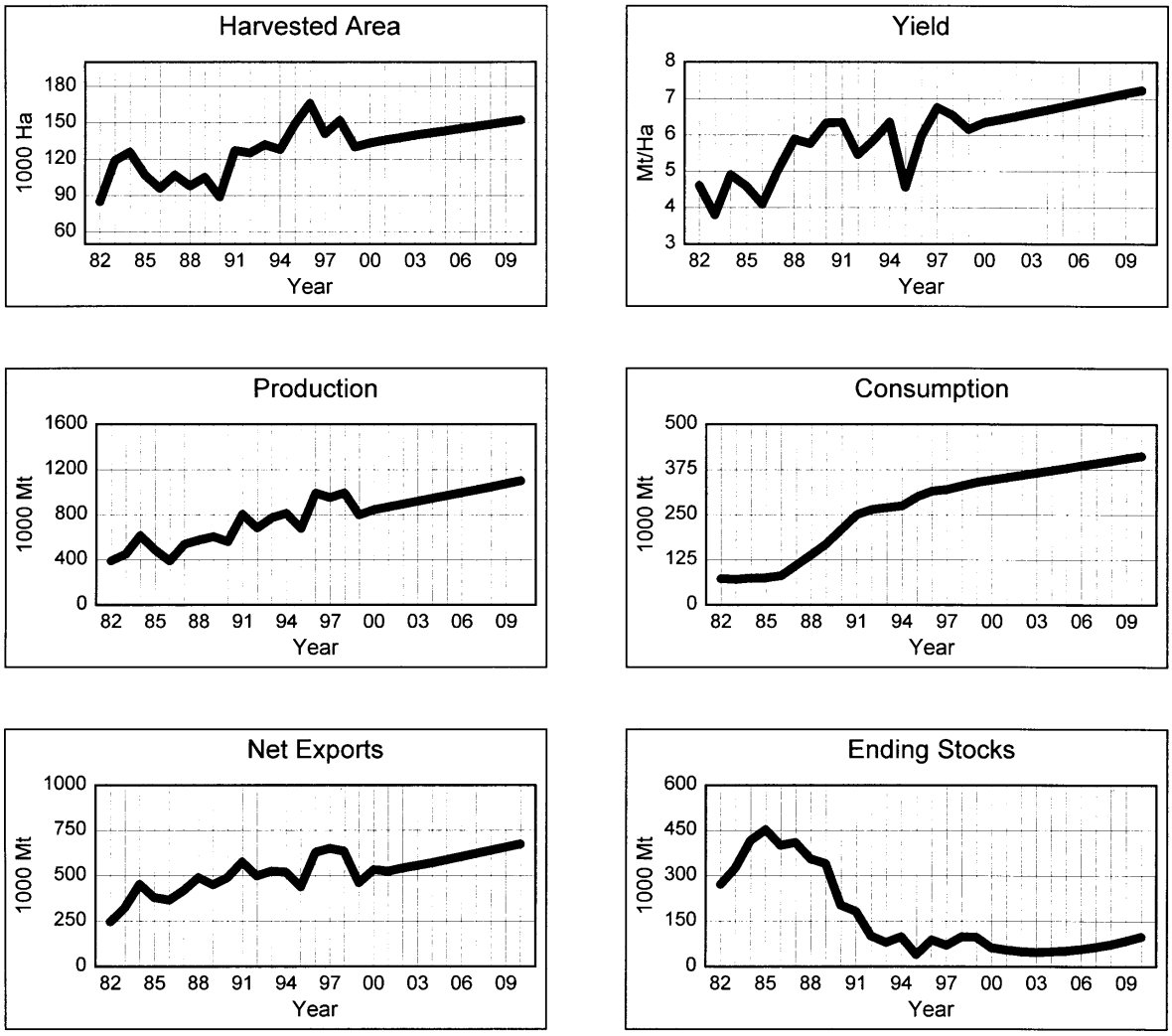
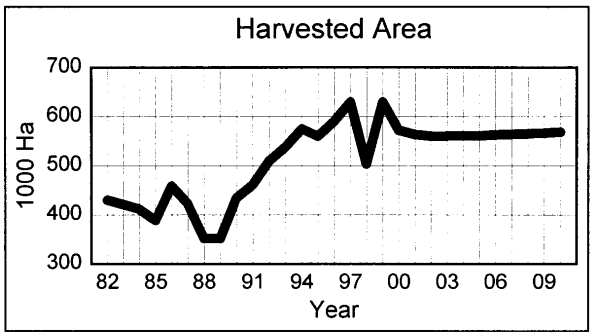
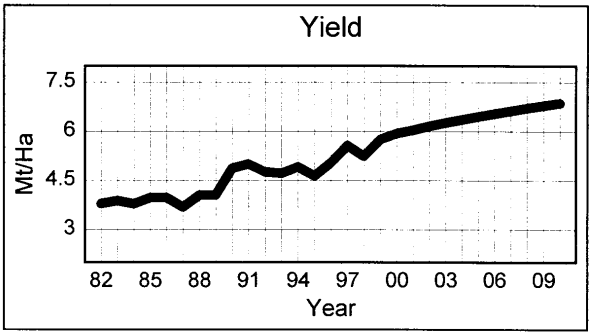
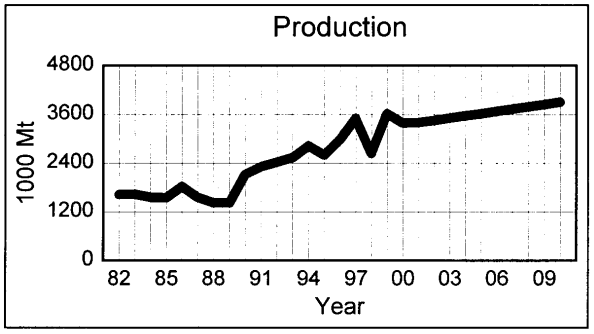
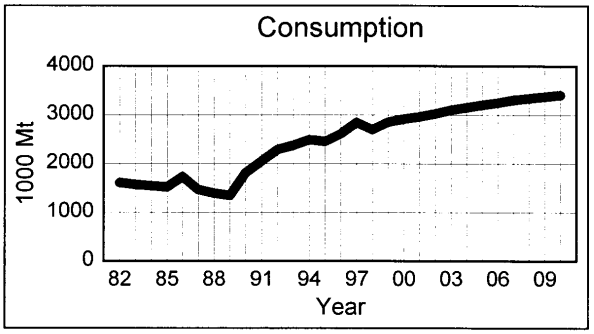


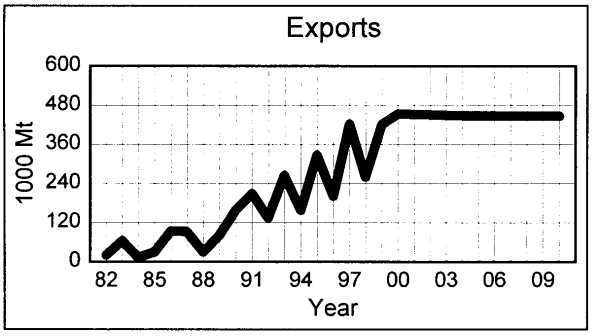
Fig. 34. AGRM 2000 Projections: Egypt Rice











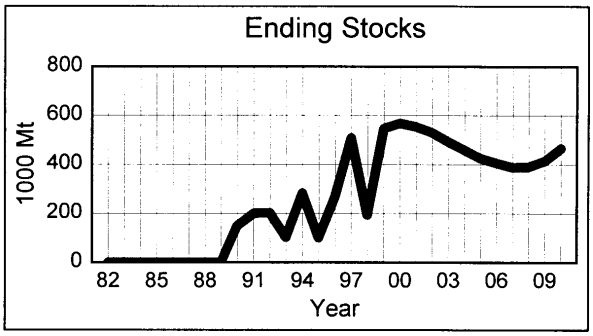


Fig. 35. AGRM 2000 Projections: Argentina Rice

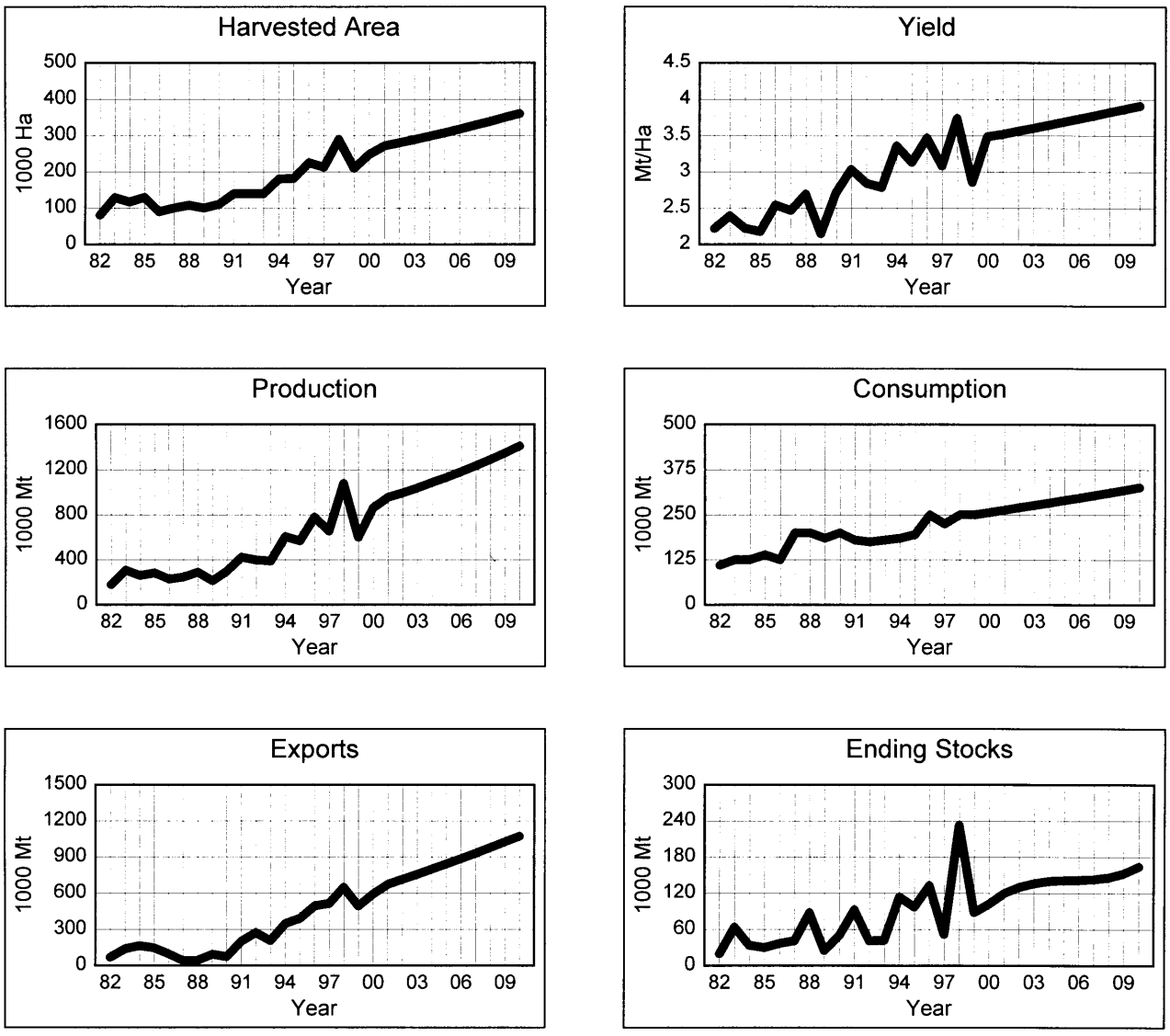


Fig. 36. AGRM 2000 Projections: Uruguay Rice

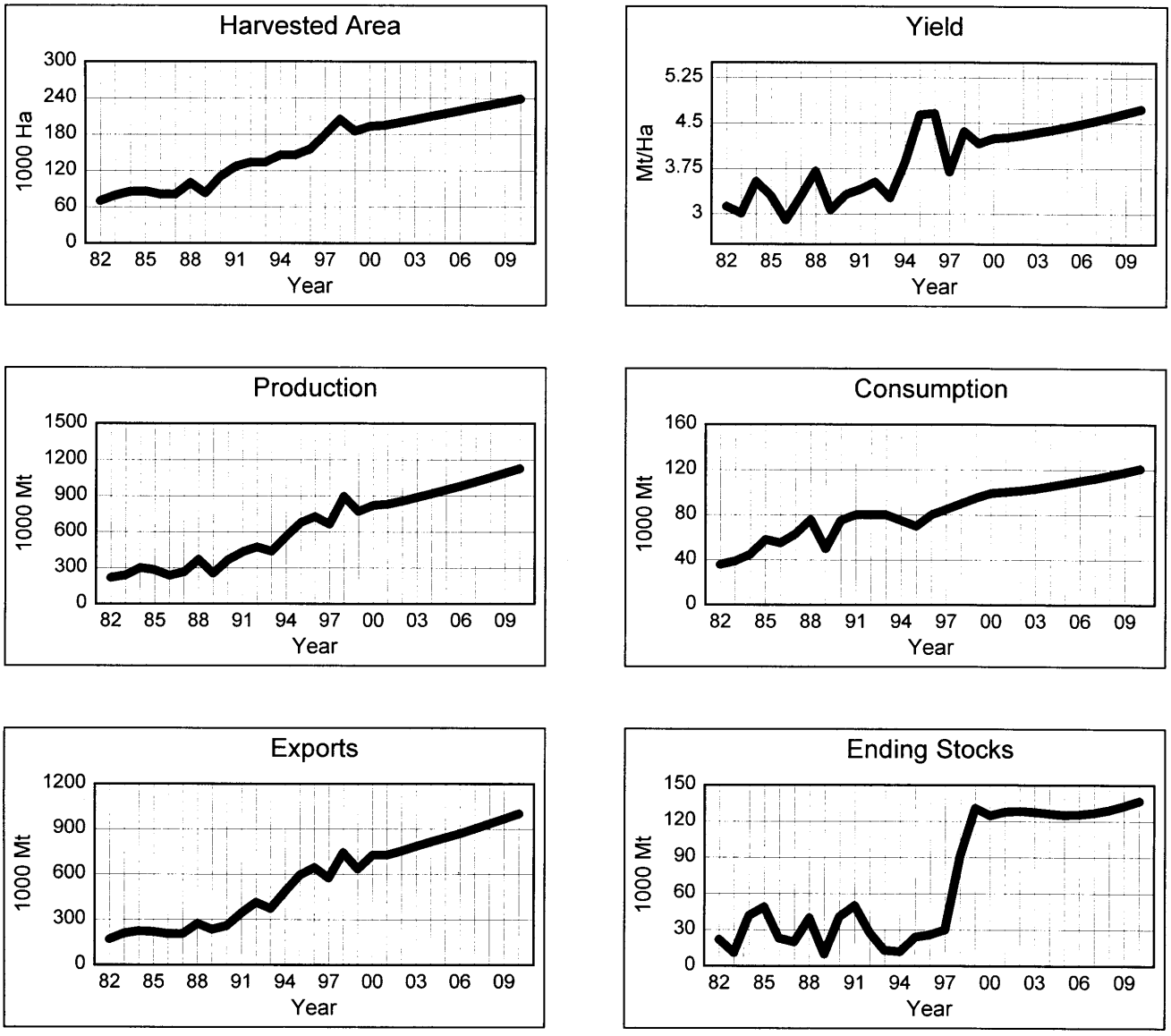


Fig. 37. AGRM 2000 Projections: Brazil Rice

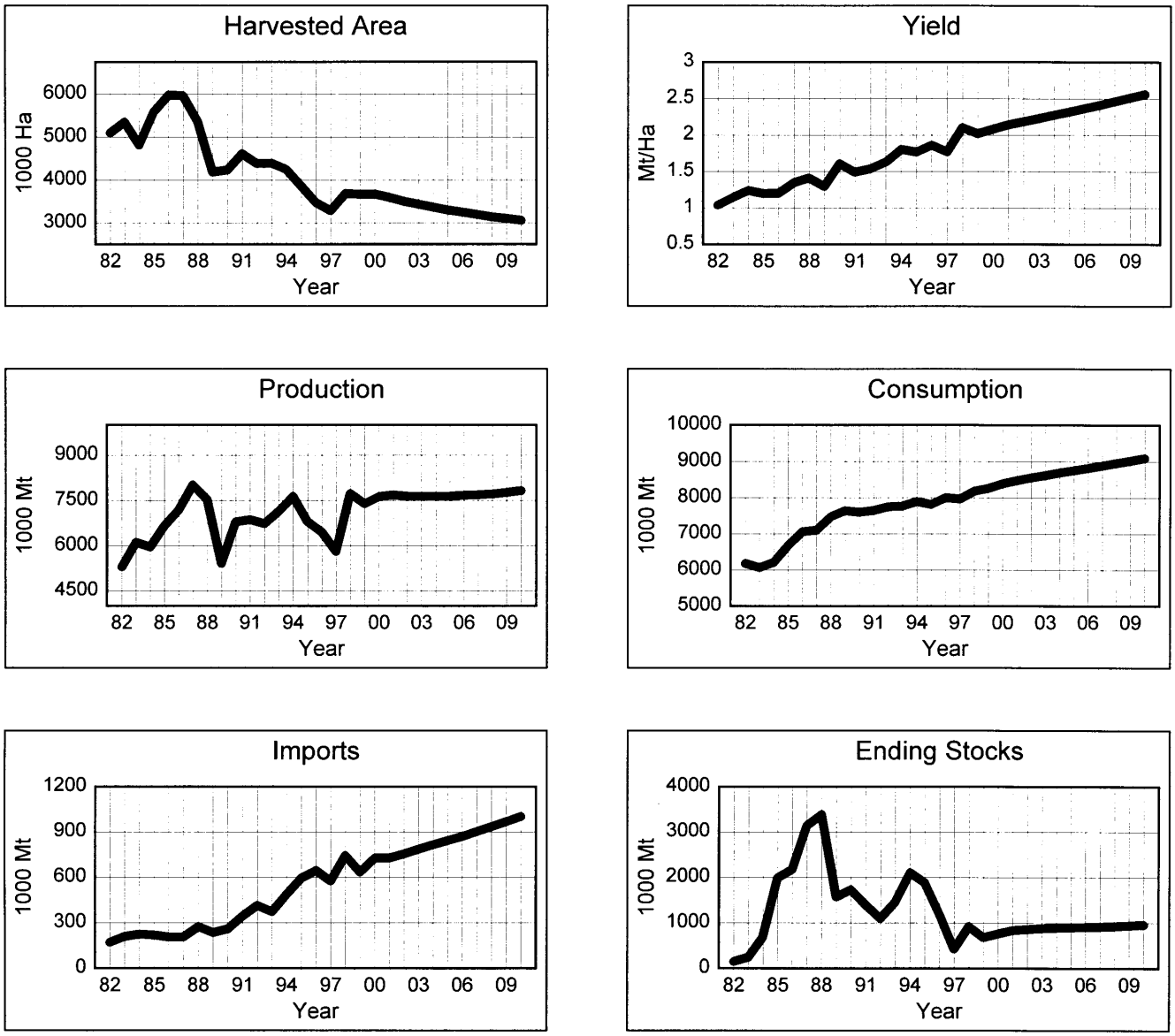


Fig. 38. AGRM 2000 Projections: European Union Rice

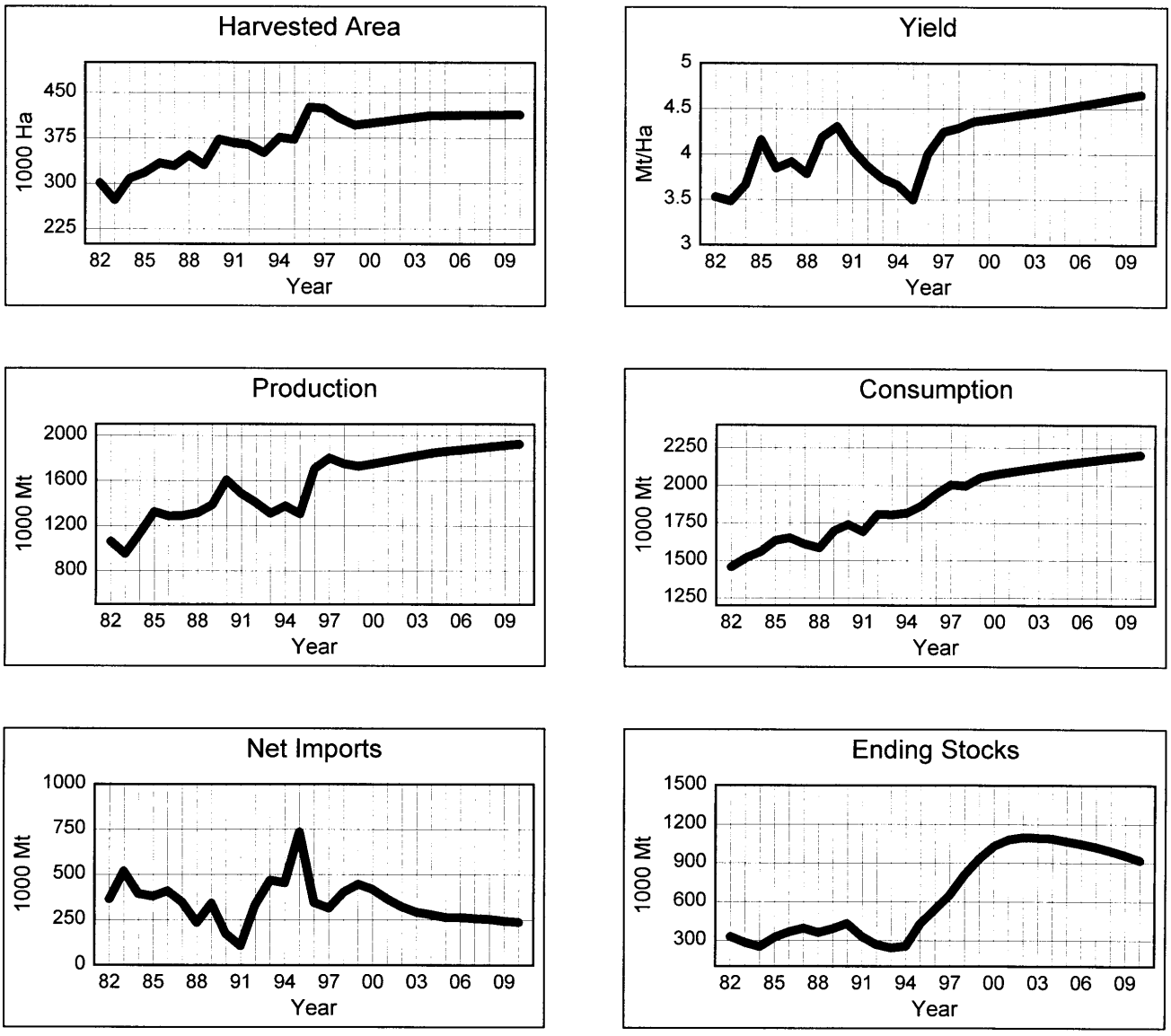


Fig. 39. AGRM 2000 Projections: Italy Rice

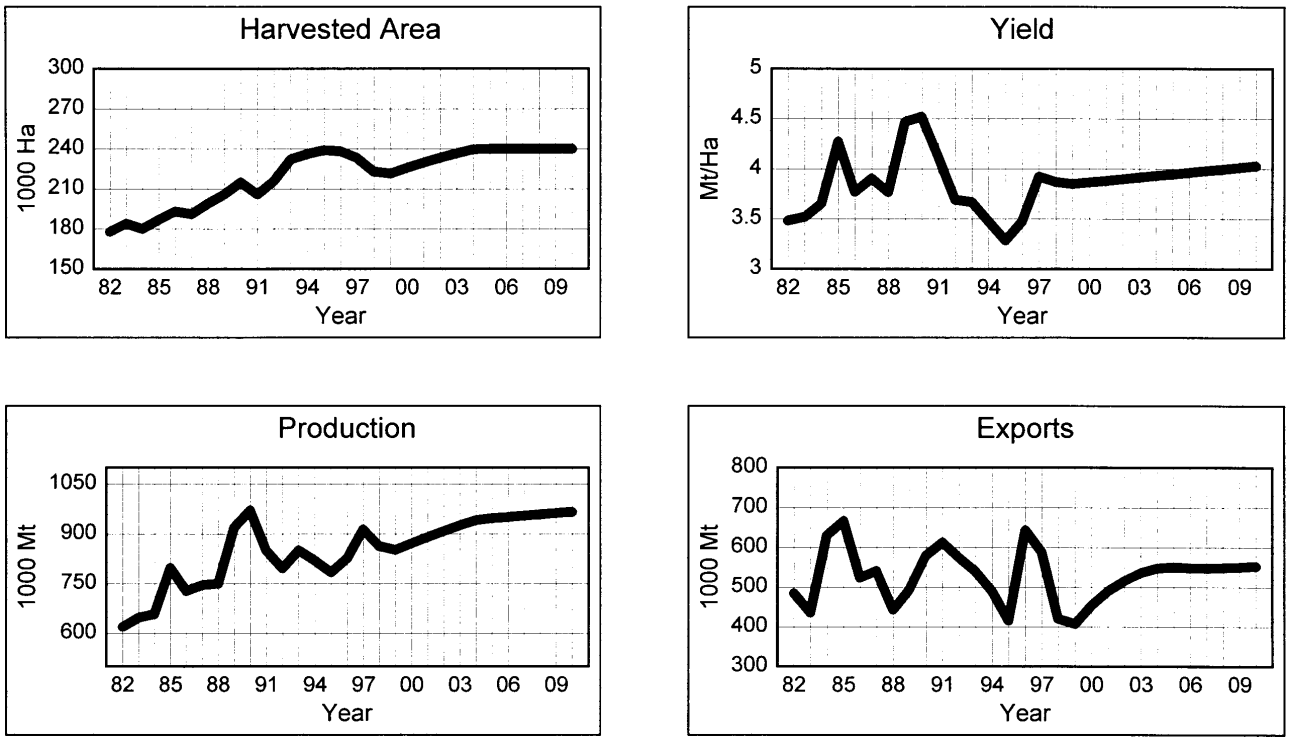


Fig. 40. AGRM 2000 Projections: Spain Rice

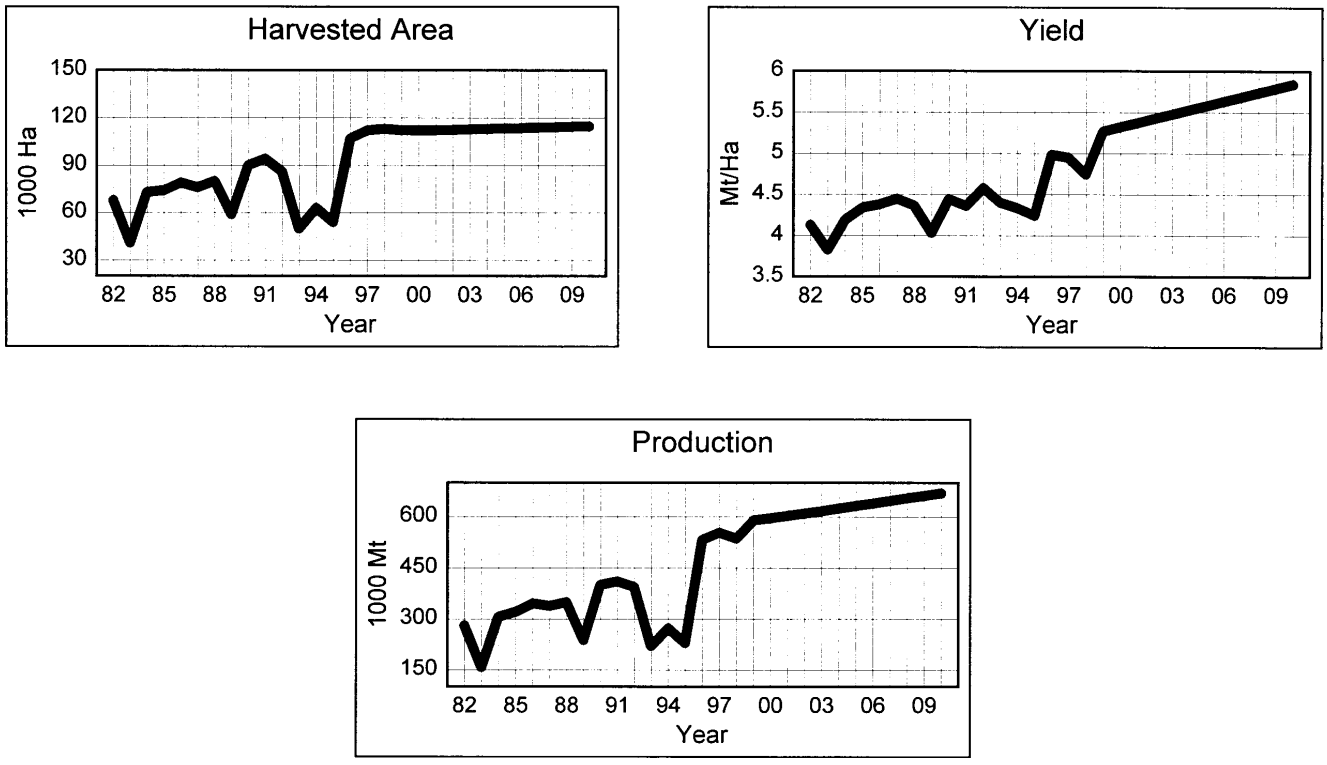


Fig. 41. AGRM 2000 Projections: Other European Union Rice

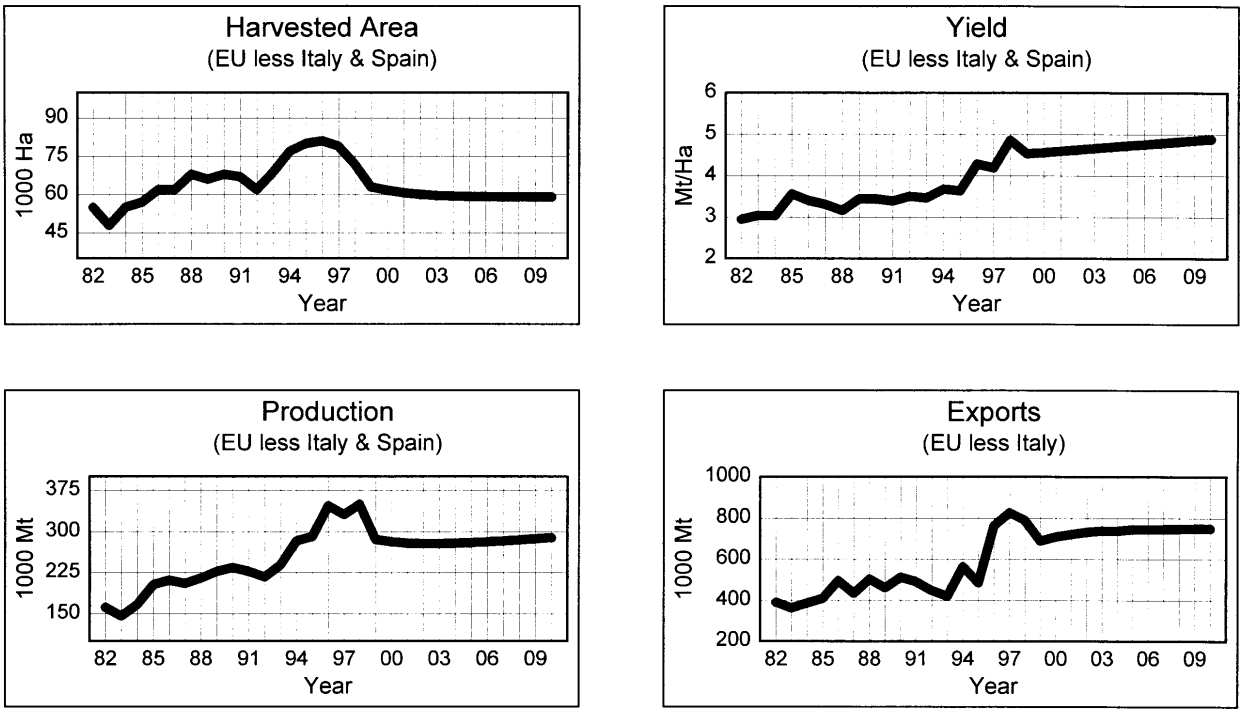


Fig. 42. AGRM 2000 Projections: Indonesia Rice

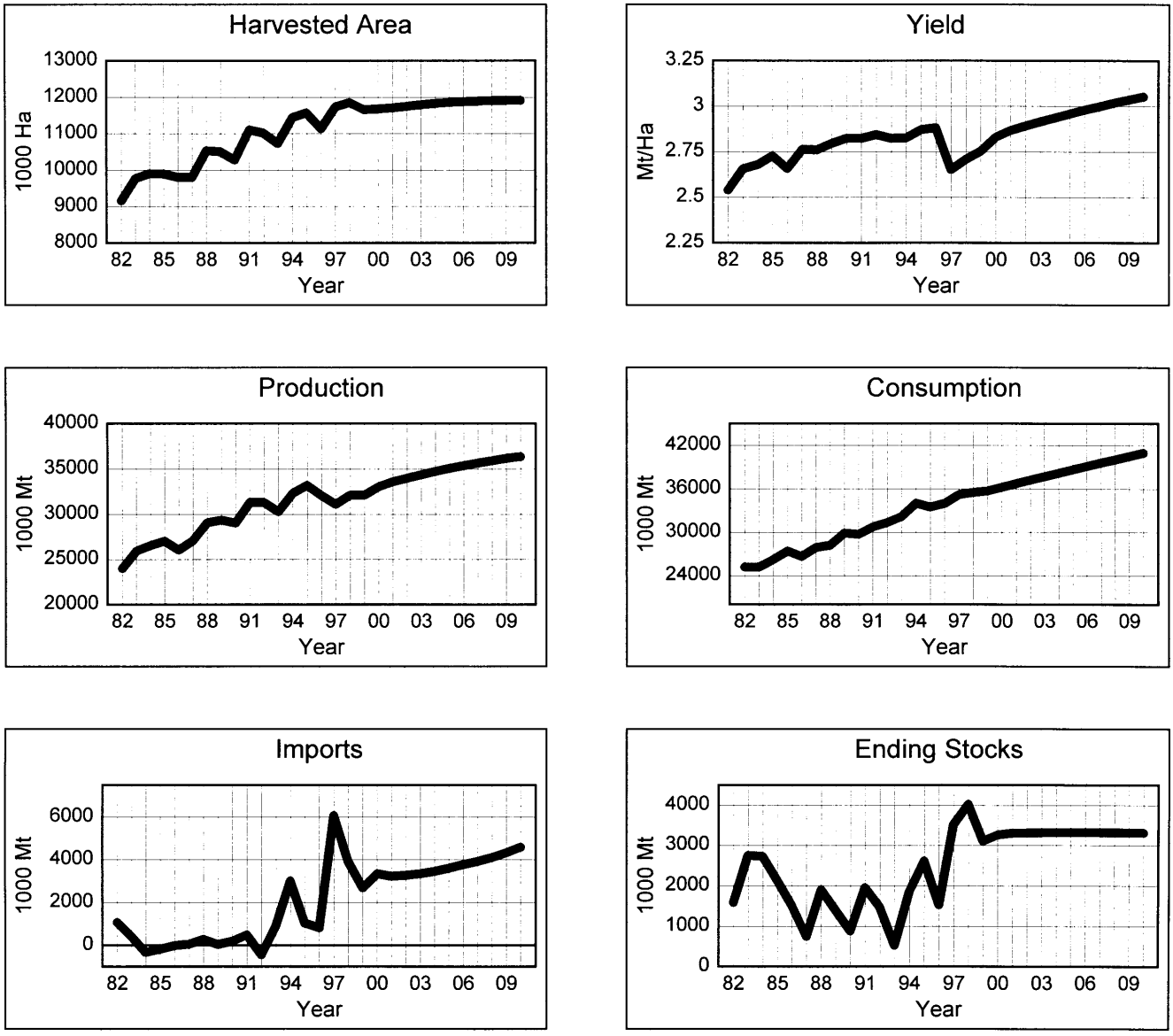


Fig. 43. AGRM 2000 Projections: Iran Rice

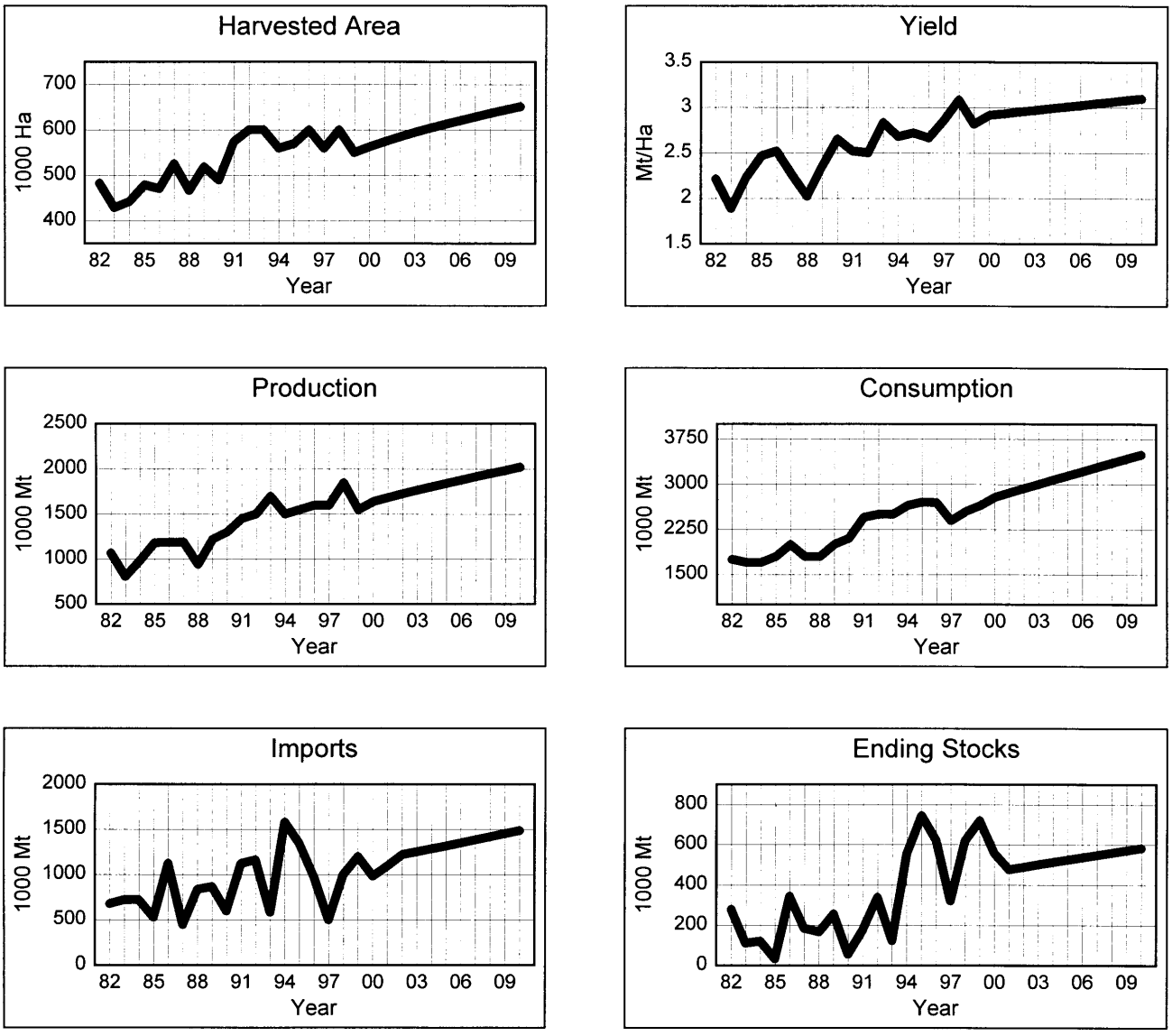


Fig. 44. AGRM 2000 Projections: Iraq Rice

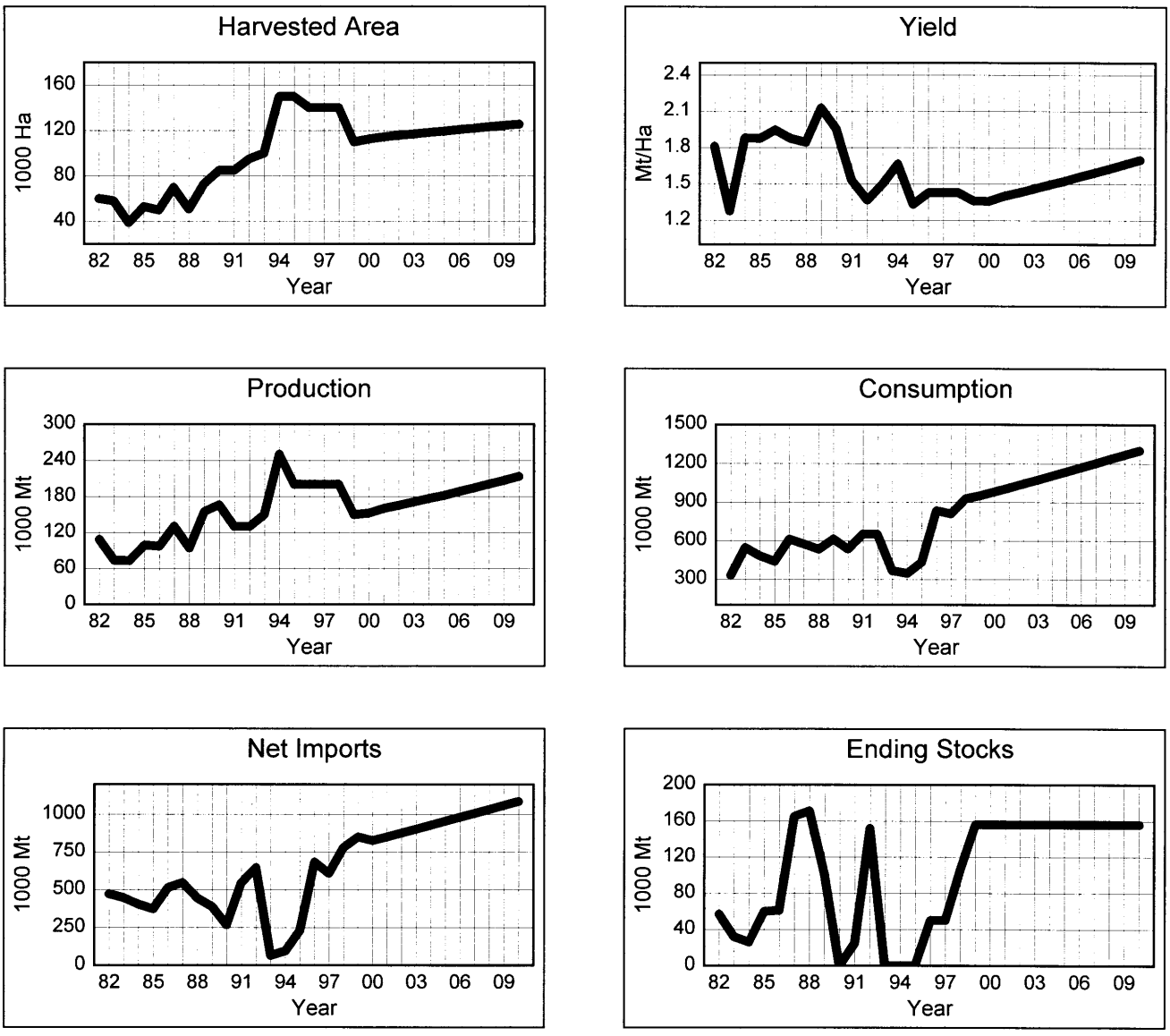


Fig. 45. AGRM 2000 Projections: Saudi Arabia Rice

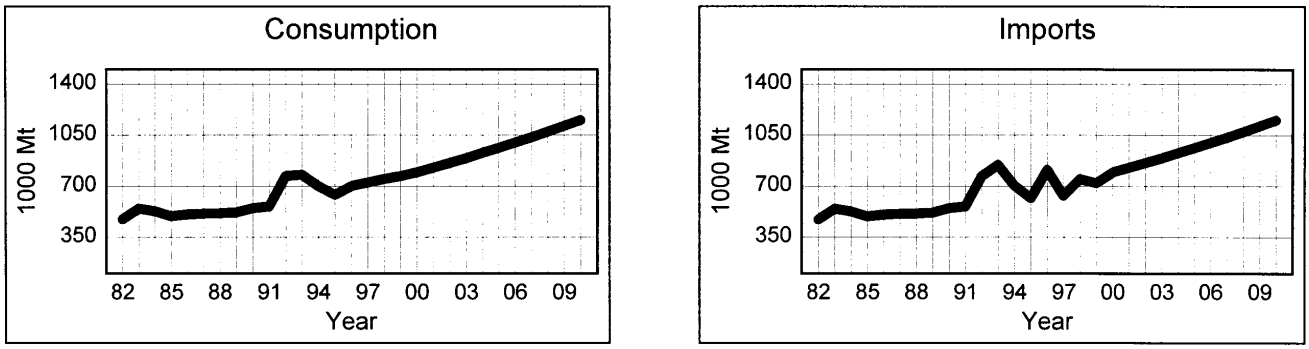


Fig. 46. AGRM 2000 Projections: Japan Rice

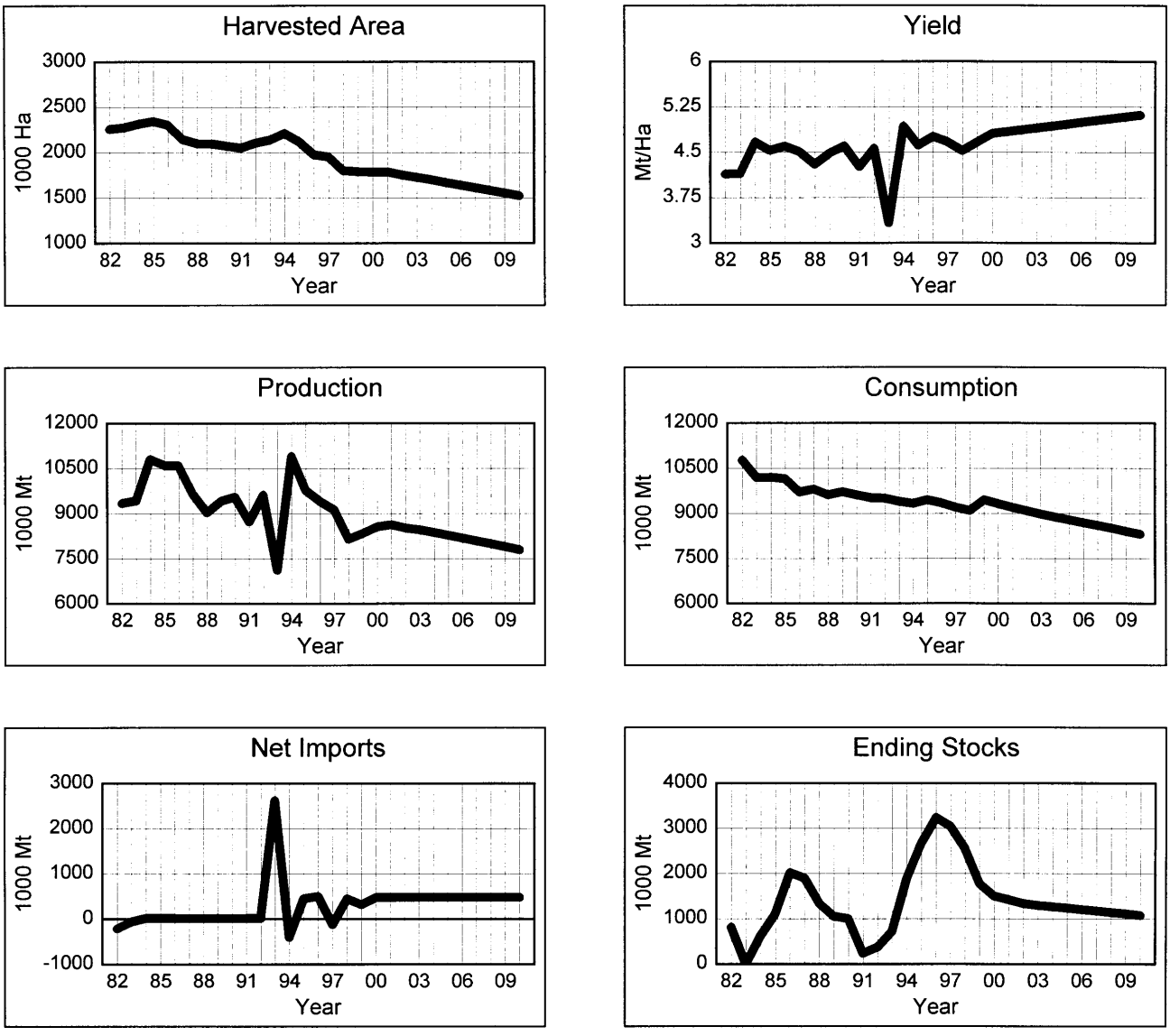


Fig. 47. AGRM 2000 Projections: South Korea Rice

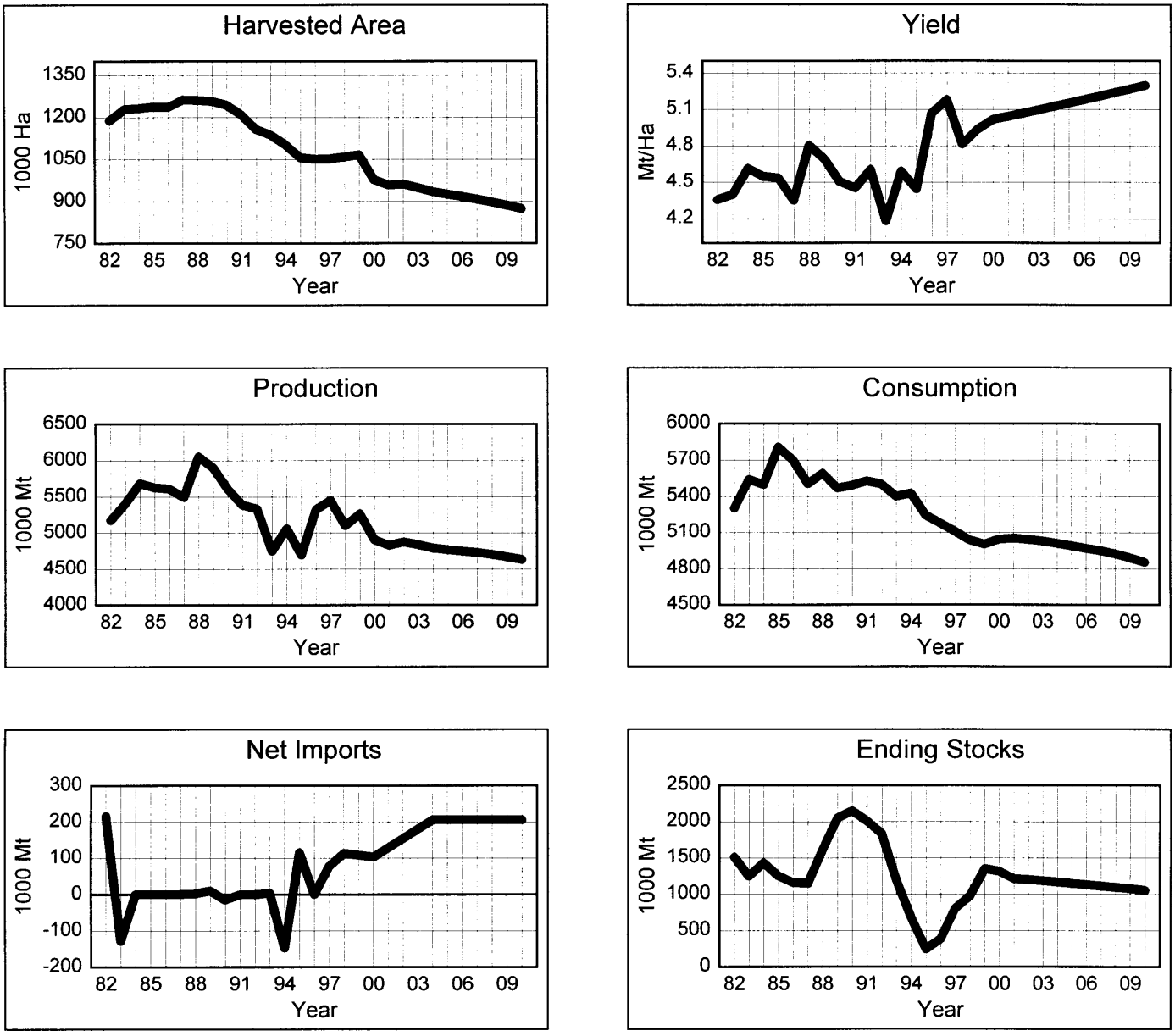
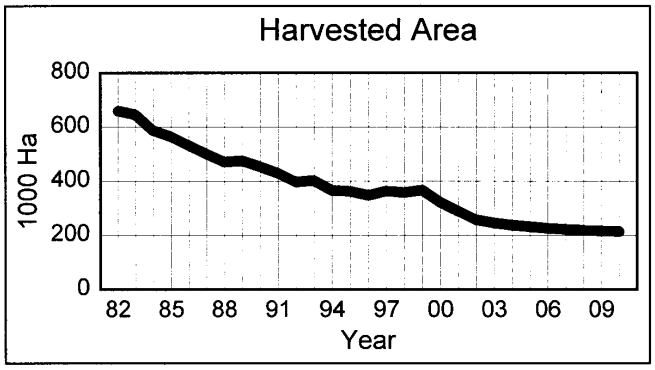
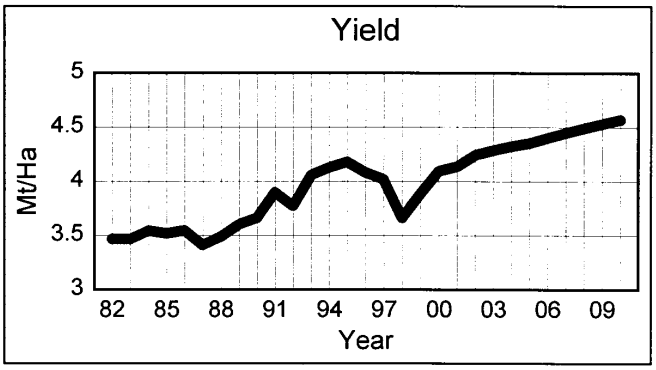
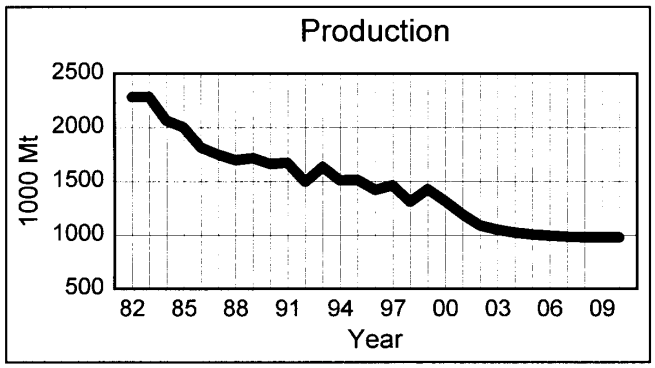
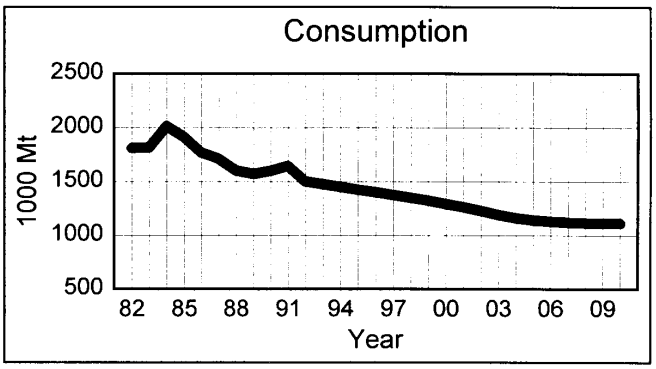


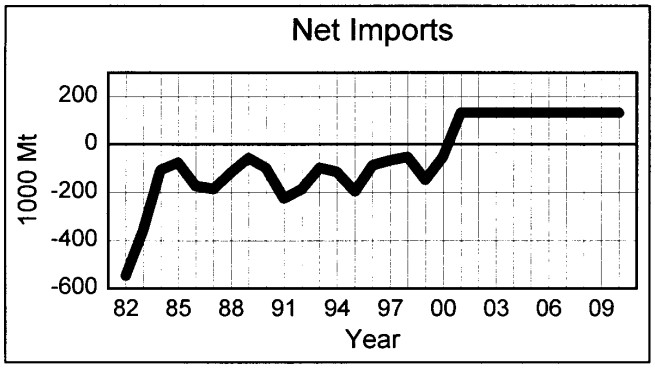
Fig. 48. AGRM 2000 Projections: Taiwan Rice











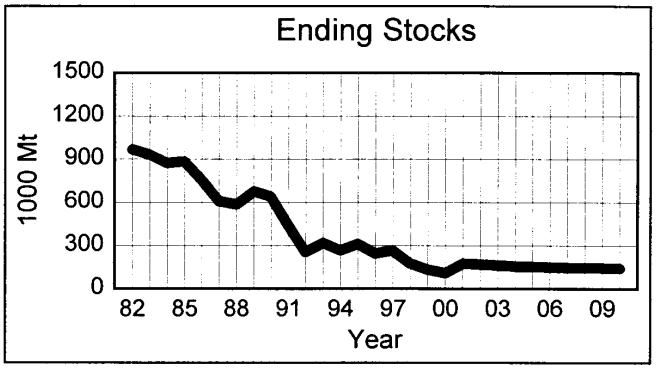


Fig. 49. AGRM 2000 Projections: Canada Rice

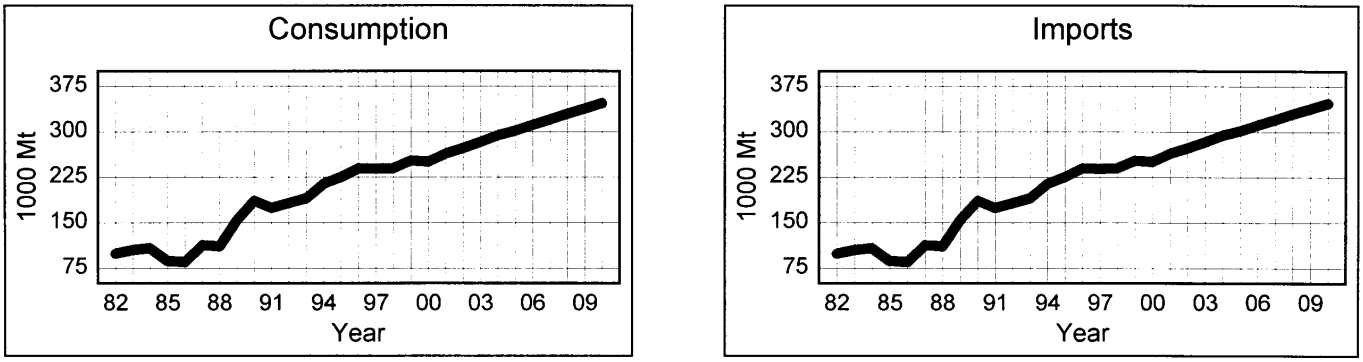


Fig. 50. AGRM 2000 Projections: South Africa Rice

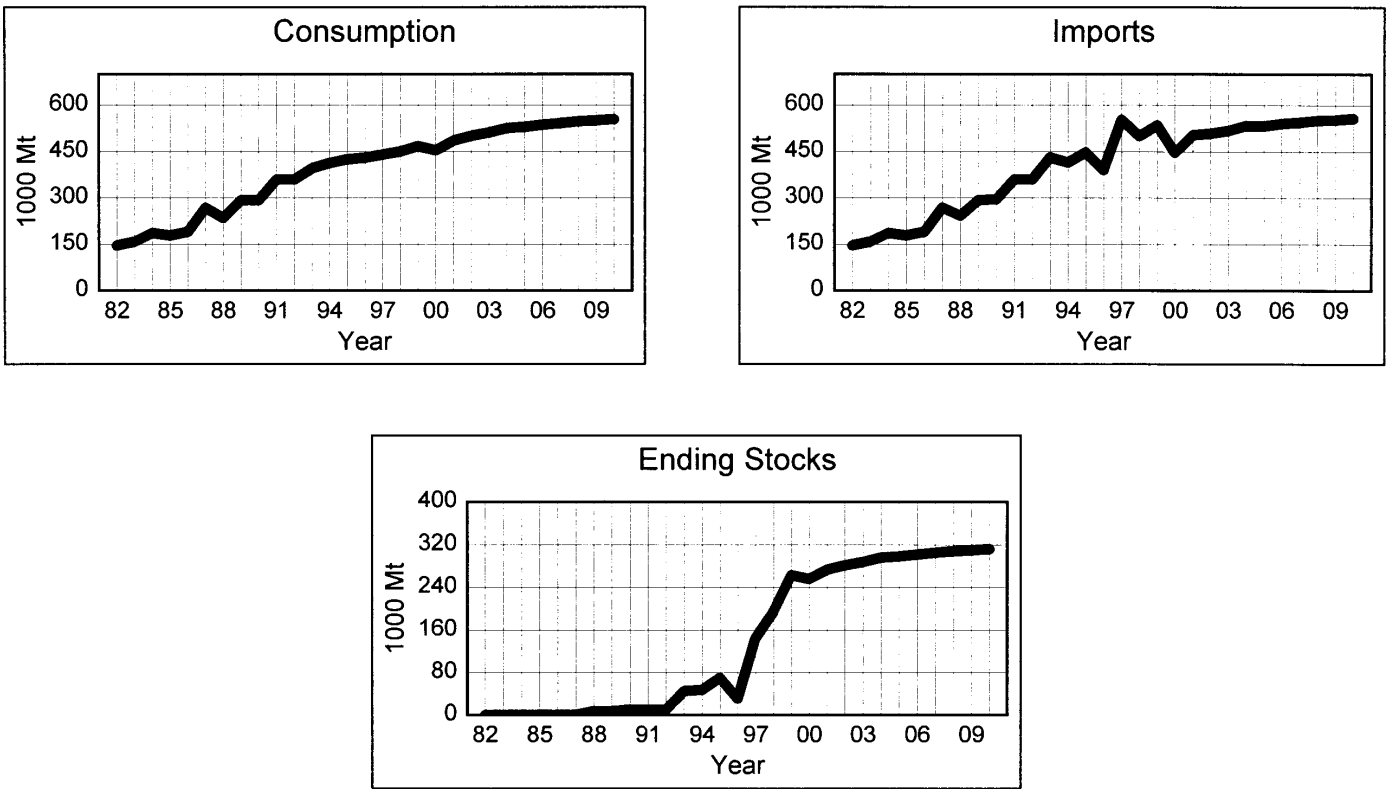
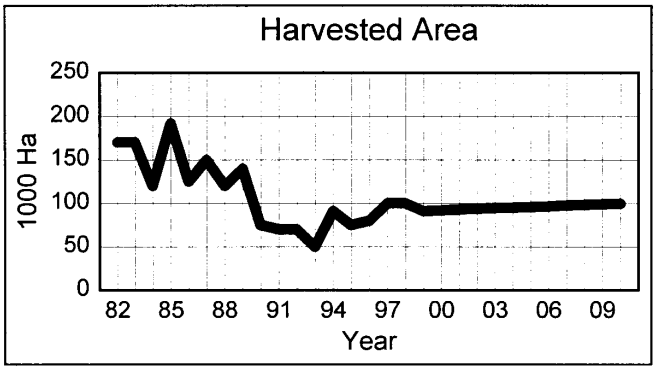
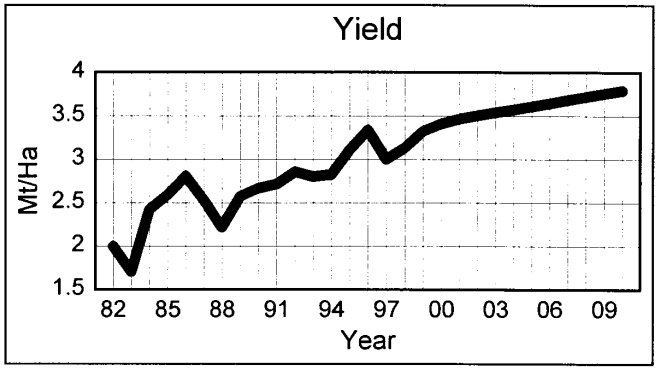
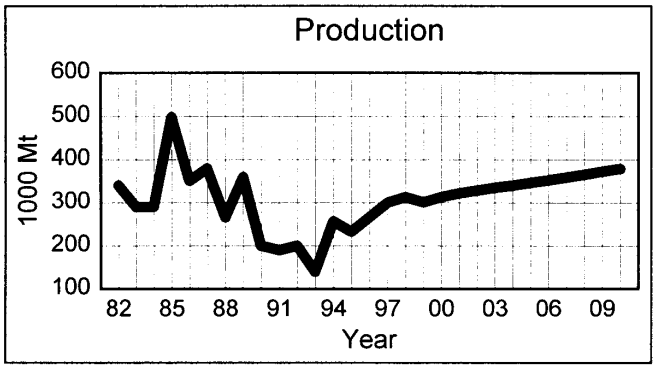
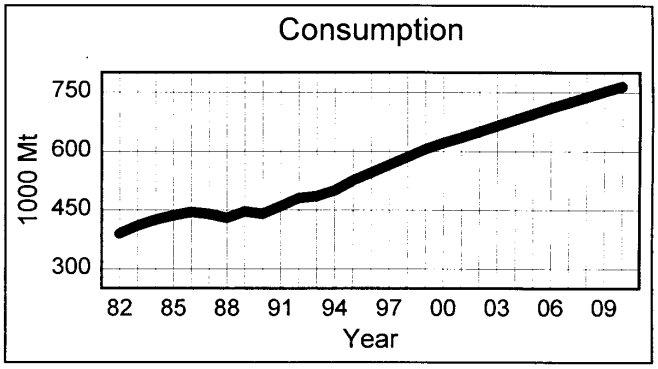


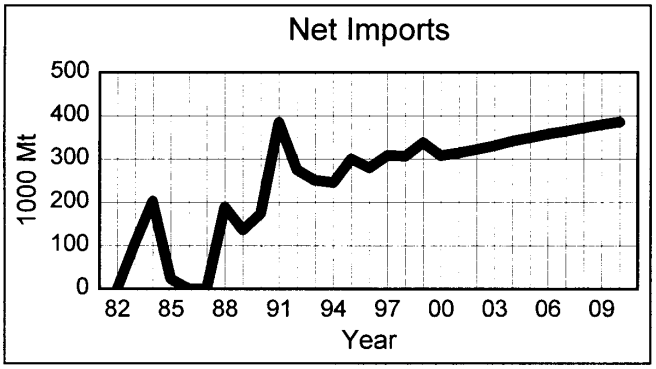
Fig. 51. AGRM 2000 Projections: Mexico Rice











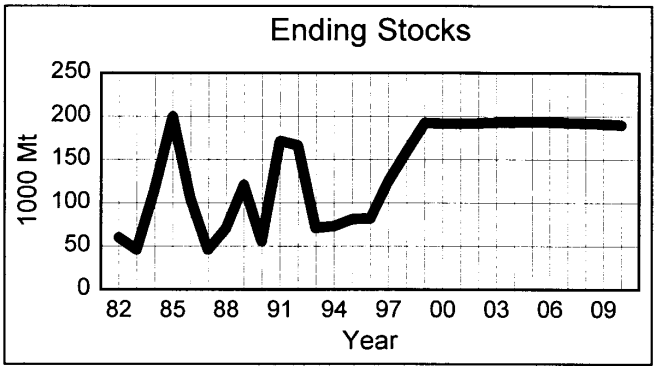


Fig. 52. AGRM 2000 Projections: Rest-of-the-World Rice