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RICE SUBSECTOR BASELINE STUDY

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APRP	Agricultural Policy Reform Program
ARC	Agricultural Research Center
CAPMAS	Central Agency for Public Mobilization and Statistics
CIF	Cost, insurance and freight
EE	Eastern Europe
EEPC	Egyptian Export Promotion Center (of MTS)
EIHS	Egypt Integrated Household Survey
ERS	Economic Research Service (of USDA)
EU	European Union
FAO	Food and Agriculture Organization (of the United Nations)
FAS	Foreign Agricultural Service (of USDA)
fd.	Feddan (equivalent to 0.420 hectares or 1.037 acres)
FOB	Free on board
FSRU	Food Security Research Unit of APRP
GASC	General Administration for Supply Commodities (within MTS)
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GOCEI	General Organization for Export and Import Control
GOE	Government of Egypt
HC	Holding Company
HC-RFM	Holding Company for Rice and Flour Mills
IFPRI	International Food Policy Research Institute
kg.	Kilogram
LE	Egyptian Pound
MALR	Ministry of Agriculture and Land Reclamation
MEFT	Ministry of Economy and Foreign Trade
MEIC	Ministry of Economy and International Cooperation
MELES	The Middle East Library for Economic Services
MPE	Ministry of Public Enterprise
MPWWR	Ministry of Public Works and Water Resources
mt	Metric Ton
mmt	Million Metric Tons
MTS	Ministry of Trade and Supply
MVE	Monitoring, Verification, and Evaluation Unit of APRP
NIS	Newly Independent States (of the former Soviet Union)
NPC	Net Protection Coefficient
PBDAC	Principal Bank for Development and Agricultural Credit
RDI	Reform Design and Implementation Unit of APRP
RRI	Rice Research Institute (of Egypt's Agricultural Research Center)
SGS	Société Générale de Surveillance
S&O	Situation and Outlook (reports and reporting)
UR-GATT	Uruguay Round, General Agreement for Tariffs and Trade
USAID	United States Agency for International Development
USDA	United States Department of Agriculture

ACKNOWLEDGMENTS

This paper is the result of the joint efforts of three agricultural economists. It was guided by the original impact assessment plan, whose team leader was Tom Zalla. John Holtzman designed, managed and led the rice subsector baseline study and wrote all but a chapter and a half of the report. Charles Stathacos assembled and analyzed information on the world rice market, with special attention to medium grain rice, and came to Egypt in April-May 1998 to interview commercial rice millers, private exporters, and some public sector officials with responsibility for rice policy and public milling and trade. Abdel-Rahim Ismail collected and helped to interpret background price and trade data from April to June 1998. He also assisted Stathacos with field interviews and obtained information on private commercial millers from the Rice Branch of the Cereals Industry Chamber.

Abdel-Rahim Ismail and Mohammed Muselhi, both of Zagazig University, also conducted an in-depth sample survey of private commercial rice mills in Egypt in November-December 1998, from which they obtained additional insights that contributed to the final report. Although the report does not analyze any of the survey data in depth, it does draw upon some preliminary survey findings.

In addition to the above analysts, other MVE team members contributed to the report. Adel Mostafa provided invaluable assistance in contacting and carrying out in-depth interviews with several key informants. Morsy Fawzi proved to be a valuable liaison to the MALR/CAAE, which provided agricultural production and paddy price data. His *Data Quality Assessment* shed light on MALR data collection and analysis procedures and issues. MVE COP Gary Ender offered insightful counsel and critical reviews at various points in the study. Flora Kaddies expertly produced numerous tables and graphs. Yvonne Azer and Hesham Amin also assisted with report formatting and data handling.

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- MALR for agricultural area, production, and yield data by governorate, and annual average farmgate prices by governorate.

- MTS for rice export volume data, disaggregated by exporting firm and shipping destination for recent years. MTS also provided retail rice price data for numerous governorates. GOCEI, the Cereals and Legume Department, and the Foreign Trade Sector of MTS provided the data.

- MVE obtained wholesale and retail price data and the consumer price index for urban and rural areas from CAPMAS.

- IFPRI provided estimates of rice consumption in both rural and urban areas from the national household expenditure survey that it conducted in 1997.

- Mr. Ezz el Din Aly Mohammed of the Rice Branch of the Cereals Industry Chamber allowed us to obtain detailed information from the Chamber's files on its members.
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- Dr. Hamdi Salem and Dr. Gamal Siam of MTS offered insights into the workings of the Egyptian rice market and export opportunities.

- Dr. Ragaa el Amir and Fatma Khattab of APRP/RDI kept us apprised of RDI's work on rice mill privatization and efforts to form a rice milling and export association. Lawrence Kent of APRP/RDI and Ron Krenz collaborated with MVE in looking at employment in the rice subsector and milling industry.

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- Numerous private sector exporters and millers offered their time, knowledge of the rice industry, detailed information about their operations, and opinions.

- Dr. A.A. Tantawi, chief breeder of the Rice Research Institute, provided detailed information about Egypt's rice breeding program and varietal characteristics.

The team also interviewed other informants, who generously offered their time and answered numerous questions. Without the combined input of all of the aforementioned key informants, this study would not have been possible. MVE alone is responsible for any errors and omissions. The findings and conclusions of this study are those of the MVE Unit alone and not of APRP as a whole or USAID.

PREFACE

By most measures, the liberalization of rice marketing is considered an Egyptian success story. In *Progress and Obstacles in Rice Sector Liberalization in Egypt: A Rapid Appraisal to Verify Policy Benchmarks,* written by Ismael Ouedraogo and Abdel-Rahim Ismail in April-May 1997, MVE concluded that market liberalization was well advanced, though certain potential barriers to imports and unfair advantages to public mills remained. Fortunately, these potential problems have never been realized, and there has been significant private sector investment in commercial rice milling in Egypt. Privatization has proceeded slowly, and the public sector rice mills returned to the market in a significant way during the 1997/98 season. There has also been significant private entry into rice trading, due to the opportunity created by market liberalization.

Imports of cheaper long grain rice (with relatively high brokens) face a 20 percent duty, 5 percent sales tax, and 3 percent or more set of miscellaneous fees. APRP Tranche II and III benchmarks call for a reduction of the tariff on imported rice to 15 percent or less in Tranche II and 10 percent or less in Tranche III. Allowing imports of milled rice, with a minimal tariff, would put some downward pressure on domestic paddy and milled rice prices, which are high relative to world price levels. Lower prices would likely dampen incentives to grow rice, whose financial returns are high (as water is not priced at its marginal cost). More vigorous enforcement of the interdiction on growing rice in certain areas should also reduce area planted to paddy.

This study, drawing from earlier work done by the University of Arkansas (led by Eric Wailes) in 1993/94 and updated by Wailes, Ragaa el Amir and Hamdi Salem in 1994/95, sets the baseline for the rice marketing and agribusiness system. It is not meant to treat any particular stage of the subsector or set of issues in an exhaustive manner. The study focuses on particular impact measures, while extending in time (series) some of the analyses done by Wailes et al. of Arkansas (1995) and Ragaa el Amir et al. (1996).

Data sources are diffuse and problematic for the rice subsector. The team expended an enormous amount of time and energy trying to collect data on rice production, marketing, price and export data in Egypt. Considerable efforts were also directed to assembling data on and assessing the world market for medium grain rice that is grown principally in Japan, Korea, Northern China. This report attempts to consolidate these data and presents a reasonably complete picture of how the subsystem is organized and performs.

This report is one of four subsector baseline studies done as part of the MVE Unit's impact assessment program. The other three are for fertilizer, cotton and wheat. By the end of the project, MVE will update the time series and examine the set of performance measures assessed in this paper. The final performance assessment will compare the organization and performance of the subsector at two discrete points in time and discuss how the APRP program contributed to any changes and improvements in the rice marketing system.

The original draft baseline study was distributed in late July 1998 for comments and review. Few comments were received, and finalization of the report was delayed for a longer time than anticipated. Two main reasons for delay were the time required to pull together price data series and the need to revise the originally flawed estimates of national milling capacity. Work by Ron Krenz and Lawrence Kent on rice milling and employment in late 1998 revealed several

alternative estimates of numbers of mills of different types and their capacity, which went well beyond the work done for APRP/RDI's original *Rice Subsector Maps*. Based on this new information, the principal author re-estimated rice mill numbers and capacity with somewhat more confidence, though definitive estimates would require a census of mills that obtained information on mill equipment type, its installed capacity, and its actual (adjusted) capacity in peak season operations. Finally, a MVE survey of commercial rice mills in November-December 1998 delayed completion of the report but provided a far better picture of private rice milling in Egypt.

EXECUTIVE SUMMARY

Introduction: Rice Subsector Liberalization and Response. The rice subsector was one of the first commodity subsystems to become liberalized in Egypt, as mandatory deliveries, fixed procurement prices, the public sector monopoly on exports, and other restrictive measures were relaxed during 1991-1992. The overall private sector response to liberalization was enthusiastic and dramatic.

Farmers responded by expanding paddy area cultivated and paddy production increased steadily in the 1990s to a record 1.557 million feddans and 5.42 million metric tons in 1997. Private businessmen responded with significant investment in commercial rice mills, widespread entry into rice trading, and private sector dominance of export marketing by the mid-1990s. By the close of 1998, there were at least 211 private commercial rice mills, while there were only eight such mills before 1990. Private sector investment in commercial mills has been so enthusiastic, particularly after 1995, that there is now excess capacity in rice milling in Egypt.

At the same time, the heavy public sector investment in rice milling capacity became progressively less utilized following liberalization, and public milling companies piled up large debts. By 1997/98, capacity in the private commercial milling industry rivaled public sector milling capacity. Privatization of public sector milling companies would have been accomplished more easily in 1993-1995, shortly after liberalization. By 1996-97, the APRP baseline year, privatization through sale to anchor investors or sale of shares on the stock market had become problematic. Several attempts at sales to anchor investors failed, as there were few bids and the bids that were made fell far short of MPE valuations and expectations. As of June 1998, MPE announced a policy of privatization of public rice milling companies through sale to employee associations. By early 1999, all but two public sector companies were being privatized in this way, though their future operating levels and profitability were uncertain.

STRUCTURE of the RICE SUBSECTOR

Domestic Industry. Some 400,000 farms produce paddy, which is assembled and traded by a large number of traders (some 5,800 paddy buyers and about 5,000 traders of milled rice). By the end of 1996/97, the milling industry had eight public sector companies, with an estimated 23.3 percent of capacity, an estimated 250 private sector commercial mills, with an estimated 35.6 percent of capacity, five cooperative mills, and some 5,500 village mills, with 37.6 percent of capacity. Five cooperative mills and some 1,900 tractor-mounted mills added another 3.4 percent of capacity. Private investment continued at a brisk pace in 1997/98 and into 1998/99, particularly bolstering capacity in private commercial milling.

As Egypt approaches the end of the 1990s, it appears as if there is significant excess capacity in rice milling. Precise quantification of industry capacity is difficult and depends on assumptions about actual operating levels relative to installed capacity, the number of months of operation (and the availability of paddy for processing year-round), mills' access to working capital, daily hours of electricity availability (particularly in rural areas), and other factors. Despite these potential pitfalls, MVE estimates that there was 43.3 percent excess capacity in 1996/97 and 71.9 percent excess capacity by 1998/99.

Although there is evidence of broad participation in rice exporting, the top five private exporters dominate a large share of the market — 41 to 53 percent of total export volume during the past three seasons. Exports by public sector companies, mainly trading companies and some public mills, declined from 86 percent of total volume in 1991/92 to 6.4 percent in 1996/97. There are a large number of private exporters, though many ship quite small volumes (of under 2,000 metric tons per year).

World Rice Market. The international market for rice is thin, as producing countries tend to be large consumers of their own rice. The main producers (and consumers) of *japonica* medium-grain rice are the Far Eastern countries of Japan, Korea, and Northern China, as well as Egypt, Italy, Australia and the United States. A number of Arab arid or semi-arid countries have become significant rice consumers since the 1970s; other important markets for medium grain rice, including Egyptian exports, are Turkey, several Eastern European and NIS countries (Romania, Bulgaria, Moldova, Ukraine, etc.), and several North African (Libya, Tunisia, Morocco) countries and Sudan. Export competitors to Egypt in Mediterranean, Middle Eastern and NIS/Eastern European markets in the medium grain market niche are the U.S. (California), Australia, and China (in some years). Egypt is a price-taker in international rice markets.

CONDUCT of the RICE SUBSECTOR

Widespread Entry Creates Hyper-Competition. Private sector investment has brought significant capacity on stream, leading to intense competition in paddy buying and milling. Quite a few smaller and/or less efficient commercial mills may fail in the coming years, particularly as the paddy crop shrinks. Six of 217 known commercial mills closed in 1996/97 and 1997/98, and two of 55 mills surveyed by MVE in November-December 1998 were not operating well into the 1998/99 season. The number of rice assemblers and traders will probably also contract as paddy production drops in the future (the summer crop fell from 5.42 mmt in 1997 to 4.45 mmt in 1998).

Uncertain Role for Public Sector Mills. In 1997/98, the Holding Company for Rice and Flour Mills rebounded from a poor 1996/97 season, when only 96,300 mt of paddy were milled, by obtaining cheap credit and purchasing 517,600 mt of paddy at prices ranging from 550 to 670 LE/mt — most of it early in the marketing season. This procurement kept the public mills operating at 31.6 percent of capacity in 1997/98, well above the anemic 5.9 percent of 1996/97. As of the 1998/99 rice marketing season, privatization of public sector mills through transfer of ownership to employee stock associations was well underway. The future viability of these companies, whose capacity was 23.3 percent of total national rice milling capacity in 1996/97, is an important unknown that will affect the operating levels and profitability of firms in other segments of the rice milling industry.

Competition for Export Market Share. There was intense competition among public and private exporters over market share in traditional Egyptian export markets such as Jordan and Syria in 1997/98. Partly in response to this, but also as part of a longer term diversification strategy, private exporters have increasingly targeted new markets such as Turkey and the NIS/Eastern European countries. Some commercial rice millers, who either export directly or supply major exporters, as well as some private rice exporters complained about public sector pricing and export marketing tactics in 1997/98, slim profit margins (particularly during 1996/97 and again in early 1999), and stiff competition from other producers of medium-grain rice,

especially the U.S. and Australia. Rice exports attained record levels in 1997/98 of 408,193 mt, 12 percent of the record paddy crop (in milled equivalent terms). Exports rebounded from a weak export performance of 166,167 mt in 1996/97.

Exports began strongly in 1998/99, as paddy prices were low and attractive to millers and exporters in the early marketing season (August-November 1998), but paddy prices firmed up in December 1998 and early 1999, squeezing export profit margins. Most millers and exporters expect lower exports in 1998/99 than in 1997/98, due to a smaller paddy crop in 1998 relative to 1997 and sharply increasing paddy prices as of December 1998.

PERFORMANCE of the RICE SUBSECTOR

Domestic Market Performance. Domestic paddy and milled rice prices declined in 1997/98, and again during the early 1998/99 marketing season, relative to 1996/97, when they were abnormally high, though they remain high relative to world prices for certain types of rice. Marketing margins do not appear to be excessive. Milling costs are commensurate with the degree of processing (village mills have lower costs than multi-stage commercial mills). Processing costs are also a function of throughput, and low capacity utilization (especially for the public sector mills and some commercial mills) keeps per unit processing costs high.

Rice Exports. After a poor export performance in the 1980s, Egypt has been a modest but important exporter of medium grain rice during the 1990s, shipping 4.2 to 12.2 percent of the rice crop in the last five completed export seasons. Exports in 1997/98 reached 408,193 metric tons, the highest level since the 1970s and greater than the 355,229 mt level of 1995/96, the other excellent export year of the 1990s. Egyptian exporters ship to a large number of countries, although the most significant volumes go to Turkey, Syria, Jordan, Romania, Ukraine and Sudan.

Imports and Protection. Imports are hampered by protection that is effectively 30 percent of the cif value; Egypt has imported very small volumes of some expensive long grain rice (Uncle Ben's) and basmati (aromatic *indica*) from Pakistan and India. Lowering protection on imported rice could lead to imports of lower grade rice, such as Thai 35 or 100 percent broken rice, which would be sold to lower income consumers. Large volume imports would put downward pressure on Egyptian domestic rice prices. This would reduce the profitability of rice cultivation and lead to reduced paddy cultivation, water savings for the New Lands, lower national paddy output, reduced milled throughput, lower capacity utilization and mill profits, and some closures of mills and laying off of mill workers. The impact of increased rice imports on Egypt's rice exports is indeterminate; importing lower grade rice for domestic consumption might allow millers to supply more higher grade domestically produced rice for export at more competitive prices.

Lack of Market Coordination and Transparency. Despite significant progress in liberalization of the Egyptian rice market and major private sector investment in rice milling, the rice subsector remains poorly coordinated. The domestic rice market has been characterized by volatile prices and marketing margins over the past several years, showing significant inter-annual variability. Shifting strategies and operations of the public sector rice mills have also contributed to market uncertainty and volatility during the past three years. Almost out of the paddy market in 1996/97, returning to the market in a major way in 1997/98, and again virtually abandoning the market in 1998/99, the public sector has affected the operations and profitability of private millers. Finally, there are signs that private investment in commercial rice mills has

been excessive during the past 3-4 years. There is increasing evidence of under-utilization and financial problems facing a number of commercial mills.

Lack of Transparency in Public Sector Milling. Public sector participation in rice marketing and milling has tended to be erratic and non-transparent during the past few years. Temporary rice movement restrictions (put in place by some Delta Governors for a brief period during the 1996/97 marketing season, but removed by the Prime Minister), subsidies for exporters who ship rice milled by public companies (proposed but not implemented), surveys of mills designed to identify firms which do not fully comply with government licensing, safety (engineering) and health regulations, and special credit arrangements work against liberalization in providing an advantage to public sector millers. The public milling industry has viewed these advantages as justifiable ways to offset an inherited legacy of high debt, excess labor, limited flexibility in pricing and procurement, and highly under-utilized capacity.

The GOE is sensitive to the problems of trying to preserve a large public sector base of installed capacity through privatization, including employee buy-outs of public mills. The future viability of these mills and how they affect the operating levels and profitability of the private commercial mills will be important to monitor. If the employee-owned mills fail, there will be significant unutilized milling capacity to dispose of, sell or scrap.

RECOMMENDATIONS

Role of a Rice Federation. The new rice federation, first formed in mid-1998, promises to be an important voice for rice millers and exporters. MVE recommends that it focus on issues of grades and standards, export promotion, and improvement of market information and intelligence in order to further the success of rice market liberalization and provide benefits to the broadest possible number of participants.

GOE Policy and Regulatory Support. Clarification and enforcement of grades and standards, as well as strengthening of collection, analysis and reporting of market information, are two areas in which the GOE can support the emergence of a competitive and efficient rice agribusiness system.

Leveling the Playing Field. Ultimately, public and private millers need to compete on the same terms, which means doing away with special credit arrangements and subsidies for public companies. With the privatization of the public mills via transfer of ownership to employees, the GOE will presumably not provide special advantages to these mills. A secondary set of issues concerns the availability of bank loans and storage space to private rice millers and exporters from PBDAC, which has reportedly restricted access in the past.

1. STUDY CONTEXT AND OBJECTIVES

1.1 Introduction

MVE's Impact Assessment Plan for APRP (see Zalla et al., 1998) calls for focused subsector baseline studies to establish as systematic a baseline in key commodity and input subsectors as possible. This rice subsector baseline study pulls together useful prior study findings, establishes time-series data files for tracking priority variables, documents policy reform measures since liberalization began, and summarizes reform progress and problems.

The baseline year is 1996/97, which was characterized by an unusual marketing season. Mill-gate (or into-mill) paddy prices rose to record levels of 800-900 LE/mt, above world price levels for similar types of traded rice (when compared as milled rice equivalents), and exports dropped to their lowest levels since 1994/95. No one imported rice in bulk into Egypt, in part due to the 20 percent tariff on rice imports, but also due to uncertainty about whether rice can legally be imported. Without a 20 percent tariff on imports in 1996/97, it is likely that some traders would have imported rice. This would have dampened domestic rice prices, as well as production incentives for the following season (1997/98). Note that the 1997/98 paddy crop reached record levels (an estimated 5.42 million mt) on record area planted of 1.557 million feddans. Yields of 3.52 mt/feddan tied the record high of 1994.

In preparing this report, MVE also collected and analyzed available secondary data (paddy production, processing costs, prices) for the 1997/98 rice production and marketing season. Along with the historical data for the 1995/96 season, this enables MVE to establish a three-year baseline, as the exceptionally high prices and low exports of the 1996/97 rice marketing season were an anomaly. During 1997/98, paddy procurement prices returned to levels more in line with world prices, and prices at the opening of the 1998/99 marketing season were even lower. Exports also returned to higher levels characteristic of the first half of the 1990s. Last, public sector mills expanded procurement from 96,300 mt of paddy in 1996/97 (only 2.3 percent of the 1996 crop) to 517,600 mt in 1997/98 and targeted the export market.

1.2 Rice Subsector Liberalization Context

Liberalization of the rice subsector began in the early 1990s, with most reforms coming in 1991, and has been well described elsewhere (see APCP Monitoring and Verification Report, Tranche V, 1993; Wailes et al., 1995; Ragaa et al., 1996; Ouedraogo and Abdel-Rahim Ismail, 1997). By the mid-1990s, paddy and milled rice could be traded freely. There were a large number of small-scale, village-based rice dealers who had entered the rice trade. Public sector rice procurement had declined significantly, and by mid-1997 there had been heavy private sector investment in rice milling, ranging from small-scale village mills of Chinese manufacture to larger-scale commercial mills made in Japan, Switzerland, China and Korea. As of mid-1998, there were estimated to be over 5,000 rice mills in Egypt, of which all but 47 were privately owned. Public sector rice milling capacity by the end of the 1997/98 season represented only about 21 percent of national capacity. Hence, private sector investment has substituted for and superseded privatization. This level of private sector investment and development was able to take place in a positive enabling environment for rice subsector liberalization.

Estimated installed milling capacity was approximately 7.4 million mt of paddy per annum as of the 1997/98 marketing season, of which 1.635 mmt was in the public sector. This milling capacity exceeded actual paddy output of 4.9 million mt in 1996 and 5.42 million mt in 1997. If paddy is cultivated on no more than 1.0 million feddans in 1999, as hoped by the GOE, actual paddy output will not exceed 3.8 million mt.[1] At this production level, there will significant excess milling capacity, which would put downward pressure on processing margins and upward pressure on paddy procurement prices, as mills compete for scarce paddy to mill.

1.3 Study Objectives

This report establishes a rice subsector baseline for the beginning of the Agricultural Policy Reform Program. It also provides data and analysis of developments during the 1997/98 season and at the beginning of the 1998/99 marketing campaign. The report draws heavily on earlier work by Wailes et al. (1995), Ragaa el Amir et al. (1996), the APRP/RDI Unit, and numerous other sources. In one sense, this report serves as a selective update of the earlier studies by Wailes and Ragaa el Amir. Beyond that, the author provides his own interpretation of conditions prevailing in the subsector during the baseline year of 1996/97 and beyond, and identifies promising areas for further progress in policy reform (mainly clarification and refinement of specific policies) and useful applied research.

This baseline study uses a structure, conduct, performance approach to the organization of the report and the analysis therein. Structure, conduct, performance (SCP) is a partial equilibrium approach to analysis of agricultural input or commodity subsystems. SCP was first developed to look at the organization, behavior and competitive performance of industries, which are horizontal groupings of firms that produce the same or related products. Key industries in the rice subsector are the rice assembling, milling, domestic trading, and export industries. While there is considerable specialization by participant type in the rice subsector In Egypt, some participants perform several marketing and transformation functions. For example, large commercial mills may assemble paddy, mill it, and sell it as wholesalers in the domestic market or export the milled rice directly to foreign markets.

When applied to subsector analysis, the SCP framework can be used to examine the organization and performance of industries in the subsector, as well as inter-relationships among firms at different levels (or nodes) of the subsystem. Taking this latter perspective, the analyst focuses on control, coordination, exchange arrangements, and risk-sharing and spreading in a vertical context, where the subsector is a vertical array of participants (firms and industries) that take a commodity from the farmgate to the end user.

APRP/RDI's *Rice Subsector Maps* (drafted in May 1997 and finalized in June 1998[2]) provides a point of departure in establishing the structure or organization of the rice subsector in Egypt

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[1] MALR estimates of paddy production in 1998 are as follows: 1.25 million feddans, yields of 3.6 mt/feddan, and output of 4.45 million mt. Note that another source (USDA/FAS) reports that the GOE target for area cultivated to paddy is only 300,000 hectares or approximately 715,000 feddans.

[2] The final Rice Subsector Maps came out in March 1999 with a June 1998 date of issue.

for the year 1996/97. It presents subsector maps showing the volume and value of inputs and outputs at each stage of the subsector, employment and aggregate wages from employment at each level of the subsector, and unit prices for outputs for each subsector level. The *Rice Subsector Maps* does not attempt to assess the conduct or performance of the cotton/textile subsector. Another RDI study on employment in the rice subsector updates and expands upon the *Rice Subsector Maps* (see Krenz et al., January 1999).

This baseline study draws on numerous sources in examining and evaluating conduct and performance. The conduct section of this study focuses mainly on pricing and exchange arrangements among firms at different levels of the industry as well as within industry segments. Performance is assessed with reference to key performance attributes: allocative, operational and technical efficiency; progressiveness; market coordination; and market responsiveness and competitiveness.

1.4 Study Overview

This report establishes a rice subsector baseline for the beginning of the Agricultural Policy Reform Program in as comprehensive a way as possible. Completing this baseline has required the following discrete analyses:

- A review of rice varieties cultivated in Egypt and their characteristics (Chapter 2) and changes in the national varietal mix (in terms of area and production) to conserve scarce irrigation water.

- An analysis of recent trends in paddy area cultivated, yields and production by governorate (Chapter 3) and by variety (Chapter 2). This includes a review of recent trends or shifts in regional shares in national production (Chapter 3).

- A summary, analysis and discussion of rice consumption in Egypt (and the region), as well as rice supply and use, trying to interpret available aggregate secondary rice data (Chapter 4).

- A summary and analysis of available data on subsector structure from various sources, as well as a preliminary assessment of subsector conduct. This chapter will include an analysis of public and private market shares and processing capacity (Chapter 5).

- An analysis of the recent trends in producer paddy prices, wholesale and retail rice prices, and export prices, as well as marketing margins, using monthly time-series data (Chapter 6). This section includes an analysis of the relationship between domestic and international prices, including calculation of NPCs.

- An overview of recent trends in international rice production and trade flows and prices, highlighting the thinness and segmentation of the international rice market and shifts in export market shares (Chapter 7).

- A more in-depth examination of Egypt's rice exports during the 1990s, including trends in overall exports, public/private market shares, and changes in export destinations (and

their relative importance). (Chapter 8)

- Description and some preliminary analysis of the operations and costs of different categories of rice mills (village, private commercial, and public). This will include an analysis of investment in the rice subsector, with particular attention to private commercial mills, during the 1990s (Chapter 9).

- An assessment of subsector performance, constraints, and opportunities for improvement, including a discussion of the extent to which different levels/stages of the subsector are workably competitive or oligopolistic (Chapter 10).

- A brief discussion of key remaining policy and regulatory issues affecting liberalization of the rice subsector and some suggestions for how the public sector can better support rice industry development (Chapter 11).

- MVE's forecast of the direction and relative magnitude of changes in rice production, trade and the milling industry, as well as other key subsector variables (Chapter 12).

The baseline report also identifies sources of key price, trade, throughput, processing cost, and subsector structure data for ongoing monitoring and final impact assessment.

2. RICE VARIETIES

Why begin an impact assessment baseline study with a discussion of rice varieties? First, it is important to understand that over 96 percent of Egypt's rice area is planted to *japonica* rice varieties and the remainder, less than 4 percent, is planted to *indica* (often called *filipino*) rice varieties. *Japonica* is a medium to short grain, round rice that is grown principally in Japan, Korea, parts of the Mediterranean and Middle East, California and Australia. World production and trade of *japonica* is dwarfed by long grain *indica* rice varieties. Egyptian consumers and many consumers in the Middle East prefer medium grain *japonica* rice. The market for Egyptian rice is therefore largely a domestic market and secondarily a regional Middle Eastern and Mediterranean market.[3]

Second, the rice crop consumes a lot of irrigation water, and area cultivated to paddy has expanded greatly during the 1990s, a cause for concern and much debate. This debate has centered on a critical issue for Egyptian agriculture: how can high water consumption of rice be reduced while maintaining production levels (and meeting domestic and export market demands) and allowing for vast new irrigated areas (in the Sinai and the southern valley, Toshka) to come on stream in the 21st century. Rice breeders introduced new varieties in the mid-1990s that are shorter season than the number one variety cultivated, Giza 171, in an effort to minimize the rice crop's water consumption. This is laudable and far-sighted and will help to reduce irrigation water required to grow rice. At the same time, more work (with implications for agricultural and resource policy) will be needed on the issue of lowering area cultivated to rice, a crop (in rotation with wheat) with the highest private profitability.

A number of rice researchers and MALR officials assert that a minimum of one million feddans of paddy must be cultivated in the Delta in order to counteract salt intrusion from the Mediterranean Sea. The University of Arkansas report (1995) showed that the economic benefits of rice in minimizing salt intrusion and loss of agricultural land in the Delta were significant. Rice is relatively salt tolerant, and Giza 178 (a new variety in 1995) was bred for salinity tolerance, although it is shorter season variety (135 days vs. 155 days for Giza 171) and hence in the soil and irrigated for a shorter period of time.

2.1 Rice Varieties and their Characteristics

The Rice Research Institute of the ARC has developed high-yielding, medium-grain *japonica* rice varieties that are bred to satisfy multiple criteria: yield, blast resistance, salinity tolerance (in the case of a few varieties), milling yield, and consumer acceptability. The rice breeding experience of the RRI is described in detail in a 1997 publication by Dr. Abdel-Azim Tantawi, chief rice breeder of RRI until recently, entitled *Rice Improvement in Egypt During Eighty Years (1917-1997)* and published in **Advances in Agricultural Research in Egypt**. This section will summarize trends in area cultivated to and production of the major rice varieties grown in Egypt during the 1990s.

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[3] Egyptian rice is not competitive in the demanding Japanese and Korean markets, largely due to reportedly inferior quality relative to competing exporters of medium grain rice, who also have captured significant shares of Asian markets and have better market intelligence and networks.

Table 2-1: Characteristics of Rice Varieties Cultivated in Egypt

Variety	J/I	Year of Release	Salinity Tolerance & Blast Resistance	Days to Maturity	Experimental Yield in 1994 or 1997* (mt/ha)	National Yield in 1997 (mt/ha)	Area Cult. in 1997 ('000 Fd)	Milling Yield, 1994 (in %)	Consumer Acceptability
Giza 171	J	1975	BR	155	7.68	8.33	751	72	
Giza 172	J	1975	BR			7.85	99		
Giza 173	I					8.17	56		
Giza 175	J/I	1989	BR	125	9.88	7.94	1	69	cooking & eating qualities less acceptable
Giza 176	J	1989	suscept. to blast	125	10.02	8.00	171	70	acceptable grain & cooking qualities
Giza 177	J	1995	BR	120-125	10.05*	8.45	168	73	excellent cooking & eating qualities
Giza 178	J/I	1997	ST & BR	130-135	11.07*	9.08	296	71	
Giza 181	I	1987	BR		9.76	9.74	2	69	excellent cooking & eating qualities
Sakha 101	J	1997	BR	135-140	10.62*		**8	72	
Sakha 102	J	1997	BR	120	9.90*		**8	72	excell. grain quality

Sources: Badawi A. Tantawi, *Rice Improvement in Egypt During Eighty Years (1917-1997)*, in **Advances in Agricultural Research in Egypt**, Vol. 1, No. 1, 1998. *National Rice Campaign*, 1997 and 1996. Interview with Badawi A. Tantawi and Rice Research Institute files.

Notes: 1) J means *japonica* and I means *indica* variety. J/I is a *japonica/indica* cross. 2) BR = blast resistance; ST = salinity tolerance. 3) Yield in 1994 or 1997 (designated by *) is experiment station trial data. 4) Milling yield = rendement. 5) Consumer acceptability has shorthand observations about whether the variety is suitable for Egyptian cuisine (e.g. glutinous or non-glutinous). 6) ** Total area cultivated to both Sakha 101 and 102 in 1997 was 8,000 feddans. 7) Giza 173 is called Reho by farmers. Giza 177 is sometimes referred to as 4000 (though its varietal designation is technically 4120). Giza 178 is variety 4255 and Giza 176 is variety 2175. Filipino rice is IRRI rice, such as IR 28.

Table 2-1 summarizes the characteristics in production and post-harvest utilization of the major rice varieties. RRI has bred virtually all varieties of rice for resistance to rice blast, which is a constant threat to the Egyptian rice crop. A few varieties have also been bred for their tolerance to salinity. Saline tolerant varieties are required in the northern Delta region in order to combat salt intrusion from the Mediterranean. All varieties are also bred for high yield and their acceptability in consumption. Note that Egypt's reported average paddy yields of 3.52 mt per feddan (1997), equivalent to 8.38 mt/hectare, are the highest recorded yields in the world. This is a positive testimony to the excellence of the breeding program of RRI, as well as to the intensity of rice cultivation and high levels of fertilizer use in Egypt.

2.2 Replacing Longer-Season with Shorter-Season Varieties

Giza 171 and 172, two longer-season introduced in 1975, together dominated area cultivated through 1995. In 1991, Giza 171 was grown on 48.3% of total area cropped to rice, and it represented 47.4% of total paddy output. Giza 172 represented 17.5% of paddy output and was grown on 19.9% of total rice area in 1991. As shown in Table 2-2, area planted to Giza 171 peaked at 752,000 feddans and 53.7 percent of area sown in 1995 but declined to 662,000 feddans, or 44.6 percent of total area sown to rice, in 1997. The twelve percent decline in area sown to Giza 171 from 1995 to 1997 marks a major watershed. Similarly, area sown to Giza 172 decreased 43 percent from 166,000 feddans in 1994 to 95,000 feddans in 1997. In 1997, Giza 172 was cultivated on only 6.4 percent of total rice area.[4]

Area planted to Giza 171 and 172 will continue to drop as new, shorter-season rice varieties are introduced. These varieties — Giza 177 and 178 and Sakha 101 and 102 — require 120 to 135 days to reach maturity, as shown in Table 2-1. By planting these varieties, rice cultivation time is reduced from 155 days (for Giza 171) by 20 to 35 days. If the current irrigation system can be adjusted, the lower water requirements for these varieties will reduce the number of required irrigations and hence economize on the increasingly scarce resource, Nile River irrigation water. The MPWWR and MALR collaborated to carry out a pilot test in directing farmers to cultivate short-season rice varieties in one irrigation command area (the Sidi Gammee Canal) during the 1998 summer growing season. Conducting this experiment in one command area, where all the farmers grew the same rice variety under a single rotation, was necessary to schedule water delivery changes. Hence, shifting from longer season to short season varieties is not automatic and cannot be implemented on a piecemeal basis. It requires that farmers in a command area follow the same rotation so that the reduced number of irrigation water deliveries can be effectively operationalized.

By 1997, Giza 177 and Giza 178 were becoming prominent in rice cultivation. They were planted on 13.6 percent and 20.3 percent respectively of total rice area in 1997, up from 1.7 percent and 0.3 percent of total area sown to rice in 1995, their year of introduction. Sakha 101 and 102 were first introduced in 1997 and represented only 0.4 percent of rice area sown that year. This area will expand steadily during the next several years, however, with positive implications for irrigation water use on rice.

[4] In 1996, Giza 171 was planted on 48.0% of total rice area, while Giza 172 was cultivated on 6.1% of rice area.

Table 2-2: Area Planted and Production by Rice Variety, 1994-97

Three other shorter-season varieties, Gizas 176, 175 and 178, have been less promising and the trend in their areas cultivated has been downward. Giza 176, a high-yielding variety with excellent consumer acceptance, was introduced in 1989 and widely grown for several years (25.5% of area planted to rice in 1992 and 26.9% of the harvested quantity, and 31.1% of area and 33.1% of production in 1994). This variety was still cultivated on 10.7% of total rice area in 1997, although its yields have been negatively affected by blast. Area sown to Giza 176 has declined steadily from 429,000 feddans in 1994 to 159,000 feddans in 1997. Giza 175, a *japonica*/*indica* cross introduced in 1989, dropped out of the rice varietal mix by 1996, because it is less acceptable to consumers than other varieties. Last, Giza 181, introduced in 1987 as an *indica* long-grain variety, was only cultivated on approximately 4,000 feddans in both 1996 and 1997 and appears not to be widely accepted by producers and consumers.

2.3 Millers' and Exporters' Perceptions of Rice Varieties

Millers are most familiar with Giza 171, 172 and 178 and commented about their milling properties in interviews with the study team. Giza 171 is the preferred variety by millers and traders for export. Giza 171 is shipped mainly to key traditional export markets such as Syria, Jordan, Lebanon and Libya, as well as to Turkey, an export destination which became important to Egypt during the 1990s. Giza 172 has similar milling properties, but it is becoming increasingly scarce.

Giza 178, the *japonica-indica* cross, is becoming more widely milled as its area cultivated increased strongly in 1997 and 1998. According to millers, however, Giza 178 produces longer, thinner grains that break or crumble with milling, leading to a high proportion of brokens and some chalky powder (which is good for little other than animal feed). Milling yields range from 60 to 65 percent for Giza 178, well below the yields of 65-70 percent for Giza 171 and 172. Although some Giza 178 is exported to Eastern Europe, NIS countries, and less demanding markets such as Sudan, it is consumed primarily in the domestic market, and it is a less preferred variety in consumption than Giza 171.[5]

As area cultivated to Giza 177, a 120-day variety, has also expanded, millers have increasingly bought and milled it. They rate its millability and export potential about the same as Giza 178, but state that it leads to a whiter milled rice than Giza 178 According to many millers, Giza 177 grown in 1997 had a high out-turn (or rendement) that clustered around 65 percent. The 1998 crop was poor and milling led to a high proportion of brokens and generally low out-turn (under 60 percent and as low as 55 percent).

Even though area cultivated to Giza 171 will decline over time, it is unlikely to drop out of the production mix completely, as larger commercial rice millers and exporters will continue to mill and ship their preferred variety. As shorter-season varieties come on stream, millers and exporters may need to promote the new varieties and convince consumers in the domestic and foreign markets that they are adequate substitutes for Gizas 171 and 172.

[5] Interviews with large-scale commercial rice millers in November-December 1998 revealed that some mill Giza 178 for export, typically to Eastern European market destinations.

3. RICE AREA AND PRODUCTION

Rice and cotton are both summer crops which compete for limited irrigated area in Egypt. Area planted to paddy now dwarfs area cultivated to cotton, a reversal from the 1970s, when cotton cultivation (1.416 million feddans on average) was consistently well above rice cultivation (1.072 million feddans on average). During the 1980s, area sown to cotton was still consistently higher, nearly 10 percent, than area planted to rice — averaging 1,060,578 feddans a year to cotton and 966,994 feddans to rice. By the 1990s, cotton area was consistently below 900,000 feddans per year, while rice area expanded steadily from 1990 (1.037 million feddans) to 1997 (1.557 million feddans), averaging 1,292,168 feddans for the 1990-1997 period. With the liberalization of rice marketing and pricing during the 1990s, returns to rice rose steadily, making rice a crop with high private profitability.[6] Furthermore, farmers report that the labor requirements and input applications are less onerous and costly for rice than for cotton.

3.1 National Area and Output

As shown in Table 3-1, area planted to paddy in Egypt did not exceed 1.0 million feddans in seven of ten years of the 1980s, averaging 967,000 feddans. Area planted was 1.037 million feddans in 1990 and continued to rise steadily during the 1990s to 1.557 million feddans in 1997. The three-year average area grown to rice in 1995-97 reached 1.454 million feddans, 50 percent higher than the 1980s' average area.

Taking a longer term perspective, the average annual growth rate in area planted from 1980 to 1997 (see Table 3-4) was 2.7% for all of Egypt and 3.3% for Dakahlia, 2.0% for Kafr el Sheikh, and 0.9% for Beheira (the three largest rice producing governorates). Over the shorter time frame of the first eight years of the 1990s, rice area planted grew at a much faster rate: 5.3% for all Egypt, 5.2% for Dakahlia, 2.1% for Kafr El Sheikh, and 5.3% for Beheira.

Yields rose from an average of below 2.5 mt/feddan during the 1980s to 3.52 mt/feddan by the 1997, as shown in Table 3-2. The most pronounced yield increases took place from 1989 to 1997, when yields grew at an average annual rate of 2.7%. The yield increases over this period were largest in Dakhalia (3.9%), Other Regions (3.7%) and Kafr El Sheikh (3.5%), while they were much lower in Beheira (1.2%), Gharbia (0.5%) and Damietta (2.0%). Nevertheless, the highest reported yields are for Beheira (3.8 mt/feddan in 1998), Gharbia

[6] While the private profitability of the wheat/rice rotation has been higher than for other rotations during the 1990s, its economic return was calculated to be below that of the wheat/maize and short berseem/cotton rotations. These latter two rotations also had a lower estimated DRC of 0.7 vs. 0.6 for wheat/rice, indicating lower social profitability for wheat/rice (see World Bank, *Arab Republic of Egypt: An Agricultural Strategy for the 1990s*, 1993). Wailes et al. (1995) recalculate economic net returns and the DRC presented by the World Bank, adjusting for drainage water reuse and reduced salinity for subsequent crops, to show higher economic and social profitability (LE 426.5/feddan vs. LE 35.1/feddan net economic returns to rice and a DRC of 0.92 as opposed to 1.0 (which compares more favorably with the Bank's DRCs of 0.6 for cotton and wheat).

Table 3-1: Area Cultivated to Paddy by Region in Egypt, 1980-1998

Table 3-2: Paddy Yield by Region in Egypt, 1980-1998

Table 3-3: Paddy Production by Region in Egypt, 1980-1998

(3.6 mt/feddan in 1995 and 1998), Dakhalia (3.7 mt/feddan in 1996-1998) and Sharkia (3.7 mt/feddan in 1998).

The overall expansion in yields led to a more than doubling of national rice output by 1997 (as shown in Table 3-3), when 5.42 million mt of paddy were produced, as compared to an average of 2.37 million mt during the 1980s, when yields stagnated. Paddy production during the 1990s averaged 4.31 million mt per annum.

Table 3-4: Annual Growth Rates for Rice Area Planted in Major Producing Areas

Governorate	1980/81 to 1997/98	1986/87 to 1997/98	1990/91 to 1997/98
Dakhalia	3.3% (R^2 = .70)	5.5% (R^2 = .83)	5.2% (R^2 = .83)
Kafr el Sheikh	2.0% (R^2 = .89)	2.4% (R^2 = .88)	2.1% (R^2 = .67)
Sharkia	2.5% (R^2 = .39)	6.0% (R^2 = .73)	6.6% (R^2 = .89)
Beheira	1.5% (R^2 = .48)	3.5% (R^2 = .80)	5.3% (R^2 = .91)
Gharbia	2.8% (R^2 = .42)	6.3% (R^2 = .70)	7.4% (R^2 = .91)
Fayoum	6.1% (R^2 = .61)	11.8% (R^2 = .91)	15.8% (R^2 = .96)
Other	9.7% (R^2 = .71)	16.7% (R^2 = .88)	17.6% (R^2 = .84)
All Egypt	2.7% (R^2 = .68)	4.8% (R^2 = .86)	5.3% (R^2 = .95)

Source: MALR production data; author calculations.

The yield increase had the effect of raising the annual average growth rate in paddy production (see Table 3-5) at double the rate of area planted; 5.5% for all of Egypt, 6.9% for

Table 3-5: Annual Growth Rates for Rice Production in Major Producing Areas

Governorate	1980/81 to 1997/98	1986/87 to 1997/98	1990/91 to 1997/98
Dakhalia	6.9% (R^2 = .78)	11.0% (R^2 = .90)	7.6% (R^2 = .97)
Kafr el Sheikh	5.0% (R^2 = .88)	6.9% (R^2 = .92)	4.9% (R^2 = .77)
Sharkia	5.0% (R^2 = .64)	9.4% (R^2 = .82)	9.2% (R^2 = .95)
Beheira	4.0% (R^2 = .89)	5.5% (R^2 = .95)	6.6% (R^2 = .94)
Gharbia	4.8% (R^2 = .71)	8.0% (R^2 = .81)	8.0% (R^2 = .90)
Fayoum*	8.3% (R^2 = .76)	15.3% (R^2 = .97)	17.8% (R^2 = .97)
Other*	12.0% (R^2 = .77)	19.7% (R^2 = .93)	22.2% (R^2 = .94)
All Egypt	5.5% (R^2 = .83)	8.6% (R^2 = .94)	7.4% (R^2 = .97)

Source: MALR production data; author calculations.

Note: Calculations for Fayoum and Others are through 1996/97 only.

Dakhalia, 5.0% for Kafr el Sheikh, and 4.0% for Beheira over the 1980 to 1997 period. Rice output expansion since the beginning of the agricultural sector liberalization (1986/87 to 1997/98) has been more rapid than over the longer period: 8.6% for all of Egypt, 11.0% for Dakhalia, 6.9% for Kafr el Sheikh, and 5.5% for Beheira.

3.2 Regional Breakdown of Area and Output

As shown in Tables 3-1 and 3-2, the largest rice producing governorate is Dakahlia by far (29.7% of national area and 30.6% of output in 1997). Kafr el Sheikh is number two at 18.1% of area and 16.7% of production in 1997), followed by Sharkia, Beheira and Gharbia. These five governorates accounted for 90.3% of area planted to rice in Egypt and 90.2% of national output in 1997. Paddy is also grown in Damietta, Fayoum and a handful of other governorates in smaller quantities. The largest percentage increase in area planted took place in Fayoum, where the mean area planted during the 1990s of 24,939 feddans is double the mean area planted to rice in the 1980s of 12,744 feddans, and in Other Regions, where the 1990s mean of 35,251 feddans is three times the average planted area of 11,639 feddans during the 1980s.[7] The upswing in rice planted in Other Regions was very pronounced from 1987-1989 to 1996 increasing almost five times to 50,978 feddans in 1996. The compound growth rate for area and output expansion in Other Regions during the 1990s to 1997 was 17.6% and 22.2% respectively. For Fayoum, paddy area and output grew at 17.3% and 19.6% respectively during the same period.

The rapid expansion in Fayoum and Other Regions has been due to expanded irrigated area in governorates that did not grow rice before the 1990s, much of which has been unauthorized. Note that growth in area and production peaked in these areas in 1996 and 1997 before both area planted and output declined steeply in 1998. During the growing season, GOE enforcement of area controls on paddy production stiffened, and many growers in the Other Regions did not plant paddy, fearing imposition of fines.

[7] Other Regions include Qalubeya, Suez, Port Said, North Sinai, and Alexandria.

4. RICE CONSUMPTION IN EGYPT

4.1 Rice Consumption

Rice consumption is significant and rising in Egypt. The 1997 Egypt Integrated Household Survey (EIHS) revealed that average annual rice consumption was 37.7 kg. per capita for a sample of 2,379 households. As shown in Table 4-1, there was significant variation in consumption within Egypt (and within each household category). Predictably, rice consumption is higher in urban and rural Lower Egypt (the Delta) at 50.0 and 58.6 kg. per capita than in urban and rural Upper Egypt at 27.1 and 27.9 kg. per capita. These levels of rice consumption are surprisingly high for Upper Egypt, where rice was consumed in far lower quantities 6-7 years earlier, as shown by the estimates obtained from the CAPMAS Household Expenditure survey of 1990-91. Rice consumption expanded nearly three times on average over the 1990-91 to 1997 period in urban areas of Upper Egypt and almost four times in rural areas of Upper Egypt. Note, however, that the standard errors are also much larger for Upper Egypt, particularly for rural areas, indicating greater variability in consumption.

As a former Board member of the Rice Marketing Company, a public rice trading company, and advisor to Ministry of Supply policy-makers in the early 1980s, Dr. Ragaa El Amir noted that distribution of milled rice at cheap prices by the Rice Marketing Company in Upper Egypt contributed to the steady increase in rice consumption. Upper Egyptian consumers prepared rice for special occasions before the 1980s, but it was not a regular item in their diet. By the 1990s, this had changed. The Rice Marketing Company shipped white rice to Upper Egypt for sale at low prices. This distribution policy contributed to the shift in consumption patterns in many Upper Egyptian households (personal communication, Ragaa El Amir).

Table 4-1: Annual Average Per Capita Rice Consumption, 1990 and 1997

(kg./capita unless noted)

Region	1990-91 Average (kg.)	1997 Average (kg.)	Standard Deviation, 1997	No. Sample Households in 1997	Percentage Increase, 1990 to 1997
All Egypt	25.94	37.70	139.18	2379	45.1 %
Metropolitan	18.20	31.16	22.20	362	71.2 %
Lower Urban	36.01	49.98	33.00	368	38.8 %
Lower Rural	46.03	58.60	81.12	631	27.3 %
Upper Urban	9.71	27.07	25.83	358	178.8 %
Upper Rural	7.16	27.88	257.86	660	289.4 %

Sources: CAPMAS, *1990/1991 Household Expenditures Survey*; IFPRI/FSRU *Egypt Integrated Household Survey*, 1997

Note: The All Egypt average for 1990-91 is calculated by weighting the averages from the disaggregated rural and urban estimates by their proportion of total population (43.6% and 56.4% respectively).

Rice consumption in metropolitan Egypt, defined as Cairo, Alexandria, Port Said and Suez, was 17% below the estimated 1997 national average at 31.2 kg. per capita. It expanded 71% from 1990-91 to 1997, however. Somewhat lower rice consumption in metropolitan Egypt, relative to Lower Egypt, is likely due to the fact that subsidized baladi bread is widely available in metropolitan Egypt, and it substitutes in consumption for rice. In addition, average metropolitan incomes are higher than they are in other areas of Egypt. Given the relatively low expenditure elasticity of demand for rice of 0.17 among non-poor urban consumers (see Table 4-4), metropolitan consumers are likely to substitute a wide range of foods for rice, including pasta (macaroni) and baked goods, fruits and vegetables, fava beans, potatoes, and animal products.

4.2 Characteristics of Demand for Rice

This section summarizes findings regarding demand and expenditure elasticities for rice and other foodstuffs generated from APRP/FSR's EIHS survey findings. Bouis, Ahmed and Hamza report a matrix of price elasticity of demand estimates for rice and key substitutes in consumption, shown in Table 4-2. Demand for rice is slightly price inelastic. Cross-price demand elasticities for different grain products with respect to rice fall in the .04-.11 range, while the cross-price demand elasticity of rice with respect to other grain products falls in the .02-.07 range.

Table 4-2: Demand Elasticity Matrix for Basic Foodstuffs Consumed by Egyptian Households

	Subsidized Baladi Bread	Subsidized Wheat Flour	Unsubsidized Wheat Flour	Rice	Maize Flour	Other Cereals
Subsidized Baladi Bread	-.33	.17	.01	.04	.01	.04
Subsidized Wheat Flour	.33	-.78	.02	.08	.03	.07
Unsubsidized Wheat Flour	.03	.03	-.92	.08	.03	.07
Rice	.02	.02	.02	-.87	.03	.07
Maize Flour	.04	.03	.03	.11	-.88	.10
Other Cereals	.01	.02	.02	.05	.02	-.91

Source: Bouis, Howarth E., Akther U. Ahmed and Akila S. Hamza. 1999. ***Patterns of Food Consumption and Nutrition in Egypt.*** APRP/FSR Unit, IFPRI, Cairo and Washington.
Note: These elasticities are uncompensated or observed for all of Egypt. Urban-rural and regional breakdowns are also available.

Expenditure elasticities of demand for rice and several grain-based products are shown for broad regional categories in Table 4-3 (urban vs. rural in Upper Egypt and Lower Egypt).

Table 4-3: Expenditure Elasticities for Selected Grain Products, by Region

Commodities	Metropolitan	Lower Urban	Lower Rural	Upper Urban	Upper Rural	Egypt
Subsidized Baladi Bread	-.15	-.12	-.11	-.18	-.07	-.11
Subsidized Wheat Flour			-.08		-.14	-.09
Unsubsidized Wheat Flour			.18		.07	.19
Rice	.23	.21	.23	.22	.33	.24
Maize Flour			-.02		.13	.02
Other Cereals	.34	.30	.29	.26	.48	.37

Source: Bouis, Howarth E., Akther U. Ahmed and Akila S. Hamza. 1999. ***Patterns of Food Consumption and Nutrition in Egypt.*** APRP/FSR Unit, IFPRI, Cairo and Washington.

Table 4-4: Expenditure Elasticities for Major Foodstuffs, by Poor and Non-poor Households and for Urban and Rural Areas

Commodities	All Urban		All Rural		All
	Poor	Non-poor	Poor	Non-poor	Egypt
Subsidized Baladi Bread	-.11	-.17	-.09	-.09	-.11
Subsidized Wheat Flour			-.08	-.11	-.09
Unsubsidized Wheat Flour			-.16	.14	.19
Fino Bread	.30	.18	.16	.08	.13
Rice	.32	.17	.40	.23	.24
Maize Flour			.08	.05	.02
Other Cereals	.38	.27	.50	.35	.37
Vegetables	.65	.56	.71	.63	.63
Fruits	.64	.56	.71	.63	.62
Meat	.77	.63	.92	.75	.73
Beverages	.81	.67	.97	.79	.78
Non-Foods	1.72	1.43	2.07	1.69	1.66

Source: Bouis, Howarth E., Akther U. Ahmed and Akila S. Hamza. 1999. ***Patterns of Food Consumption and Nutrition in Egypt.*** APRP/FSR Unit, IFPRI, Cairo and Washington.
Note: The poor are defined as households with the lowest 40 percent incomes, while the non-poor are the remaining 60 percent incomes.

Expenditure elasticities are shown by broad income category (poor vs. nonpoor) in Table 4-4. As one would expect, the expenditure elasticities are lower for grains and flour than they are for

fruit, meat, beverages and non-food products. Expenditure elasticities are negative for subsidized bread and flour across all broad income groups, but positive for rice and fino bread. In urban areas, expenditure elasticities for rice are about the same as those for fino bread, while they are over twice as high as those for fino bread in rural areas. Poorer households have expenditure elasticities for rice that are about twice as high as non-poor households. Demand for rice appears to be relatively income elastic, although it is below that for the category Other Cereals.

In the Annex, MVE reports consumption per capita estimates for rice, wheat-based products, maize, meat, poultry, fish and eggs by region for 1990/91 (Table A-3) and 1995/96 (Table A-4). Delta-based consumers, particularly in urban areas, and metropolitan Egyptians consume more rice than wheat products (grain, flour and macaroni) per capita. Surprisingly, this is not the case among rural Delta households, which is a counter-intuitive finding.

Estimates for rural and urban consumption of these foodstuffs are also reported from CAPMAS household budget surveys done at several different points in time over a thirty-year period, 1964/65 to 1995/96 (see Tables A-2a and A-2b). What is striking from these tables is how white maize consumption dropped 78 percent from 1964/65 to 1995/96, while consumption of wheat-based products (grain, flour, macaroni) increased 2.7 times from 35.8 kg. per capita per year in rural Egypt in 1964/65 to 94.9 kg. per annum in rural Egypt in 1995/96. White rice consumption in rural areas expanded 69 percent from 1964/65 (17.6 kg./person/yr.) to 1990/91 (29.69 kg./yr.), but dropped off surprisingly to 19.79 kg./person per annum in 1995/96. For urban Egypt, rice consumption per capita remained relatively flat across CAPMAS survey years, while wheat consumption declined (for grain and flour) and maize consumption dropped precipitously.

4.3 Projected Demand for Rice

Assuming that there are no changes in real prices, the percentage increase in total rice consumption can be calculated as follows: $c = p + e(y)$, where

c = percentage growth rate in total consumption
p = population growth rate
e = income elasticity of demand
y = growth rate in per capita income.

In terms of absolute levels of consumption, $C_t = C_{t-1} * [1 + p + e(y)]$, where C_t equals the absolute volume of consumption in period t, and p, e, and y are expressed as decimal fractions.

Based on estimated population growth of 2.0 percent per annum, an income elasticity of demand for rice of 0.22 (all-urban estimate), and anticipated per capita income growth of 2.7% percent a year (conservative estimate), we project that rice consumption in Egypt will rise 7.7 percent between the baseline year of 1996/97 and 2001/02, leading to marginally greater per capita consumption of 36.6 kg./yr. Assuming the same rates of growth and overall income elasticity of demand over a ten-year period, aggregate rice consumption will increase to about 2.530 mmt by 2006/07, which translates into 35.1 kg./yr. per capita. Given the lower income elasticity of demand for rice, in comparison to meat, dairy products, and fruits, per capita consumption of rice will remain flat over the next ten years, although the percentage increase in aggregate consumption will be 12.9%. Using a higher income elasticity of demand of 0.27 (rural areas) and

a more optimistic growth rate of 5.0%, projected increases in consumption are larger—37.4 kg./yr. in 2001/02 and 36.5 kg./yr. in 2006/07.

Table 4-5: Projected Rice Consumption in Egypt

	Rate of Pop. Growth	Income Elasticity of Demand	Per Capita Income Growth	Aggregate Rice Consumption, mmt	Per Capita Rice Con-sumption, kg./yr.	Percent Increase in Aggregate Consumpt.
1996/97	2.0%	0.24	2.7%	2,242.0	35.4	
2001/02	2.0%	0.22	2.7%	2,415.2	36.6	7.7%
	2.0%	0.27	5.0%	2,433.0	36.9	8.5%
	1.6%	0.22	2.7%	2,405.7	37.1	7.3%
	1.6%	0.27	5.0%	2,423.5	37.4	8.1%
2006/07	2.0%	0.22	2.7%	2530.2	35.1	12.9%
	2.0%	0.27	5.0%	2548.8	35.4	13.7%
	1.6%	0.22	2.7%	2520.3	36.2	12.4%
	1.6%	0.27	5.0%	2539.0	36.5	13.2%

Sources: Table 4-2 (from IFPRI/FSRU); Central Bank
Notes: The 2.0% population growth rate is estimated from the 1996 census. The low and high income elasticities of demand are, respectively, for urban (0.22) and rural)0.27) areas. Per capita income (GDP) growth, actually GDP growth per capita, of 2.7% is taken from the World Bank (*Arab Republic of Egypt Country Economic Memorandum*, March 1997). 5% per annum is the more optimistic projection.

Expanded demand will reduce the surplus available for export, assuming productivity increases in rice cultivation do not keep pace with demand and income growth[8], and assuming declining area cultivated to paddy. The Rice Research Institute maintains that yield increases from shifting to shorter-season, higher-yielding varieties will partially offset decreased area planted to paddy. Nevertheless, higher aggregate domestic rice consumption will lower export volumes, unless lower-grade, long-grain rice (with a high percentage of brokens) is imported and substitutes in consumption for Egyptian *japonica*. Many observers think that this is unlikely, as is discussed in the next section.

4.4 Consumer Tastes and Preferences

Rice is an increasingly popular foodstuff in Egypt for several reasons. First, increases in rice production have made it more widely available outside of rural production zones in the Delta,

[8] Egyptian rice yields are among the highest in the world. Refering to Table 2-1, the yields of the new short-season varieties are 15-25% higher than those for Giza 171/172.

where a lot of households consume a good part of what they produce. Second, in milled form, rice is ready and convenient to cook. Rice tends to be sold in one- and five-kilogram retail packs (plastic bags) in urban markets for prices as high as LE 1.5-2.0 per kilogram in the spring of 1998. During the post-harvest period in 1998/99, retail rice prices had dropped to below LE 1.0 per kilogram, though they had firmed to LE 1.1-1.2 per kilogram. At low prices of LE 1.0/kg., rice becomes a good substitute for macaroni and subsidy-free bread made from 72 percent flour. Third, rice is reported to be the main staple in some zones of the Delta that are under-supplied with subsidized baladi bread.

Egyptian consumers prefer medium grain, *japonica* round rice to longer grain varieties, which have been grown in Egypt in small quantities but not greatly appreciated. Medium grain rice generally has high amylose content, sticks together well (is glutinous), and is suitable for Egyptian cuisine. Rice is often prepared with butter or margarine. In rural areas, some households consume rice at all three meals. In the morning, leftover rice from the previous day's lunch may be eaten. At lunch (main mid-day meal), rural consumers will eat rice cooked with butter or margarine along with other starchy staples (such as macaroni, potatoes or bread), vegetables and perhaps some meat or chicken. For dinner, rural households consume rice mixed with milk and sugar and served warm. In contrast to rural areas, rice consumption in urban areas is largely limited to the mid-day meal, where rice cooked with butter or margarine is served with other starchy foods, vegetables and some animal protein. *Koshari* is also popular among urban consumers; it is a mixture of rice (longer grain varieties preferred), macaroni, lentils and onions. Urban consumers tend not to consume rice for breakfast, eating fava beans prepared as *foul* or white broad beans prepared as *tammeya* instead. In metropolitan Egypt, rice is not usually a dinner staple, as many households consume feta cheese, yoghurt, eggs and bread.

Whether Egyptian consumers, particularly poor ones, would buy cheaper imported long grain rice (30 percent broken or higher) is an open question. MALR officials think that substitution of lower-quality and cheaper long grain rice would not take place, as dietary preferences for *japonica* rice are too deeply ingrained in Egyptian consumption patterns, and the dishes that Egyptians prefer require medium grain rice with high amylose content. Some exporters think that poor consumers would buy long grain imported rice if it were the cheapest rice available. Clearly, research is needed to gain better insights into this question. A food technology institute could carry out taste tests with consumer panels, preparing both long and short grain rice with a number of dishes.

Currently, only small quantities (generally less than 600 mt a year—see Annex Table A-13) of high-quality, expensive rice is imported for sale in supermarkets and boutiques. Most of this rice is basmati from Pakistan and India or long grain Uncle Ben's. Clearly, these items are priced beyond the reach of most Egyptian consumers at LE 10-12 per kilogram, and imports of these specialty rices average only a container or two a month. These rices are sold in plastic bags of two or five kilograms or boxes in high-end retail shops and grocery stores in higher income neighborhoods in metropolitan Egypt (especially Cairo).

World prices for Thai long grain rice with a high proportion of brokens (35 and 100 percent) remain quite low relative to prices in the mid-1990s, although they have risen from their earlier

very low levels of late 1997.[9] Some exporters maintain that they could profitably import cheaper long grain rice for sale to poorer consumers, if there were no tariff, at prices well below the LE 1.5-2.0 per kilogram[10] that prevailed in urban areas in the spring of 1998. Tariffs and taxes, equivalent to a 30 percent on the base product (as of late 1998), are high but do not appear to be prohibitive.[11] Perhaps traders factor in other transactions costs associated with bringing imports of any foodstuff into Egypt.[12]

Another reason why there are no imports of cheap long grain rice into Egypt may be that foreign long grain rice is an untested product in the Egyptian market. Traders know that Egyptian consumers prefer medium grain *japonica* rice, and they also know that the Egyptian experience with home-grown long grain varieties has been mixed and does not inspire confidence.[13] The financial and transactions costs associated with rice imports serve as a further deterrent. Phytosanitary and health regulations also inhibit imports. Nevertheless, reducing the tariff on imported rice should provide some incentive to traders to import trial shipments to test the Egyptian market. Note that a 1997 MTS study on rice (see *Rice Prices and Trade: A Policy Brief* by Rollo Ehrich and Gamal Siam) recommended that the tariff be reduced to five percent, but MTS did not act on this recommendation. Under Tranche II of APRP, the MTS recommended lowering the rice tariff by five or more percentage points, which represents a movement, albeit a nominal adjust-ment, in the right direction. Under Tranche III, the tariff is supposed to drop to 10% or less.

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[9] USDA/ERS reports that the lowest point for Thai long grain rice exports with 35% and 100% brokens was November 1997, when prices were $213/mt and $181/mt respectively. Prices for these types of rice climbed to $264/mt and $252/mt by October 1998, but they dropped back to $221/mt and $202/mt (preliminary estimates) as of March 1999.

[10] Currently, the budgets of lower-income consumers force them to buy small retail packs whose unit prices are high. Poor consumers typically do not buy staple foods in larger volumes, which would minimize their cost per kilogram, because they lack the cash to do so.

[11] Tariffs and taxes are applied multiplicatively in Egypt, not additively. Hence, the cif import value is first multiplied by 1.2 (20% tariff). The resulting figure is multiplied by 1.05 (5% sales tax), and that resulting figure is multiplied by 1.03 (3% for various fees).

[12] These transactions costs include inspections from the MALR for phytosanitary protection, the Ministry of Health for food health hazards (including radiation), and the Ministry of Trade and Supply (for conformation with the stated grade and quality).

[13] One reason for the poor Egyptian experience with domestically produced long grain rice is that Egyptian dehullers were ill-suited to milling *indica* rice. These units tend to produce a high percentage of brokens and powdery, pulverized grains. As a result, many public rice milling companies bought roller mills that were less rough on the long grain rice and led to a suitable end product.

4.5 Supply Use Table and Interpretation

Tables 4-6A and 4-6B summarize annual rice production, net trade, consumption, and carryover from 1975 to the 1990s. Table 4-6A reports GOE data from a number of sources. It yields ending and beginning stocks of implausibly high levels, suggesting over-estimation of production and/or under-estimated rice consumption. Table 4-6B uses USDA/ERS estimates of rice consumption, which are higher than those from the GOE and yield ending and beginning stocks of lower and more believable levels. The two tables use essentially the same accounting framework to calculate stocks. The general relationships are:

- Adjusted Paddy Production (paddy balance) = Paddy Production - Estimated Losses (paddy prod. * 15%)
- Milled Rice Equivalent = Paddy Balance * 0.67 (conversion rate)
- Quantity Available for Consumption = Milled Rice Equivalent - Net Exports (X-M)
- Ending Stocks = Opening Stocks + Quantity Available for Cons. - Estimated Rice Consumption

While rice is a summer crop[14] and produced entirely within the calendar year noted in the far left column, the rest of the columns refer to the rice marketing year, which begins in September and extends to mid-October of the following year. Going from left to right, the tables show estimated paddy production and then net out seed requirements and estimated paddy losses of 15 percent to arrive at a *paddy balance*.[15] This is converted to milled rice using a national average conversion factor of 0.65. Milling yields are reported to be higher for public sector mills and the best of the private sector commercial mills — generally in the 65-70% range.[16] A larger proportion of the paddy crop is milled by small village mills, however, whose yields are generally closer to 60%.

Export data are reported by MTS from 1981/82 on for the rice marketing season, which runs from the paddy harvest period to mid-October of the following year. CAPMAS[17] figures for

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[14] Small quantities of paddy are grown during the *nili* season, but these are negligible.

[15] Note that MTS estimates paddy losses at 10% per crop year. MVE chooses to use the higher 15% estimate for losses in this chapter, though this may be an overestimate. There is need for a well-designed field survey to arrive at an estimate with a sounder empirical basis. Different estimates for losses are used in Chapter 5 and the Annex for different recent years. Many observers think that losses were highest in 1996/97, when many new entrants began buying and storing paddy, but lower in 1998/99 (7.5%), when the smaller crop was bought up and processed in a shorter period, with less apparent speculation by *amateur* traders (many of the new entrants of 1996/97 were reported to have lost money that season and to have exited the rice market in 1997/98 and 1998/99).

[16] Milling paddy to produce higher grades for export leads to a lower milling out-turn than 65-70%, though less than 15 percent of the crop is milled for export (and much of the exported rice does not fall in the highest two grades).

[17] CAPMAS obtains its data from the Customs Service under the Ministry of Finance. CAPMAS publishes its *Annual Bulletin of Foreign Trade* about one year after the end of each calendar year.

Table 4-6A: Paddy & Rice Supply and Use Estimates, 1975-1997

Table 4-6B: Paddy & Rice Supply and Use Estimates, 1975-1997

the calendar year are reported for years earlier than 1981/82. Imports, reported on a calendar year basis, are negligible in most years, except for 1986-1988 (when rice was imported and distributed as a relatively minor subsidized basic food commodity).[18] Net exports (exports-imports) are subtracted from milled rice availability to arrive at a residual estimate of the total quantity of milled rice available for consumption. In Table 4-6A, the quantity available for consumption is adjusted downward by an additional five percent for losses in bagging, handling, and transport.

In Table 4-6A, estimated rice consumption was obtained from MALR food balance sheets up through 1994. For 1997, consumption is calculated as the Egypt Integrated Household Survey per capita estimate of 37.7 kg. per person times the estimated population of 64.4 million. The estimated rice consumption for 1995 and 1996 is calculated as estimated population times an interpolated per capita consumption figure for those years.[19] In Table 4-6B, the higher estimated rice consumption estimates of USDA/ERS are used. Finally, the estimated aggregate rice consumption figure is subtracted from the quantity of milled rice available for consumption plus opening stocks to yield a rough estimate of year end stocks. The USDA/ERS consumption estimates yield stock estimates that fall within a more plausible range than the GOE figures.

Note that we do not show the opening and closing rice stocks for the period 1975-1989, because the year-end stock figure is negative in virtually every year, leading to an implausibly high cumulative deficit across years. Since 1990 the year-end stock position (in milled rice terms) has been positive, exceeding 1.0 mmt at the close of the 1994/95 marketing season and approaching two mmt (1.9 mmt) by the end of the 1997/98 season. While paddy stocks have been reportedly large since 1996/97, these orders of magnitude for rice stocks appear to be too high.[20] Paddy stocks can be held for more than a year without losses if the paddy is properly stored and the moisture content is low (14 percent or less), but it is reported that many farmers and small traders put paddy with too high a moisture content into storage. Annual carryover at the calculated levels since the end of the 1994/95 season would lead to significant storage losses (higher than the 15 percent per annum that we have applied to paddy for the entire time-series).[21]

The paddy and rice supply and use estimates since 1990/91 in Table 4-6B are more internally consistent than those of Table 4-6A. Rice stock changes are negative in 1990/91 and 1997/98,

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[18] Dr. Ragaa el Amir, who headed the General Administration for Supply Commodities (GASC) within the Ministry of Supply and Internal Trade during the second half of the 1980s, questions the magnitude of the import figures for 1986-88. He believes that they were substantially lower, generally not exceeding 5,000 mt per annum during this period.

[19] Per capita consumption in 1995 and 1996 is interpolated as a linear function between 1994 and 1997 (at even intervals).

[20] Note that the ending year rice stocks need to be adjusted upward to arrive at paddy equivalent stocks.

[21] We have assumed that losses of white or milled rice are zero in Table 4-6B, although some storage losses or leakage from or breakage of rice sacks is likely to take place. In Table 4-6A, losses of five percent are assumed for milled rice (reflected in Net Quantity Available for Consumption).

with the latter being a year of large exports. Ending rice stocks for 1995/96 through 1997/98 exceed half a million metric tons, which is a high level but possible given record high production levels. The comparison of two sets of estimates in Tables 4-6A and 4-6B illustrate that the supply use tables for paddy and rice are clearly a set of approximations, based on official statistics and several assumptions. Production estimates are considered by some observers to be on the high side. MVE's Assessment of Data Quality has shown that area, yield and production estimates for key field crops, such as rice, wheat, maize and cotton, at the national level exceed aggregated estimates at lower levels (i.e., districts) of the statistical reporting system. This assessment also suggests that national estimates follow a smoother trend over time than would be expected, given weather variability.[22]

The apparent discrepancies in the data suggest that the official production estimates may be high for the 1990s. Furthermore, no one in the GOE or the rice business in Egypt has a good estimate of paddy or rice stocks. The allegedly massive carryover of paddy into the 1997/98 season appears to be a guesstimate based on aggregate data and not derived from any empirical estimates obtained from field surveys. The year-end rice stocks in Tables 4-6A and 4-6B range from 711,200 mt (using USDA/ERS consumption estimates) to 1.794 mmt (using purely GOE figures) in milled rice terms. This is a wide range and highlights the fact that any analyst's estimate of paddy and rice stocks is only good as the data and assumptions going into the calculation.

Despite reservations about using data from the supply use tables, MVE can draw several tentative conclusions from examining the secondary time-series data:

- Per capita rice consumption appears to be rising, particularly from the late 1980s onward.

- Exports have fluctuated greatly over the past 23 years, but they are much higher on average during the 1990s (217,300 mt per year) than they were in the 1980s (63,100 mt on average). This is in large part a function of greatly increased area planted, yields and total production, leaving a surplus for export.

- Apparent quantity available for consumption has outstripped estimated rice consumption during the 1990s, which suggests either over-estimated national production or significant carryover stocks from year to year (or some of both).

- A decline in area planted to paddy and national output could eliminate large carryover stocks and cut into the exportable surplus, assuming per capita consumption remains at the same level or increases modestly from recent levels (see projections in section 4.3). This also assumes that rice imports would remain at negligible levels.

[22] Note, however, that inter-annual variability in irrigated Egyptian agriculture is generally far lower than in rainfed or dryland (non-irrigated) agriculture in other countries.

Egypt's future performance as a rice exporter will be affected by domestic consumption levels, area cultivated to rice (slated to decline), the productivity of the new high-yielding, short-season varieties relative to the old longer-season varieties, and rice import policies and levels. Note that the productivity of the new varieties should not refer only to crop yields but to milling yields (which appear lower for the new varieties relative to Gizas 171 and 172). These issues will be addressed in later sections of the paper.

5. STRUCTURE AND CONDUCT OF THE RICE MARKETING SYSTEM

This section will discuss the current structure and conduct of the rice marketing system. It will also trace changes since the liberalization of the marketing system in the early 1990s.

5.1 Structure of the Marketing System

5.1.1 Paddy Production

Approximately 400,000 farm families have grown paddy as a summer crop in Egypt in each of the last few years.[23] Typically, farmers will change their crop rotations every other year. In some cases, producers will grow paddy in two out of three years. Whether a producer grows paddy is in part a function of what his neighbors are growing. If most of the farmers in a village are planting cotton, producers in that village will follow their lead.

5.1.2 Private Paddy Dealers

According to the *Rice Subsector Maps* of Ronald Krenz et al. (draft 1997 and final 1998), there are an estimated 8,000 dealers in paddy. This is a guesstimate, calculated from average quantities procured per dealer, based on survey data from 1995 for the 1994/95 season (see Ragaa el Amir et al., 1996). Since 1995 there have been no surveys of rice dealers, so their average quantity purchased in 1996/97 and 1997/98 is unknown.

Krenz et al. (1999) estimate that there are 5,165 rice dealers in 1998/99, assuming one trader per 242 feddans.[24] Using this same ratio for the baseline year, 1996/97, the number of rice traders was higher at 5,800. Note that commercial rice millers surveyed by MVE in November-December 1998 report a decline in the number of rice traders since 1996/97 (see Holtzman et al., 1999). Rice trading appears to be largely localized (within a region or with an adjacent region), small-scale, not highly capitalized, and fluid in terms of entry and exit. Millers report keen competition. Many of the rice traders are not specialized in rice distribution; they typically handle other foodstuffs to reduce risk through diversification.

5.1.3 Rice Milling

This report devotes a lot of attention to rice milling in Egypt, because MVE perceives this to be a key node in the rice subsector. There is evidence, formal and informal, that private sector commercial rice milling has boomed in recent years, as the public sector mills have processed

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[23] This figure is calculated as follows. From Morsy Fawzy et al., *Producer Survey Results: APRP, Tranche I* (March 1998), 98 sample farmers (of 181 total) grew an average of 3.67 feddans of paddy. Dividing this figure into the total area planted in Egypt (1.44 million feddans, the average of 1995-97) yields 393,534 farms.

[24] The one trader per 242 feddans estimate comes from wheat trading (see Krenz, R.D., *Wheat Subsector Maps for Egypt*, October 1998). This ratio is applied to estimated area of paddy harvested of 1.25 million feddans.

a declining proportion of the paddy crop. The massive investment in commercial rice mills post-dates the excellent reports of Wailes et al. (1995) and Ragaa el Amir et al. (1996). Because MVE felt that recent developments in commercial mills were neither documented nor well understood, MVE decided to conduct a survey of 55 mills in November-December 1998 in six rice-producing governorates of the Delta in order to capture historical data for the 1997/98 and 1996/97 seasons and to gauge what mills were doing early in the 1998/99 season.

In order to distinguish a *commercial rice mill* from a *small village mill*, several attributes must be kept in mind:

- Commercial mills have a multi-step milling process that includes cleaning, dehulling (sometimes in two passes), re-cleaning/sorting, polishing, and often addition of paraffin oil (in a rolling drum) to make shinier and whiter *camolino* rice. Village mills, in contrast, are single-pass mills that may have a small cleaning unit, but not multiple pieces of equipment to make multiple passes in dehulling and polishing.

- Commercial mills have a scale that easily permits processing of 10 mt of paddy a day or more. Any rice mill that cannot process one mt of paddy an hour does not classify as a commercial operation.

- Commercial mills run continuously and do not do small batch processing, as small village mills do for different customers. Clients for commercial mills tend to be traders and exporters (or the miller himself, who buys the paddy) and not producers. The clientele for small village mills is almost exclusively producers.

- The larger and more commercial the rice mill, the more likely the miller buys a substantial portion of his own paddy for processing rather than relying on traders and exporters to bring paddy for custom milling. Furthermore, larger commercial mills process a significant proportion of their paddy throughput into rice destined for export.

- The type and origin of the milling equipment tends to be heterogeneous, often mixed within a mill,[25] and in and of itself is not an indicator of whether a mill is commercial or a small village unit.

These distinctions are not always perfectly clear-cut. In some small to medium scale mills without polishers, sorters and other pieces of equipment, where the mill processes only one mt/hour or slightly more, classifying the mill as a village mill (*mawani*) or a small commercial unit (*farrakha*) is a judgement call that depends in large part on the clientele the mill serves and how the miller runs his business (doing all custom milling vs. buying and processing some paddy on his own account).

[25] In the November-December 1998 survey of rice mills, it was not uncommon for MVE to find commercial mills with 2-4 types of imported equipment as well as locally made machinery for cleaning, venting husks, and moving the paddy/rice from one piece of machinery to the next.

Initial APRP Capacity Estimates. The first APRP estimates of rice milling industry capacity in Egypt appeared in the draft *Rice Subsector Maps* (1997) for 1996/97, as shown in Table 5-1.

Table 5-1: Initial APRP Estimates of Rice Milling Capacity in Egypt, 1996/97

Mill Category	No. Units	Total Annual Capacity (mill. mt/yr)	Percent of Total Estimated Capacity	Average Annual Capacity per Unit, (mt/yr)	Average Daily Capacity per Unit (mt/day)
Public mills	47	1.985	31.3%	42,434	169-191
New commercial mills	10	0.400	6.3%	40,000	181
Old commercial mills	137	0.794	12.5%	7,562	34
Other private	22	0.194	3.1%	8,818	40
Village mills	5,388	2.977	46.9%	539	2.44
TOTAL	5,604	6.350	100.0%	NA	NA

Source: APRP/RDI *Rice Subsector Maps*, Krenz et al., 1997

Note: Assumptions about capacity. Estimated capacity for the public mills approaches theoretical or installed capacity. Capacity for the private mills is more a "rated capacity" than a measure of theoretical throughput.

The *Rice Subsector Maps* reported that there were 5,388 village mills, a very significant capacity in small, single-pass village units. This included 3,388 licensed mills and an estimated 2,000 unlicensed ones, whose total capacity was estimated to be 2.977 mmt per year, or 46.9 percent of national milling capacity. An obvious unknown was and remains the number of unlicensed village mills.

The distinction between *old* and *new* commercial mills, made by Ragaa el Amir et al. and Krenz et al., does not appear to be clear-cut. As shown in section 9.3, much of the investment in commercial mills has come on stream since 1995. If the beginning of January 1995 is considered the cutoff between *old* and *new* mills, MVE's sample frame of commercial mills shows that there are 211 mills, of which 58 are "old" (put in operation before 1995), 137 are "new" (put in operation after 1995), and 16 mills have an unknown start-up date.

Holding Company Estimates of Rice Mills in Egypt. In addition to the estimates found in the *Rice Subsector Maps*, the Holding Company for Rice and Flour Mills undertook a survey from August to November 1997 of 4,714 rice mills at the behest of the Rice High Council, chaired by MTS Minister Ahmed Goueli. The purpose of this survey seems to have been to identify and enumerate unlicensed mills and mills not complying with health and mill layout regulations. The results of this survey are shown in Table 5-2 below. The HC-RFM enumerated 4,714 mills, of which 1,365 or 29 percent did not have licenses.

Comparing HC-RFM data on mills to CAPMAS census data shows that there are 2.2 mills on average per village in rice producing areas, which matches up well with field observations. The number of mills per village ranges from a high of 3.4 mills in Dakhalia, the leading rice growing area, to 0.8 mills in Fayoum, a relatively minor rice growing zone.

Table 5-2: Status of Licensed and Unlicensed Village Rice Mills in Egypt, Nov. 1997

Gover-norate	No. of Villages	Mills Visited	No. Mills per Village	Without License	% Without License	Licensed but not Complying w/Regulations	% Not Comply-ing
Damietta	59	176	3.0	94	53	67	38
Kafr El Sheikh	241	532	2.2	128	24	357	67
Beheira	463	752	1.6	285	38	337	45
Fayoum	157	124	0.8	36	29	78	63
Gharbia	314	619	2.0	225	36	360	58
Sharkia	492	1031	2.1	220	21	791	76
Dakahlia	438	1480	3.4	367	25	988	67
Total	2164	4714	2.2	1365	29	2978	63

Source: Holding Company for Rice and Flour Mills survey (courtesy of Chairman Kamal Ghoneim). The numbers of villages are from the 1990 Census, CAPMAS (as reported in Krenz et al., 1999).
Notes: From the observations, 371 mills are licensed and comply with the regulations (or are closed because of the end of activity).

The fact that 29% of the enumerated mills did not have a license is not very surprising, as one would not expect all small village mills to apply for one. The fact that 63% of all mills do not comply with health and safety regulations could indicate one of two things: 1) millers don't know all the regulations; or 2) millers consider the regulations too stringent (and perhaps too costly to comply with).

Assuming that the Holding Company survey missed 20 percent of the unlicensed village mills,[26] MVE estimates that there were another 341 unenumerated mills. Adding this to the HC-RFM total of 4,714 enumerated mills yields 5,055 village mills. To emphasize the approximate nature of these data, MVE takes 5,000 units as a reasonable estimate for the number of village mills in Egypt at the end of the 1996/97 rice marketing and milling season.

Other Estimates of Rice Mill Numbers. There are several other estimates of the number of rice mills in Egypt reported in Krenz et al. (1999) and generated by MTS, MALR/CAAE and CAPMAS. These estimates appear in the Annex. The MTS and MALR/CAAE estimates—3,364 and 3,910 mills respectively—appear to be on the low side, but the CAPMAS figures are of particular interest. In a 1996 census, CAPMAS enumerated 7,432 grain mills. Krenz et al. state that 80 percent of the licensed mills in the rice producing governorates were rice

[26] The figure of 20% is purely an assumption and has no particular empirical base.

mills. If true, then there were 5,946 rice mills in Egypt in 1996. For the purposes of this report, we take 5,000 and 6,000 mills as lower and upper limits on village mill numbers for the baseline year, 1996/97.

Krenz et al. (1999) also estimate that there some 2,000 tractor-powered rice mills in the rice producing governorates. They estimate that these mills have a capacity of one mt per day and they operate 50 days a year after the paddy harvest.

Public Sector Milling Capacity. Public sector rice milling capacity has declined steadily since 1989 (see Table 5-3), when Ahmed el Miniawy and Ismail Gamal el Din surveyed the rice milling industry.[27] They reported that there were 52 operating public sector rice mills with an installed capacity of 5,495 mt/day (operating 24 hours a day). Assuming an average of 221 working days per mill in 1989, this is equivalent to 1,214,395 mt per annum of milled rice.[28] Using a 63 percent conversion factor, this is equivalent to 1,926,611 mt of paddy, which is 97.1 percent of the estimate of 1.985 mmt a year appearing in the *Rice Subsector Maps*.

MVE's interviews of the managers of the public sector rice milling companies (except Sharkia Rice Mills Company) reveal that actual capacity was 4,777 mt of paddy per day in 1996/97 and 1997/98. The reason for the 13.1 percent decline in daily milling capacity since 1989 is the closure of 15 public mills. According to MVE's sources, only 37 of 45 rice mills owned and operated under the Holding Company for Rice and Flour Mills were operating in 1996/97 and 1997/98. Using the assumption of 221 operating days a year, public sector milling capacity is 1,055,717 mmt of white rice a year, equivalent to 1,649,558 mt of paddy.[29]

MVE's Identified Rice Milling Capacity. MVE has obtained more detailed information about private sector commercial rice mills showing that earlier studies underestimated their numbers and overall capacity. Based on data from the Rice Branch of the Cereals Industry Chamber, private sources, and the late 1998 sample survey of commercial mills carried out by MVE, we have identified private sector commercial rice mill numbers at 211 mills with an aggregate capacity of 1.512 mmt per year (see Table 5-4). This capacity is nine percent higher than the estimate of old and new commercial mills and other private mills in the *Rice*

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[27] The findings of El Miniawy and El Din were reported in *Economic Working Paper No. APAC-89-(3)* in 1989 and summarized in the University of Arkansas report *Rice Production and Marketing in Egypt*, 1994. Decreases in public sector milling capacity over time are shown in the Annex.

[28] Assuming a six-day work-week, the public sector mills operated 8.5 months in 1989. Assuming a five-day work-week, operation would extend to 10.0 months.

[29] Krenz et al. (1999) confirm that the number of public sector mills that were operational had fallen to 37 mills by the beginning of 1998/99. Note that "public" mills include mills that are nominally private (owned by ESAs and managed by public sector mill managers) but operated more as public enterprises than private firms.

Table 5-3: Estimated National Rice Milling in 1989

Subsector Maps (see Table 5-1) — 169 mills with 1.388 mmt per year.

The identified rice mill capacity is probably lower than commercial milling capacity, however. MVE estimates that there may be as many as 300 private commercial mills [30] in 1998/99 (see Annex Table A-11), with sufficient capacity to process 3.0 mmt of paddy. The theoretical capacity measure for 1998/99 in the Annex also assumes that the estimated 5,750 village mills have the capacity to process up to 4.0 mt/day of paddy, a higher estimate than the 2.5 mt/day used in Table 5-4, which is more a measure of actual utilization.

Table 5-4: Identified Rice Milling Capacity in Egypt, 1998/99

Mill Category	No. Units	Total Annual Capacity (mill. metric tons/yr.)	Percent-age of Total Capacity	Aver. Annual Capacity per Unit (mt/year)	Average Daily Capacity per Unit (mt/day)
Public mills	37	1.650	30.0%	44,583	201.7
New commercial mills (as of 1/1/95)	137	1.023	18.6%	7,524	39.6
Old commercial mills (to 12/31/94)	58	0.343	6.2%	5,909	31.1
Other commercial mills (start-up date unknown)	16	0.146	2.7%	9,139	48.1
Cooperative mills	5	0.052	0.9%	10,400	52
Village mills	5,750	2.156	39.2%	375	2.5
Tractor-powered mills	2,000	0.100	1.8%	50	1.0
TOTAL	6,252	5.495	100.0%	NA	NA

Sources: 1) Public mills: HC for Rice and Flour Mills and managers of public sector milling companies. 2) Private and cooperative mills: Rice Branch, Cereals Industry Chamber, KOMPASS and private sources. 3) Village mills: Krenz et al., 1997 & 1999.

Notes: Public mills are assumed to be able to operate 221 days per year. Commercial mills are assumed to operate 190 days per year. Millers surveyed by MVE reported operating 188 and 194 days in 1997/98 and 1996/97 respectively. Capacity for commercial mills is actual peak season throughput (which is lower than installed capacity). Cooperative mills are assumed to operate 200 days a year. Village mills are assumed to have the capacity to process 2.5 mt/day for 150 days per year. Note that the number of commercial mills may be larger than reported in the table.

[30] Krenz et al. (1999) estimate that there are 350 commercial mills as of late 1998. MVE (see Section 9.2) estimates that there are closer to 300 commercial mills in late 1998.

Summarizing MVE's revised estimates in one table, Annex Table A-11, shows that there is now far more milling capacity in the private sector 6.014 mmt per annum, 78.6 percent of national capacity), than in the public sector, which has 21.4 percent of total estimated capacity. Identified (or enumerated) private sector commercial milling capacity—1.512 mmt per year—is now nearly equal to public mills' capacity.[31] This contrasts markedly with 1989, when an estimated 82.5 percent of total milling capacity resided in the public sector and private sector commercial milling capacity was a mere 66,000 mt/year.

Revised APRP Estimates of Rice Milling Capacity for the Baseline Year, 1996/97

In attempting to reconcile conflicting figures on Egypt's rice milling capacity, MVE performed a series of rigorous cross-checks of paddy production and estimated paddy throughput for different types of mills across three production and marketing years — 1996/97 to 1998/99. These cross-checks, shown in Tables 5-5 and Annex Tables A-10 and A-11, have drawn on data collected by MVE, RDI, and others. Hence, the revised capacity estimates have an empirical base, but they should be treated with caution, as they are not obtained from a census of rice mills. Estimates of the numbers and throughput of village mills and tractor mills should be treated as guesstimates. Furthermore, the number of private commercial mills is unknown, though MVE estimates that were 250 commercial mills in 1996/97 (and 275 and 300 such mills in 1997/98 and 1998/99, as shown in the Annex tables).

Table 5-5 shows estimated milling capacity in 1996/97 (top half of table) and MVE estimates of actual utilization of different types of rice mills (bottom half of table).[32] As shown at the very bottom of Table 5-5, there is a substantial unaccounted for balance of paddy (or processing gap)—429,521 mt—that appears as a residual after subtracting probable milled input (utilization) from national paddy production. This balance could be a function of over-estimated paddy production. Assuming MALR production estimates are accurate, the balance could also represent an under-estimate of throughput by one or more categories of rice mills, an under-estimate of the numbers of those mills, or both. Note also that the estimated paddy losses of 15 percent of production may be a bit low for 1996/97,[33] as there were numerous reports of major losses stemming from poor storage practices by new entrants into paddy trading, who stored paddy with high moisture content under poor conditions.

Note that estimated capacity breaks out roughly in thirds among public sector mills (23.3 percent), village mills (37.6 percent), and private sector commercial mills (35.6%). By 1998/99 (see Annex), these proportions had shifted slightly to 21.4% (public sector/ESA), 36.1% (village mills), and 39.2% (private sector commercial mills), as more commercial mills

[31] Note that the estimated of public sector milling capacity is generous in that it assumes potential for higher capacity operation than the commercial mills—221 days per year vs. 190 days. Clearly, this has been a counterfactual during the past five years.

[32] See Annex tables A-10 and A-11 for estimates of capacity and utilization in 1997/98 and 1998/99.

[33] Paddy losses are assumed to be much lower, 7.5 percent of production, for 1998/99.

Table 5-5: Estimated Milling Capacity and Utilization of Rice Mills in Egypt, 1996/97

had come on stream. MVE estimates that commercial mills milled an estimated 48.0 percent of all the paddy processed in 1996/97, while 45.2 percent of the paddy milled was processed by village mills and only 2.6 percent by public sector mills. In 1998/99, these proportions are projected to change only slightly, with commercial mills processing 52.7 percent of the paddy milled and village mills processing 43.3 percent.

Clearly, by 1996/97, private commercial rice mills were coming to dominate the rice milling industry. Although public mills increased their paddy throughput in 1997/98, the remaining two public mills and the six privatized ESA mills were basically out of the picture by 1998/99. Village mills remain important in rural areas where they serve rural customers, who are almost entirely producers, although their utilization rates are lower than they were in the three seasons following liberalization (before significant additional private commercial milling capacity came on stream). Commercial millers and their exporter partners now
represent, however, a driving force in the industry for changes in milling scale, technology, export orientation and the search for new export markets (see chapter 9).

However positive a development private investment has been, it is clear that there is too much capacity in 1998/99 for all mills to operate efficiently. Capacity was 43.3 percent greater than required to mill the paddy crop in 1996/97, assuming the installed capacities per mill type noted in the top half of Table 5-5. By 1998/99, capacity was greater still at 71.9 percent more capacity than required, due to ever-expanding mill numbers and a production shortfall in the 1998 paddy crop. Even in the record production year of 1997/98, capacity was an estimated 36.5 percent higher than needed.

5.1.4 White Rice Dealers

The *Rice Subsector Map*s estimated approximately 5,000 white rice wholesalers and retailers in 1996/97. This estimate is as reasonable as any other. Traders involved in milled rice distribution probably handle other agricultural products as well, such as other grains, beans and potatoes. This segment of the rice subsector is under-researched, though the white rice trade is likely to be competitive.

5.2 Conduct of the Marketing System

5.2.1 Conduct through the 1997/98 Marketing Season

Both paddy procurement and white rice sales are competitive and have been since the rice trade was liberalized in the early 1990s, as described in detail in APCP Monitoring and Verification Reports (1992 and 1994), the University of Arkansas rice study (1995), and Ragaa el Amir et al. (1996). There are a large number of participants assembling paddy and selling milled rice at the wholesale and retail levels, assuring workable competition. Specifying the exact number of traders is not important. Entry barriers are low, and the capital requirements of the rice trade are not high (particularly at the retail level). It is reported that many rural assemblers held significant paddy stocks following the 1996 harvest and during the 1996/97 marketing season. We do not know how important rural storage is by rice dealers, or whether the storage capacity is owned or rented by the dealers. PBDAC has massive national storage capacity, and there is some evidence that this capacity is rented out to registered rice traders, although not on a very widespread basis

or on a very large scale.

Rice milling has also become highly competitive, although the outputs of the three main categories of mills are differentiated. For many years, it has been argued that public sector mills produce the highest quality white rice, using expensive Japanese (Sataki) and Swiss (Buhler) technology and a multi-step milling process. The public mills were established to produce high-grade milled rice, which would meet export and the most exacting of domestic standards. Investing in high-end rice processing machinery was fine for the export market, which languished in the 1980s, but it overshot domestic market requirements and especially consumer capacity to pay the real economic cost of high-grade rice. Many consumers in Egypt are poor and constrained by low income to pay the lowest possible prices for foodstuffs, including rice. Hence, the majority of Egyptian consumers are willing and indeed required to sacrifice quality for lower prices.

Many households' limited effective demand is one key reason why small village mills, which produce rice with 15-30 percent brokens, a higher percent of damaged or discolored grains, and higher foreign matter content, have flourished in Egypt, particularly in Delta governorates. Another important reason for the success of the small village mills has been their decentralization and proximity to producers, who are also major consumers of milled rice (as shown in Table 4-1, where per capita rice consumption is highest in the rural Delta). Public sector mills are larger, more centrally located, and more costly to operate than village mills. Private commercial mills also have higher operating costs than single-pass village mills. Unless operated at high levels of capacity utilization, commercial mills have trouble competing with smaller village mills, whose costs are very low, in satisfying rural domestic market requirements. Because of this, the commercial mills produce higher quality rice for the export market and high-end domestic urban market.

By the end of the 1980s (1989), there were 1,882 licensed small-scale, single-pass village mills.[34] Fully 56.9 percent (1,070) were located in two Delta governorates, Dakahlia and Kafr el Sheikh. By 1997, there were some 5,000 to 6,000 village mills, a three-fold increase that represented a 12.5 to 15.5 percent compound growth rate over an eight-year span.[35] This astonishing growth over a period that coincided, in large part, with rice market liberalization, can only be viewed as market driven and responsive to most consumers' budget limitations.

The engineering mind-set of the managers who have run public sector rice milling companies led public mills to emphasize quality at all costs. Significant re-investment in costly milling equipment during the 1980s in quite a few public mills coincided with weak export market performance (as exports averaged only 55,774 mt per annum from 1981/82 to 1989/90, while

[34] Most of these village mills, called *mawani*, were manufactured by Egyptian workshops in Mansoura. These workshops are small-scale blacksmith operations producing low-cost milling equipment and copying imported designs. The 1,882 mills were likely only registered mills.

[35] Comparing licensed rice mills between 1989 (1,882) and 1997 (3,349) yields a compound growth rate of nearly eight percent.

exports averaged 207,300 mt a year from 1974 to 1980).[36] By 1996/97, the high milling costs of public mills, relative to private sector mills, and the high paddy procurement prices had squeezed margins and virtually driven the public sector out of both the export and domestic rice markets. Higher levels of paddy procurement in 1997/98 raised public mill capacity utilization to 31.6 percent from a low 5.9 percent in 1996/97, but most of that season's public milling output was destined for export markets.

Competition among private sector mills is intense at all levels. National capacity estimates, regardless of the source, indicate significant overcapacity. MVE's estimate of milling capacity of 5.495 mmt (see Table 5-4), based on a low estimate of commercial mills (only those identified), represents sufficient capacity to mill what is required during a high production year. Many mills — not just public sector ones — are reported to be operating well below capacity, which portends a shakeout. There has been enthusiastic and what now appears to be excessive investment in mills during the past 3-4 years, which has led the Rice Branch of the Cereals Industry Chamber to caution prospective investors from further (new) entry. In addition, the Social Fund has been advised to curtail loans to early retirees and school leavers who wish to invest in small rice mills. Too much capacity and the downside risk of mill business failure has become too high.

In the medium to long run, as pressure mounts to reduce area planted to paddy and if national production actually declines (returning to levels of the 1980s and early 1990s), probably only the most economically efficient mills will survive.[37] Even if all the public sector and ESA mills were to close down overnight, MVE's larger estimate of national milling capacity of 6.015 mmt (see Annex Table A-11)[38] would be enough to process the 1998 crop of 4.45 mmt of paddy and even a crop of the magnitude of the record 1997 paddy harvest of 5.42 mmt. Actual operating levels for both commercial mills and single-pass village mills could expand significantly—certainly at least 25 percent and probably close to 50 percent—if there were no public mill competition, and there were sufficient paddy to process and sufficient working capital to procure the larger paddy crop.

Through the 1997/98 rice marketing season, there were allegations that public sector milling companies received special advantages that enabled them to keep operating despite heavy losses. Early in the 1996/97 season, for example, the Holding Company for Rice and Flour Mills urged the Prime Minister to offer exporters a discount of 50 percent the cost of the public sector rice milling charge if they exported white rice milled by the public sector mills. This measure has

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[36] Note that the figures for the 1980s are MTS data reported by marketing year, while the 1970s numbers are CAPMAS data reported for calendar years. According to CAPMAS, rice exports averaged 617,250 mt/year from 1970 to 1973.

[37] The term economic efficiency (or cost-price efficiency) is used in place of technical efficiency (input-output relationships), because the latter represents an engineering perspective and no insights on how economically and financially viable a milling enterprise is.

[38] To avoid any confusion, note that the estimated milling capacity of 5.495 mmt in Table 5-4 uses only identified commercial milling capacity (211 mills), while the larger estimated capacity of 6.015 mmt in Annex Table A-11 assumes a larger number of private commercial mills (n=275).

never been implemented, but it could undercut the private commercial millers. Another incident from November 1996 (see Ouedraogo and Abdel-Rahim Ismail, 1997) also threatened to harm the interests of private millers and exporters. For several days in several Delta Governorates, governors forbade cross-governorate shipment of paddy. It was quickly overturned by the Prime Minister, and movement restrictions have not been applied to paddy or white rice shipments since then. Finally, some private rice exporters reported in 1997 that neither storage space nor loans from PBDAC were available to unregistered, unlicensed rice dealers.

By aggressively returning to the market in 1997/98 in procuring 517,600 mt of paddy, the Holding Company for Rice and Flour Mills put additional competitive pressure on private sector millers. Some commercial millers complained that the public milling industry was behaving anti-competitively, compressing margins to unprofitable levels in order to put competitive pressure on the larger private commercial millers. There is some ill-will and grumbling by major private sector millers and exporters that the industry needs to stabilize paddy and milled rice prices (in effect, to collude to set margins) to maintain profitable operations. The private sector charges that the public sector mills can operate at a loss, because these losses are underwritten by the GOE. It would be useful to quantify milling and marketing margins for monitoring progress of the rice subsector under APRP, though obtaining accurate accounting and engineering data for different types and scales of mills is a major challenge in attempting to quantify milling costs at different levels of processed throughput.[39] Analyzing marketing margins is easier to do, although there are problems with available price data (see section 6.1 for discussion) and trying to interpret that data (see section 6.2).

5.2.2 Privatization of Public Sector Mills and Its Effects

Through 1997/98, GOE investments in public milling capacity represented enormous sunk costs and privatization was problematic. Privatization efforts in 1997 and the first half of 1998 faltered; however well-intentioned those efforts, they represented too little too late. If the privatization program had begun in 1992-93, when the rice market was being liberalized, the GOE would most likely have had much more success in privatizing rice mills. Land values were lower at that point, and very high land values in 1997 and 1998 inflated the overall cost of a public sector rice mill and represent a major deterrent to privatization. Since 1992-93 there has been such heavy private sector investment in rice milling that there is currently very little interest among private investors in buying expensive, high-end public mills, whose high valuations are driven in good part by high land values. Furthermore, the availability of cheaper Chinese and Korean milling technology has lowered entry costs for private investors, who have discovered that they don't need to buy far more costly Japanese and Swiss mills to produce white rice that is highly acceptable to Egyptian consumers and in many of Egypt's export markets (particularly those where incomes are moderate, such as Eastern Europe, the NIS, Turkey, Syria, Jordan, and Sudan).

[39] In addition, it is a challenge to obtain accurate data on private sector costs and returns. Not only do most millers not complete detailed records, but they may be suspicious of any inquiry coming from the public sector (through the MALR, even if financed by APRP), fearing taxes or fines.

In the second half of 1998, the MPE strategy on rice mill privatization changed so that employee stockholder associations (ESAs) were created to take over ownership of the public sector milling companies while retaining the same management teams. This form of privatization is untested in Egypt and has obvious risks: debt carried over, redundant labor retained, lack of investment capital to rehabilitate some machinery, lack of working capital to procure paddy for milling, old school managers are not replaced with new ones who understand marketing and product differentiation and positioning better—to name a few. The first ESA type of privatization was undertaken by Sharkeya Rice Milling Company, the public sector milling operation that is reported to have the best financial situation and some liquidity. The rice milling operations at Sharkeya will need to go well if privatization is to succeed at other former and current public sector milling companies. If the Sharkeya experiment is a failure, it will portend unsuccessful privatization of public sector mills using the ESA method. If this point is reached, the GOE and the managers of the privatized ESA milling companies will have little choice other than to liquidate the milling equipment for its salvage value, unless there are willing buyers of (expensive) second-hand milling machinery. The mills' land can be easily sold to speculators and land developers as commercial or residential real estate.

5.2.3 Future Conduct and Monitoring Issues

Behavior of the Former Public Sector Mills. A potential problem for private sector commercial millers, who target the upper end of the domestic market (urban consumers) as well as export markets, is the behavior of the public sector mills and recently privatized public mills owned by employees. If these mills receive cheap credit, and if they are allowed to under-price private competitors because they are permitted to operate unprofitably (selling at prices that do not cover operating costs, depreciation, and interest on debt), many private commercial millers will suffer losses and some mills will be forced out of business. On the other hand, maintaining a level playing field will lead to the demise (or privatization) of the public sector mills and probably the closure of most employee-owned and -managed mills.

Monitoring Entry and Exit into Commercial Rice Milling. This will be an important priority for MVE. Significant exit would be evidence that there has been excess investment and that milling margins are too thin. Note that Rice Branch records show that six members, all private millers, or about 3 percent of the known population of private commercial mills, are no longer operating. While this is not a high rate of business failure in a competitive industry, mill closures are likely to increase during the next few years, given excess capacity and declining national production in 1998 and beyond. As of early December 1998, two of 55 commercial mills surveyed by MVE had not begun buying and milling paddy for the 1998/99 season. Furthermore, some commercial mills were not active in 1997/98 or operated at well below capacity.

The discussion of conduct has focused largely on the rice milling industry, as MVE perceives this industry to be the absolutely critical stage (or node) of the rice subsector, where commercially oriented rice millers serve as channel captains organizing and coordinating paddy assembly and sales of white rice. The conduct of public sector mills and the newly privatized mills has the potential to be detrimental to the interests of private millers. Furthermore, milling remains the stage of the subsystem where there is significant participation by public sector companies or privatized firms with a public sector management style and orientation. As discussed in chapters 8 and 9, there is some participation of public trading companies in export marketing, but their

share has declined since the early 1990s and a number of the public exporters are likely to be liquidated or privatized in the next couple of years.

Potential for Collusive Fixing of Prices and Margins. The rice industry federation that is being formed has raised the issue of volatile prices and narrow margins (particularly in 1996/97 but also in 1997/98). Notes from Rice Branch, Cereals Chamber monthly meetings also show that millers (as a subset of the new federation) are worried about price volatility. APRP is recommending that the federation focus on strengthening public and private market information systems as a way to make the domestic paddy and white rice markets more transparent. Publicly collected rice prices need to be disseminated far more quickly; private market information could perhaps be collected by a unit within the new rice federation.

The Role of Grains Commodity Council. Another institutional innovation that might affect the conduct of rice marketing and milling is the formation of commodity councils by the GOE. There has been a rice council chaired by Minister Goueli; the vice-chairman has been Kamal Ghoneim. This organization has not played a major policy and regulatory role in the past. If reorganized or renewed as part of a broader grain commodity council under MTS tutelage, the rice subsector should have adequate private sector representation and the council should play a broad oversight and regulatory role (and refrain from intervening in pricing and market segmentation/access issues).

APRP/RDI is developing policy benchmarks that concern the organization and functioning of the commodity councils, as well as rice federation priorities, funding and functions for Tranche IV. A recent consultancy and report by Eric Wailes and Ragaa El Amir (1998) also stressed the need for the rice federation to focus on issues such as improving market information and intelligence, and better defining and enforcing of grades and standards (with significant industry input).

6. RICE PRICES AND MARGINS

This chapter first discusses sources of price data and problems in their reliability, completeness and consistency. It then looks at trends during the 1990s in reported producer paddy prices, wholesale and retail rice prices, and marketing margins. It also summarizes available data on rice processing costs and charges. Last, we examine trends in rice export values (calculated unit values) and prices, as well as calculate the NPC for rice in several different ways.

6.1 Data Sources and Reliability

Table A-1 in the Annex lays out in summary form the different types of data used in preparing this report and what the sources of these data are, the frequency of data collection, the publication medium, and other pertinent information. In this section, we discuss in detail what the principal sources of price data are, how they are collected and reported, and their apparent reliability.

6.1.1 Producer Paddy Prices

There are three sources of paddy and rice prices in Egypt. It appears as if the MALR/CAAES collects data on paddy prices in rice producing governorates during the main part of the paddy marketing season, or only for four months (September-December). These data are reported to be collected at the district level but available only as monthly averages for reporting governorates. These data are shown for 1985 through 1997 in Table 6-1. Farmers sell paddy largely during the September-January period following harvest. Calendar year prices are not ideal when prices from an earlier marketing season, such as January-February of the 1996-97 season, are used in calculating an annual average with prices from a later marketing season, such as September-December 1997 of the 1997/98 marketing season.

As part of an agricultural data quality assessment (Morsy Fawzy et al., 1999), MVE has focused mainly on obtaining, analyzing and assessing agricultural production data. With respect to paddy prices, MVE has learned that data collection agents obtain estimates from non-scientific samples and limited observations. Samples tend to be small convenience samples. It is unclear if price data are collected weekly, bi-weekly, or during a particular week of the month, which should be the same week across districts (and hence governorates) but may not be. It is also unclear how many data collection points there are in each district, as district prices are somehow aggregated to the governorate level. Finally, it is unlikely that any weighting of price data by district, according to estimates of quantities sold, is ever done in aggregating to the governorate and national levels.

In examining the annual paddy price data, MVE noted suspiciously highly correlation coefficients (see Annex Table A-6). Pair-wise correlations for eight governorates exceed 0.98 for the 1990 to 1997 period. One would expect reasonably highly correlated prices in governorates within the Delta. Correlations between prices in the main producing governorates and prices in Fayoum (and in Menoufia, not a principal rice-producing gover-norate) should not be as high as price correlations between Delta governorates, but they are.

Table 6-1: Paddy Rice Farmgate Prices, 1985-97

6.1.2 Situation and Outlook (S&O) Reports

In 1998, MALR began to publish periodic S&O Reports, with assistance from the APRP/RDI Unit. Rice S&O reports primarily contain information, including tables, downloaded from a USDA internet site and published in English (when the audience is Arabic speaking and reading). While some of this information is useful in providing the big picture in world rice production, stocks, trade and consumption, much of it is too "macro" to be of much use to Egyptian policy-makers and rice industry participants. The Egyptian rice market has some special characteristics (*japonica* rice, virtually no imports, often high prices) which are a function of varietal choices, consumer preferences and trade policies. The S&O Report made no attempt to link the Egyptian rice market to the world market (not even for medium grain rice, which is what is produced and consumed in Egypt).[40] Clearly, there is very significant room for improvement. Properly collecting and reporting domestic paddy and rice prices would represent a good starting point.

6.1.3 Wholesale and Retail Price Data

Other than MALR, there is no source of paddy price data in Egypt. The MTS, Cereals and Legumes Department began to report wholesale and retail price data in January 1996 to Minister Ahmed Goueli. Twenty-six governorates report the lowest and highest wholesale and retail prices monthly to MTS/Cairo. Table 6-2 shows time series for four prominent governorates: Cairo, Giza, Alexandria and Qaloubeya. These time series are not entirely complete, but they are more complete than the data for the 22 other governorates. As in the case of the MALR prices, the MTS minimum and maximum prices are nice round numbers, suggesting that the data are not really collected by enumerators but obtained as estimates from a minimum of sources (GOE and industry).

The time series in ten governorates are very incomplete, making analysis of trends and margins impractical. Furthermore, there is limited month by month movement in prices. The lowest retail price in Cairo, for example, was reported as 1.4 LE/kg. from August 1996 through February 1998, though prices did drop from 1.4 LE/kg. to 1.1 LE/kg. by July 1998. Similarly, the highest consumer price in Port Said was reported to be 1.4 LE/kg. from November 1996 through March 1998. This lack of variability is implausible.

The Head of the Cereals and Legume Department noted that Minister Goueli specified that he wanted internal reporting of monthly minimum and maximum prices in the 26 governorates. This is unconventional, as most market information systems report mean weekly or monthly prices, where the mean price is averaged across markets in an area (such as a district) or

[40] The June 1998 S&O Report for Rice referred to Egyptian rice production (a one line entry) in a table on rice area, yield and production for the world and selected countries and regions.

Table 6-2: MTS Minimum and Maximum Wholesale and Retail Rice Prices for Four Governorates

across weeks of a month.[41] In more sophisticated systems, price data are weighted by across weeks of a month.[42] In more sophisticated systems, price data are weighted by across weeks of a month.[43] In more sophisticated systems, price data are weighted by transacted volume, though the weights are hard to arrive at in a decentralized marketing system with numerous transaction points, including the farmgate. That the Ministry of Trade would request minimum and maximum prices, rather than mean or modal prices (with the price range noted), is a surprise. Perhaps this is because the Ministry's political concern is with price variability (including consumers' perception of this variability)[44] and the range of prices, rather than with precise reporting of mean price levels obtained from a sample of data collection points (markets) at specific, harmonized collection times.

Minimum and maximum prices present a serious challenge for any kind of useful analysis, which requires some form of point estimate for each time period. One cannot assume that the mean monthly price is simply the average of the minimum and maximum prices for that month. Prices could have clustered close to either the minimum or the maximum levels, making such an average an erroneous estimate. Without some knowledge of the relative volumes transacted at different prices within a range, it is impossible to establish a point estimate for a period such as a month.

Price data from January 1996 to November 1998 for the 26 governorates are the only series

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[41] In many countries, price data collection does not conform to administrative boundaries or jurisdictions. Rather, prices are collected for specific markets which are important in terms of volume, price leadership, and the location of production, high-volume wholesale trade, or important redistribution/consumption points. If price movements in many markets are highly correlated with price movements in 3-5 key markets exhibiting price leadership, resources in price data collection tend to be concentrated in those key markets. High data quality for a few key markets is preferred over collecting prices for each political jurisdiction.

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[44] Not only the MTS is concerned with price variability. An important initial impetus to formation of a rice trade association appears to have been the desire by major public and private millers and exporters to stabilize paddy and rice prices.

available at MTS. Earlier data (for 1995 and earlier years), probably incomplete, can supposedly be obtained at the governorate level. Given MVE resource and time constraints, as well as our preliminary assessment of data quality and utility, MVE elected not to obtain data for earlier years.

6.1.4 CAPMAS Retail (and Wholesale) Price Data

CAPMAS' main interest lies in calculating and tracking several price indices rather than in reporting prices for any particular commodity. CAPMAS calculates urban and rural CPIs, as well as urban CPIs for food, clothing and other categories of goods. Price data used to generate the CPIs are collected monthly in major urban areas and bi-monthly in rural areas. In order to reconfigure the consumption basket and reweight the individual items in that basket of goods, CAPMAS carries out periodic national budget and expenditure surveys, with the last one conducted in 1995-96. Earlier surveys were carried out in 1974-75, 1980-81, and 1990-91.

MVE obtained month by month time-series data for retail prices in 17 governorates (excluding Cairo and Alexandria) and for average national wholesale prices. In general, retail prices are predictably higher in non-producing governorates such as Giza, which is highly urbanized, and Upper Egypt (Minya, Assiut and Sohag), than in the Delta producing governorates. Rice prices track one another closely in contiguous governorates. The national wholesale rice price, an abstraction, may be Cairo or Giza based, as it exceeds retail price levels in most of the rice producing governorates during most months.

6.2 Analysis of Prices and Margins

6.2.1 Trends in Producer Paddy Prices

Deflating paddy prices by the wholesale price index for the period 1990-1997 shows that real paddy prices stayed roughly constant from 1990 to 1993 and then increased 12.5 percent in 1994 and remained constant to 1997, before dropping below 1990 levels in 1998 (see Figure 6-1). Across the seven major rice-producing governorates, real prices were only 10 percent higher in 1995-1997 than they were before liberalization in 1990. If the MALR paddy price data are deemed reliable (an important caveat), this observation goes somewhat against the conventional wisdom that liberalizing rice marketing and pricing greatly increased the profitability of rice. Assuming real input prices trended upward slightly, the net profitability of rice was probably relatively unchanged or improved marginally.[45]

In contrast to the relatively constant, then gradually rising real paddy prices, the real price of seed cotton (for the varieties Giza 75 and 70) fluctuated more widely from 1990 to 1998. Real Giza 75 prices dropped from 1990 to 1993, exceeded the 1990 price with the high

[45] To make more definitive judgements about the profitability of different summer crops, such as rice and cotton, requires analysis of the profitability of the alternative crop rotations (including the winter rotation crop in the analysis). Hence, MVE conclusions of rice profitability should be taken with caution. An analysis of the profitability of alternative rotations is beyond the scope of this paper. APRP/RDI is currently undertaking this analysis.

Figure 6-1: Trends in Real Paddy Prices, 1990-1998

support prices of 1995 to 1997, and then dropped precipitously in 1998. Real Giza 70 prices followed a similar pattern, though the fluctuations are less pronounced than for Giza 75. The ratio of paddy prices to seed cotton prices increased from 1990 to 1994, dropped to its lowest level since 1986 during the three years of the high seed cotton support prices (1995 to 1997), and returned to early 1990s' levels in 1998. Note that paddy prices were higher relative to seed cotton prices in the mid-1980s than they were in the 1990s.

6.2.2 Wholesale Price Trends and Seasonality

Annual average rice wholesale prices, the wholesale price index, and wholesale margins are shown in Table 6-3 for the period 1990 to 1998 (first eight months). The annual wholesale prices are unweighted averages of monthly prices reported by CAPMAS in its periodic bulletins (with a quarter or so lag). MVE has the monthly wholesale price and price index observations in its data base.

National average wholesale prices, expressed in 1997 constant price terms, show that prices remained constant in real terms from 1991 to 1993, increased 19 percent in 1994, rose another 11 percent in 1995 and 6 percent in 1996, leveled off in 1997, and declined 7 percent in 1998. Real wholesale prices were therefore highest from 1995 to 1997. A complete twelve-month time series of wholesale prices for 1998 would show a sharper drop than 7 percent in 1998. Prices appeared to be heading back up in both nominal and real terms in early 1999.

The national average wholesale price appears to be the weakest part of the CAPMAS data base related to rice. MVE was unable to obtain governorate level wholesale prices from CAPMAS, which would definitely provide a better picture of price variability over space and probably a better idea of price seasonality and margins over time than the annual average wholesale prices. In examining the monthly national average wholesale prices, one observes that the price stays constant for many months at a time before 1994 and appears to be unreliable. From the level of LE 955/mt of milled rice in March 1994, the wholesale price jumps up to LE 1202/mt in April 1994, rising in modest increments in January 1995 (LE 1270/mt), January 1996 (LE 1330/mt), and July 1996 (LE 1370/mt), before beginning to drop in April 1997—first to LE 1290/mt and later to LE 1150/mt by May 1998. The fact that declines in wholesale prices took place late in the marketing season during two successive years (April 1997 and May 1998) is counter-intuitive and calls the CAPMAS data into question.

As a storable commodity, rice should show a seasonal pattern of relatively low prices in the months immediately after the harvest (September to November), followed by steady price rises from December through June or July. By this point (mid-summer), producers' and traders' expectations about the size of the new rice crop would be crystallizing and might induce either additional sales of last season's stocks (if the harvest is expected to be good) or continued storage of these stocks in anticipation of strong price rises (if the harvest is expected to be poor). The fact that wholesale price rises and declines seem to be almost random leads MVE to believe that the national wholesale price series is unreliable and should not be used seriously in data analysis. That being said, the fact that the CAPMAS wholesale rice prices trended downward from the 1996/97 season, when paddy and rice prices at all levels of the marketing system were reported to be unusually high, to the beginning of the

Table 6-3: Wholesale Rice Prices and Margins

1998/99 season shows that the CAPMAS data are better in more recent years than in the past.

6.2.3 Wholesale Marketing Margins

Table 6-3 also shows two different measures of the efficiency of wholesale marketing. First, there is the wholesale marketing margin, defined as the margin between the wholesale and producer prices divided by the wholesale price. This margin declined from 24-30 percent in the early 1990s to 14-17 percent in the 1993-1996 period following liberalization, and finally to 9.5 percent in 1997 and 4.8 percent in 1998. This is a positive trend and evidence that increased entry and competition have compressed wholesale marketing margins.

Note, however, that the wholesale marketing margin is really a combined margin for wholesale trading in paddy (assembly function), processing (milling), and sale of the milled rice. Millers typically take on the last two functions, while separate wholesale traders perform the paddy assembly and transport function, usually delivering the paddy to the commercial mills. Hence, the wholesale margin, as we have defined it, includes rice milling and bagging costs and sometimes transport costs for milled rice, if the commercial mills ship the milled rice to distribution points other than the mill. The decline of this (multi-function) marketing margin below ten percent may be evidence of a hyper-competitive paddy/rice market, leading to razor-thin returns to paddy wholesalers and rice millers. The fact that many commercial millers complain about poor (low) returns to milling lends some credence to this hypothesis of hyper-competitiveness.[46]

A second measure of wholesale marketing efficiency is shown in the final column of Table 6-3 as the wholesaler share of the consumer or retail price. This is calculated as follows:

Share of Wholesaler = ((Wholesale Price - Producer Price)/Retail Price) * 100

As with the wholesale marketing margin, this share declined from the relatively high levels of the early 1990s (22-26 percent) to 15-17 percent during the 1993-1996 period, and to under 9 percent in 1997 and 1998. This also suggests increased efficiency in performing the wholesale marketing functions as result of rice market liberalization and the ensuing increased private sector entry and competition.

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[46] Despite these complaints, larger commercial millers with access to large amounts of working capital for buying paddy typically buy significant volumes of paddy at seasonally low prices right after the harvest. This helps to boost the profitability of their operations, although they do incur costs in storing paddy (rental costs or capital costs in building storage, interest charges if funds are borrowed to buy (and store) paddy, and the opportunity cost of capital). In a survey of commercial rice mills carried out in November-December 1998, MVE found that the larger commercial millers bought large volumes of paddy shortly after the harvest and had the capacity to store this paddy for several months. By building up paddy stocks, the large mills ensure higher levels of capacity utilization for a longer period following the harvest. In contrast, village mills and small commercial mills lack the liquidity, access to finance, and storage capacity to buy much of their paddy when it is cheapest for later processing.

6.2.4 Retail Price Trends and Seasonality

Table 6-4 shows annual average retail prices for several governorates, as well as averages (calculated across governorates) for three regions: Delta, Middle Egypt, and Upper Egypt. Deflating average governorate retail prices by the urban CPI reveals that real retail prices were significantly higher in 1990 and 1991, before liberalization, than they were during the rest of the 1990s. Retail prices in most governorates trended downward strongly in real terms from 1990 to 1993, at which point they rose moderately in 1994 before declining steadily to 1993 levels by 1998. This is shown for selected governorates and for the regions of Middle Egypt and Upper Egypt in Figure 6-2. Retail rice prices during the first eight months of 1998 were at their lowest real levels during the 1990s. By December 1998, however, prices at all levels of the marketing system had begun to rise strongly as paddy supplies became tight, a function of the smaller paddy harvest in 1998 relative to 1997.[47]

As with CAPMAS wholesale prices, the governorate retail prices do not consistently exhibit a seasonal pattern that corresponds to what is observed for most storable commodities.[48] In some years, retail prices decline sharply a month or two after the harvest, but in other years, prices remain flat or even rise a bit. Since rice imports are insignificant in Egypt, one would expect seasonal price swings to be only somewhat less muted than seasonal price movements at the producer or wholesale levels.

6.2.5 Retail Marketing Margins

The retail marketing margin, the difference between the monthly national average wholesale price and various retail prices, exhibits some unexpected patterns. MVE examined the marketing margin using monthly observations for a) national average wholesale and retail prices (where the national wholesale prices are reported by CAPMAS and the national retail prices are calculated as an unweighted average of 17 governorates), b) national average wholesale and Dakhalia retail prices, and c) national average wholesale and Giza retail prices.

Plotting of the price series in Figure 6-3 illustrates annual changes in the relative magnitude of these margins. The margin is quite high in 1990 and 1991 before liberalization. From 1992 through 1996, margins show an unusual pattern, negative for many months and swinging between positive and negative, particularly for calculations a) and b). The wholesale-Giza retail margin c) appears to be the most robust and believable, ranging from 0 to 9.9 percent (of the wholesale price) during most months from January 1993 to March 1997. As of April 1997, the margin increases to 12.4 percent (from the 5.8 to 7.3 range of the previous seven months) and remains above this level for all but two months of the remainder of the time series (through August 1998). From April to August 1998, the marketing margin

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[47] Some observers also think that the Prime Minister's announcement of a relatively high producer price for paddy in mid-December 1998 had a lot to do with this rapid price rise.

[48] MVE has a database of monthly retail rice prices, as well as urban and rural consumer price indices, from 1990 through 1998, obtained from CAPMAS reports. Neither the wholesale nor retail price data bases are shown here or in the Annex, but they are available from MVE upon request.

Table 6-4: Average Annual Retail Prices for Selected Governorates and Regions, 1990-1998, and Selected Margins & Relationships

Figure 6-2: Real Retail Rice Prices in Selected Governorates and Regions, 1990-1998

Figure 6-3: Wholesale-Retail Price Margins, 1990-1998

(between two adjacent stages of the marketing system) averages 25.9 percent, which is implausibly high and would be evidence of market power that it is customarily not exercised or imposable at the retail level of the marketing system in most developing countries. Using marketing margin a), the national wholesale-average retail margin, shows somewhat smaller margins for the period September 1996 through August 1998, but the margin's absolute magnitude is still too high to be readily believable.

The retail-wholesale price margin (using margin c) ranges from 25 to 330 LE per mt from January 1994 to August 1998, with the magnitude of the margin greater in the latter part of the period of analysis than in the earlier part. The margin is under 10 percent for all but two months from January 1992 through March 1997, and in most months it does not exceed 7.3 percent, but the steady rise from April 1997 suggests that the wholesale-retail margin has increased as liberalization of the domestic rice market has supposedly been completed, with expanded private sector participation, and increased national production (18 percent higher in 1994 than in 1997). Inflation may have contributed a little bit to the absolute increase in the magnitude of the marketing margin, but not much, as it has been modest by Egyptian standards since 1994. The rising relative margin (as a percentage of the national average wholesale price) suggests that the CAPMAS data are flawed.

The wholesale price data are particularly suspect, for the reasons noted above; to be usable and meaningful, wholesale prices need to be collected and reported for major wholesale markets. Without knowing how CAPMAS collects and calculates a national average wholesale price for rice (and any other commodities), MVE concludes that such a national average price is a flawed concept and may lead to some unreliable findings in analysis.

By calculating average annual retail prices from CAPMAS's monthly reported price observations, we can examine movements in annual average prices and margins, as shown in Table 6-4 and Figure 6-3 using national averages and also the annual average Giza governorate retail price. The retail marketing mark-up is defined as the relevant retail price minus the national average wholesale price, divided by the wholesale price. This mark-up is strongly positive in 1990 and 1991, before liberalization, but then drops steadily to its lowest level during the decade by 1994. It remains relatively low until 1997, when it rises strongly, and increases again in 1998. One would expect the retail mark-up over the wholesale price to remain low in 1997 and 1998, as there are many rice retailers and none of them are expected to exercise significant market power.

As a better measure, the retail marketing margin, which is also the retailer's share of the consumer or final price, drops significantly from 1990-1991 following liberalization and remains very low in percentage terms. This is consistent with the observation that food retailing is typically a low-cost enterprise, facing low entry barriers, in many developing countries. The CAPMAS data appear reliable here.

Last, the differences in retail prices between the Delta and Giza and between the Delta and Upper Egypt show a modest decline in relative magnitude (percentage) over time. The Giza retail prices were on average 14-15 percent higher than the average Delta retail prices from 1992 through 1995 and then dropped to under ten percent in two of the three following years. The Upper Egypt retail prices were 10.7-17.2 percent higher than the average Delta retail prices from 1993 through

1998, though the lowest difference (of 10.7 percent) came in 1998.

6.2.6 Liberalization and APCP/APRP Effects on Farm to Market Margins

Over the life of APRP, one would expect marketing margins from farm to consumer to shrink, because increased competition in the rice subsector will force participants to be as efficient as possible in rice assembly, processing and distribution. Note that there is a *ceteris paribus* assumption in any analysis over time of marketing margins; it is assumed that the form of the product (degree of value added in processing), its packaging, its convenience (in delivery) and other attributes are held constant. Over a 4-6 year period, this is probably a reasonable assumption, though MVE will need to be attentive to possible changes in rice processing, packaging and distribution that would invalidate the *ceteris paribus* assumption. Counteracting any efficiency effect of increased competition might be the increased cost of food distribution in overcrowded, congested urban markets, particularly Cairo and Alexandria. This is less likely to be a factor in secondary cities.

There are no monthly paddy price data for examining monthly changes over time in farm to market margins. Annual approximations of producer paddy, wholesale paddy, wholesale milled rice, and retail rice prices can be used to estimate marketing margins in a rough way, assuming a fixed conversion rate (across years and rice varieties).[49] Table 6-5 presents estimates of farm-to-consumer margins for 1990 to 1998, using various price series and early season estimates for 1998/99. As expected, the farm-to-market margin dropped significantly from 1990 and 1991 (when it was 39.4 and 35.0 percent of the retail price) to 1994, when it was only 8.7 percent (surprisingly low). It doubled in magnitude in 1995 and has remained in the 15-19 percent range since then. There has been no significant change in the farm-to-consumer margin since 1994 (nor in the producer's share of the retail price, which has stayed within the 80-85 percent range). The producer share of the final consumer rice price is high, indicating competitive and efficient performance of assembly, processing, and distribution functions. MVE and others have observed reasonable milling and transport costs, the main components of the gross marketing margin.

While demand can reasonably be assumed to expand steadily for rice, though perhaps at a more modest rate than during the early 1990s, supply may decline significantly under APRP. There are numerous APRP benchmarks designed to reduce water allocation to paddy and area planted to paddy. The net effect of shifting to shorter season varieties and reduced plantings overall will likely cause paddy area to decline. Reduced paddy profitability, brought about by downward pressure on rice prices from import competition and more strict enforcement of area restrictions on planting paddy, could also induce producers to shift to summer crops, such as maize, whose relative profitability becomes higher. The aggregate impact of tighter supplies, along with heightened competition to procure and process those supplies, could further compress marketing margins from the producer to the consumer levels.

[49] Note that transformation rates differ by variety. According to a late 1998 MVE survey of commercial rice mills, the milling yield or rendement was highest for Gizas 171, 172 and 173, and lower for Gizas 176, 177, and 178 and Sakha 101/102.

Table 6-5: Farm to Consumer Marketing Margins for Rice, 1990-1998

Another APRP policy variable that could contribute to tightening marketing margins, even if aggregate Egyptian rice production declines and supplies tighten, is the tariff on imported rice. If the GOE lowers the tariff on imported rice (from 20 percent to 10 percent or less), domestic rice may come under increased competitive pressure from cheaper, though often lower-quality, imported rice. This could contribute to lower marketing margins.

6.2.7 Rice Market Integration

Pair-wise correlations of monthly retail rice prices from January 1990 to August 1998 in 17 governorates are used to test for the integration of the Egyptian rice market. The price correlation matrix, shown in the Annex, reveals very high correlations (generally where $r \geq 0.90$) between governorates a) within the Delta, b) within Middle Egypt (including Giza), and c) within Upper Egypt. This regionalized market integration is to be expected, given the relatively short distances and good roads separating markets in governorates within each given region. Prices correlations between governorates located in different regions (e.g., Delta governorates with governorates in Upper Egypt) are generally weaker but still quite high, ranging between $r = 0.60$ and $r = 0.90$. The lowest correlations are found between retail prices in Giza and governorates outside of Middle Egypt ($0.69 \geq r \geq 0.58$), and between prices in Qena and governorates outside of Upper Egypt ($0.86 \geq r \geq 0.60$). MVE has no explanation for why Giza appears to be the most weakly integrated governorate (with other governorates) in Egypt, when one would expect *a priori* that Giza, as representative of the major domestic consumer market (the greater Cairo area), would be strongly integrated with other governorates, particularly the Delta producing governorates. This anomaly may be due to data quality problems.

In a country with good roads and the population concentrated in a limited arable (and highly urbanized) area, one would expect that the retail market for rice, a major staple, would be well-integrated. There appear to be no barriers to inter-governorate and inter-regional transport of paddy or rice, despite a short-lived attempt by some Delta governors to impose movement restrictions after the harvest in 1996.

6.2.8 Analysis of the Wholesale-Consumer Rice Marketing Margin Using MTS Data

MTS rice price data can be examined with caution for movements in the marketing margin, although care must be taken to calculate the margin using monthly minimum wholesale and retail prices (separately) and then maximum wholesale and retail prices. Most of the MTS time series are not complete; Cairo and Qalubeya, which have reasonably complete series of minimum and maximum prices from early 1996 to late 1998. In examining Cairo margins, the margin between the minimum prices (retail and wholesale) and maximum prices is equal in about half the months. In other months, there are large differences, with the magnitude of the margin being greater for maximum prices. *A priori*, one would expect the margin between maximum prices to be larger than that for minimum wholesale and retail prices. In Qalubeya, the margin between minimum (wholesale and retail) prices and between maximum prices is equal in all but four months, which is implausible. The magnitude of the margin between minimum prices varies between LE 100 and 300 per mt during most months.

The utility of minimum and maximum prices is limited. The MTS data provide a cross-check against CAPMAS prices. The advantage of the MTS data are that both wholesale and retail

prices are collected for the same governorate, whereas CAPMAS reports only a national wholesale price for rice.

6.3 Rice Export Prices and Measures of the Competitiveness of Egyptian Rice

6.3.1 Recent Trends in Rice Export Prices

Monthly nominal rice export prices from January 1993 through August 1998 are shown in Table 6-6. These prices are unit values, calculated from the total value and volume of exports, as collected by the Customs Service and reported by CAPMAS. The market year averages, reported for 1993/94 through 1997/98, show the highest prices in 1995/96 (LE 1235/mt) and 1996/97 (LE 1198/mt), with a seven percent decline in 1997/98 to LE 1103/mt. Since the CAPMAS figures are not differentiated by type and grade of rice (i.e., *camolino* vs. *natural*; grades 1-4), they should be taken as rough approximations for export prices.

Export price data for the major traded types and grades of rice can also be pieced together from various sources, including earlier reports and interviews with exporters and millers in 1997 to 1999. These data are shown in Table 6-7 and should be treated as illustrative and not considered as accurate point estimates based on scientific sampling. The price data by type/grade of export rice are useful in showing that premiums are paid for the highest grades, which are usually shipped to the demanding Arab markets. Lower grades, particularly 3 and 4, are reserved for less discriminating and more price-sensitive markets in Eastern Europe and the NIS.

The magnitude of the price premium between *camolino* rice, grades 1 and 2, has ranged from only LE 30/mt of rice in 1994/95 to LE 60/mt in 1996/97 and in 1997/98. *Camolino* 3 appears to be rarely shipped, so there are no price observations in most years. The price premium between *natural* rice grades 1 and 2 again was LE 60-75/mt in 1996/97 and 1997/98, and LE 50-55/mt between grades 2 and 3. In 1994/95 and 1995/96, the difference between prices at adjacent grades was greater as one moves from the highest grade, *natural* 1, to the lowest grade, *natural* 4.

As with the CAPMAS unit export values, one can observe that nominal export prices were high in 1995/96 and 1996/97 and then dropped significantly in 1997/98. This drop contributed to a 146 percent increase in export volume from 1996/97 to 1997/98. Export prices remained low at the outset of the 1998/99 season but had begun to rise in December 1998 to significantly higher levels in February-March 1999 that were stalling exports.

6.3.2 Measure of Protection and Competitiveness: Nominal Protection Coefficient

The nominal protection coefficient (NPC) of a commodity is the ratio of its domestic price to its border price. Whether a commodity is imported or exported affects the adjustment of the border price. If an import, the CIF price for the commodity must be adjusted upward for internal transportation and marketing margins. These adjustments make the border price comparable to the estimated domestic price that the farmer receives because both refer to the same stage of production. The CIF price can also be adjusted to the major consumption point

Table 6-6: Monthly Average Export Prices of Rice, 1993-1998

Table 6-7: Rice Export Prices by Type and Grade, 1994/95 to 1998/99

within a country to assess incentives to consume imported vs. domestic rice. If an export, the FOB price of the commodity must be adjusted downward, because farmers incur the cost of domestic marketing margins to deliver the good to the port.[50]

Alternatively put, the NPC is a ratio of the domestic price decision makers face given intervention and the border price they would have faced in the absence of intervention. The numerical value indicates the positive, negative or neutral structure of protection generated by policy. Adjustments to price data may be needed to make meaningful calculations and comparisons.

Egypt faces a 20 percent tariff on imported rice, plus 5% sales tax and 3% miscellaneous import fees; nominal protection is 30 percent (tariffs and taxes are multiplicative). APRP is working to reduce this tariff to 10 percent or less in Tranche III. Imports are negligible at present and limited to high-quality, expensive *basmati* and Uncle Ben's rice. If rice tariffs are eliminated in Egypt, imports of these specialty rices will likely expand little. It is unclear which types of rice would be imported for wider consumption (below the highest income niche and foreign consumers willing to pay for expensive specialty rices) in the absence of protection. Imports could be either a) inexpensive Thai or Vietnamese broken rice or b) more expensive U.S. or Australian medium grain *japonica* rice. MVE considers alternative a) more likely. Hence, the more appropriate time-series used in calculating border prices for calculating NPCs is the readily available price series for Thai rice (15%, 35% or 100% broken long grain). For comparative purposes, both Thai and U.S. prices will be used.

Table 6-8 shows that the NPCs are less than 1.0 by a wide margin when the import competing rice used in the comparison is U.S. medium grain rice. The NPCs are higher when Thai 15% broken rice is used in the comparison but still less than 1.0. Finally, the NPCs are generally greater than 1.0 when the import competing rice is Thai 100% broken, the cheapest long grain rice exported from Thailand, the number one exporter in the world. Egyptian analysts and experts think that 100% Thai broken rice will never be imported into Egypt. When this type

Table 6-8: Net Protection Coefficients for Egyptian Rice

Import Competing Rice	Point of Comparison	1995	1996	1997	1998
U.S. Medium Grain	Wholesale Level	0.59	0.67	0.67	0.54
	Producer Level	0.48	0.64	0.59	0.40
Thai 15% Broken	Wholesale Level	0.77	0.90	0.94	0.84
	Producer Level	0.63	0.75	0.83	0.63
Thai 100% Broken	Wholesale Level	0.95	1.21	1.25	1.01
	Producer Level	0.78	1.01	1.11	0.75

[50] This paragraph paraphrases material found in Isabelle Tsakok's *Agricultural Price Policy: A Practitioner's Guide to Partial Equilibrium Analysis*, 1990.

of rice is excluded from the calculation of the NPC, Egypt's medium grain *japonica* rice is shown to face negative net protection. Removing or lowering the tariff would raise the NPCs somewhat, though not enough to induce imports of medium grain rice from the U.S. This is not the case for Thai long grain rice with 15% brokens, as some of the NPCs become greater than one, particularly at the wholesale level, and for Thai 100% brokens, where the NPCs go from near one to consistently greater than one.

Note that generally higher world rice prices in 1998 relative to 1997, contributed to a lowering of all the NPCs in 1998 from their 1997 highs. Exceptionally low early (peak) season paddy prices in Egyptian rice producing governorates, which have risen since December 1998, also kept the numerator (in the NPC calculation) low in 1998 relative to the earlier years and contributed to low 1998 NPCs.

6.3.3 Measure of Competitiveness: Comparing Egyptian Rice Prices with Those of Competitors in Export Markets

As an important rice exporter to Mediterranean and selected Middle Eastern markets, Egypt shipped 408,000 mt in 1997/98 and 355,000 mt in 1995/96. MVE has information on export prices from various sources, though the prices tend to be calendar year rather than marketing year prices (hence they cover parts of two marketing years). U.S. medium grain rice prices are available and can be adjusted to compare with Egyptian export prices in a Middle Eastern market where the two rices compete, such as Turkey or Syria. Similarly, Australian medium grain rice prices can be adjusted and compared with Egyptian rice prices in the Gulf markets, such as Saudi Arabia. For the purposes of this analysis, MVE focuses on comparing the competitiveness of Egyptian rice with American rice in Turkey, a large market for both countries, and with Australian rice in Saudi Arabia. NPCs are calculated and shown in Table 6-9.

Table 6-9: Export Parity Comparisons for Egyptian and Other Traded Rice

Export Competing Rice	Point of Comparison	1990	1991	1992	1993	1994	1995	1996	1997	1998
U.S. Medium Grain	Turkey, CIF	0.70	0.76	0.75	0.74	1.15	0.82	0.98	0.89	0.73
Australian Medium Grain	Saudi Arabia, CIF	na	0.89	0.72	1.00	1.06	0.99	1.02	0.76	0.87

Source: CAPMAS, University of Arkansas (1995), USDA/ERS, Australian Bureau of Agricultural Economics Research (ABARE)

Since the export parity coefficients are less than 1.0, Egyptian rice has been cheaper than American rice in the Turkish market for all the years during the 1990s except one (1994). The unweighted average NPC for the entire nine-year period (1990-1998) is 0.84. Egyptian rice has also been cheaper in the Saudi market than Australian rice during most years, but the gap is narrower (NPC averages 0.91 for the 1991-1998 period), and hence Egypt's competitive advantage there is more tenuous. For four years, the NPC has equaled 1.0 or more (for one of these four years, it is actually 0.99).

There are no taxes on Egyptian rice exports. No import duties are assumed in the analysis for Turkey or Saudia Arabia, though they are presumably negligible and would tend to cancel each other out in the NPC calculations (augmenting both numerator and denominator).

7. THE INTERNATIONAL RICE MARKET

Since most Egyptian rice is *japonica* — the short/medium/round grain variety — export market outlets are specific to those countries with a preference for *japonica*, mostly the Arab countries of the Middle East, the Mediterranean countries of Europe, and increasingly in the last three years, Eastern Europe and the NIS. Other supplying countries, such as the U.S. and Australia, have made inroads into the Middle East region, bolstered by government support, which, in the case of the U.S., came to approximately $57/mt of paddy paid to producers who receive contract payments during the 1997/98 marketing year.[51] However, the U.S. program is phasing down and will decline to an average of about $40/mt of paddy by 2002, when the program will get reviewed. Australia has a state trading enterprise which controls domestic and export marketing and provides price supports.

The competitiveness of the Egyptian rice industry in international markets is an important issue since Egypt has become a larger exporter of *japonica* rice during the 1990s. In view of the overall volatility of international rice markets, changing patterns of consumption and buying preferences in Egypt's Middle Eastern and Mediterranean markets, and the entry of new markets for lower grade rice in Eastern Europe and the Soviet Union, it is important for Egyptian producers, millers, and exporters to understand what the driving forces are behind these market changes.

7.1 World Production and Consumption

Rice accounts for about one-fifth of the world's grain consumption and is the staple food for much of the developing world, especially in Asia. Asia is also the major rice producing continent, accounting for 88.6 percent of world production of 570.1 million mt of rough rice in 1997/98. China and India, which produced 195.1 and 122.0 million mt respectively in 1997/98, 55.6 percent of total world output, are by far the leading rice producing countries. A second tier of countries that each produces between 10 and 50 million tons are, in order of importance for 1997/98: Indonesia (47.5 mmt),[52] Bangladesh (27.9 mmt), Vietnam (27.0 mmt), Thailand (22.8 mmt), Burma (15.3 mmt), Japan (12.5 mmt), and the Philippines (9.9 mmt). Finally, countries that produce between 1 and 10 million mt of rough rice, are, in order of importance, Brazil (8.5 mmt), the United States (8.1 mmt), South Korea (7.4 mmt), Pakistan (6.5 mmt), Egypt (5.5 mmt), Taiwan (2.0 mmt), and Australia (1.3 mmt). Therefore, the only significant rice producing countries outside of Asia — Brazil, the United States, Egypt, and Australia — are minor producers, together accounting for 4.1 percent of world production. Egypt by itself produced 5.42 million mt of rough rice in 1997, representing just under 1 percent of world production, but it ranks as the only African or Arab country that is a significant rice producer. However, there

[51] Under the 1996 farm bill, rice producers receive $465 million, which is allocated to farmers as pre-planting season payments based on historical acreage and yield, not planned production. The estimated $57 per ton is an informal estimate.

[52] In 1997, El Nino weather delayed the planting of the main crop from October to December so the harvest was delayed from March to April-May; however, a more important affect was that the planting of the second crop has been pushed back.

are a number of smaller African countries that have high per capita rice production and consumption; Guinea Bissau and Madagascar are prime examples with over 100 kg per capita rice consumption.

Projected world production and consumption were expected to total 378.7 million mt and 387.1 million mt in 1998/99 (milled basis), compared with 385.4 and 383.7 mmt respectively estimated for 1997/98, with consumption increasing 1 percent. As rice is a major source of calories in producing countries, most of the production is consumed, and often only a small percentage remains for export markets. In fact, the export market is dominated by three countries — Thailand, Vietnam, and the United States — which made up 54 percent of the world rice trade in 1998 and are regular suppliers from year to year. Three other countries, China, India and Pakistan, accounted for 30 percent of total trade in 1998, but, in the case of India and Pakistan, high consumption levels force them to reduce exports in poor production years.[53] There is an assortment of countries supplying the remaining 20 percent, such as Argentina, Egypt, Guyana, and Uruguay.

The world market for rice is considered thin, because the quantity traded on world markets is a relatively small proportion of total volume of world production/consumption. Table 7-1 shows that the volume traded is small[54] as a proportion of total production, but has been generally higher following the Uruguay Round of GATT (UR-GATT) than before 1994/95, and stood at a record level of 5.8 percent in 1997/98. Secondly, many countries that are major producers are erratic suppliers or buyers. For example, Indonesia imported 5.7 million mt in 1998, 7 times the level of imports of 800,000 mt recorded for 1997. China, a major exporter this year with 2.25 million mt, was a net importer of almost 2 million mt in 1995. India's exports climbed from 600,000 mt in 1994 to 4.2 million in 1995, leveling off in 1996 at 3.6 million mt, then dropping to 2.0 in 1997, a preliminary estimate of 3.0 mmt in 1998, and a projected 2.0 million mt in 1998.

7.2 Characteristics and Demand for Different Rice Types

There are four types of rice — *indica*, *japonica*, aromatic and glutinous — with *indica* and *japonica* accounting for over 80 and 15 percent of overall production respectively. Consumer preferences for either are based on cooking and taste characteristics. *Japonica* rice is a medium, short, or round grain that is sticky when cooked, compared with *indica*. *Indica*, or long-grain, is produced in most of the Asian countries except Japan, North and South Korea, Taiwan and northern China, where *japonica* is the preferred rice. *Indica* is the major type of rice traded on international markets. Thailand, Vietnam, and the Gulf region of the United States dominate exports of long grain, although the market is stratified according to grade and origin. The U.S. dominates exports to Latin America countries, which typically import rough

[53] India's export performance of the past four years—an average of 3,179 mmt per calendar year—has been consistently stronger than its mean exports of 567,000 mt per annum from 1989 through 1993. The difference in export volume for the two periods is far less pronounced for Pakistan—1,114 mmt per year for the 1989-1993 period and 1,813 mmt per annum for the 1994-1998 period.

[54] World trade in wheat, for example, is approximately 20 percent of production.

Table 7-1: World Rice Trade as a Proportion of Production, 1980/81 to 1998/99
(million metric tons)

Year	Production in Milled Rice Equivalent	World Trade	World Trade as % of Prod.	Total Use (Consumption)	Ending Stocks	Stocks As % of Cons.
1980/81	270.0	12.7	4.7%	275.0	48.5	17.7%
1981/82	277.9	11.5	4.1%	283.0	43.3	15.3%
1982/83	285.0	11.5	4.0%	284.8	43.6	15.3%
1983/84	306.9	12.1	4.0%	302.6	47.9	15.8%
1984/85	316.7	10.7	3.4%	309.0	55.6	18.0%
1985/86	318.0	11.7	3.7%	319.1	54.4	17.1%
1986/87	316.0	12.8	4.1%	319.8	50.7	15.9%
1987/88	314.6	11.2	3.6%	320.6	44.7	13.9%
1988/89	331.4	13.9	4.2%	327.3	48.8	14.9%
1989/90	343.9	11.7	3.4%	338.2	54.5	16.1%
1990/91	352.0	12.1	3.4%	347.4	59.1	17.0%
1991/92	354.7	14.1	4.0%	356.4	57.5	16.1%
1992/93	355.8	14.9	4.2%	357.9	55.3	15.5%
1993/94	355.6	16.4	4.6%	358.7	52.2	14.6%
1994/95	364.8	21.0	5.8%	366.9	50.1	13.7%
1995/96	371.2	19.6	5.3%	371.2	50.1	13.5%
1996/97	380.2	18.9	5.0%	379.2	51.2	13.5%
1997/98	385.4	23.9	5.8%	383.7	52.8	13.8%
1998/99[1]	378.0	21.7	5.3%	384.2	45.7	11.9%
1999[2]	390.0	22.0	5.6%	390.0	44.4	11.4%

Source: *World Grain Situation and Outlook*, Foreign Agricultural Service, USDA through 1998/99. Projections for 1999 are from the University of Arkansas Global Rice Model, *Current Outlook*, March 1999.

Notes: Stocks, exports, and consumption are expressed on a milled basis in marketing years. Trade is expressed on a milled rice basis in calendar years. Stocks as a percent of consumption represent the ratio of marketing year ending stocks to total use. Trade statistics include intra-EU trade.
[1]1998/99 statistics are forecasts as of March 1999. The world trade figure of 21.7 mmt is for calendar year (CY) 1999, while CY 1998 trade is reported as a record 27.65 mmt. [2]1999 statistics are preliminary forecasts.

rice and do their own milling, and where the consumer preference is for long grain rice. *Japonica*, or medium/short grain, which accounts for less than 15 percent of world rice trade, is produced in China, Japan, Korea, Taiwan, Brazil, Australia, Spain, Italy, Egypt, and in California in the United States. The major exporters of *japonica* are Australia, China, Italy and the United States, which supply Japan, South Korea, and the Middle East, where this type of sticky rice is preferred. The quality standards in Japan and South Korea are very high, and imports have begun only in recent years, mostly due to the (UR-GATT) agreement to open up

their markets. The target for *japonica* imports for Japan and Korea under UR-GATT is one million mt by 2007. The two other types of rice, aromatic (a long grain rice with an aroma) and glutinous (also known as waxy, a sticky dessert rice), are minor, although jasmine and basmati are aromatic rices that are growing in demand and are very profitable because of the high prices they command as specialty products in the market. Thailand supplies most of the jasmine rice, while India is the largest exporter of basmati, with Pakistan the second supplier (basmati is now about one-third of Pakistan's total rice production).

The stratification among importing countries with respect to type and quality of rice consumed is significant enough to add to price volatility, as consumers will not easily shift from one type of rice to another in response to price changes. When long grain prices are higher than medium grain, consumers will not automatically switch to either a lower priced *japonica* or a lower quality *indica*. The price spread in the U.S. between long grain, medium grain, and parboiled rice has varied from year to year depending on weather conditions and marketing trends in supplying and buying countries. In the U.S. market, size is a critical factor and rice is sold as long grain (*indica*) and medium grain (*japonica*). However, the distinctions become less clear in the non-U.S. rice trade where size is not as critical as the type of rice, so there is demand for long-grain *japonicas* and medium-grain *indicas*. While there is some substitutability among different rice types, strong consumer tastes and preferences make demand for rice relatively price inelastic. In a year such as 1998, when the price of high quality long grain was high relative to other types of rice, consumers did not automatically shift to medium grain rice.[55] With less than perfect substitutability between medium and long grain, price response is weak. There is more substitutability for rice used in processed foods and beer brewing, since grain size and appearance are not as important.

Changing consumer preferences are affecting markets. For example, there is increasing demand for long grain rice in southern European countries over medium and short grain. Origin can be an important factor for consumers, even in choosing within the same rice type. Some exporters in Egypt expressed frustration that consumers in some Middle Eastern countries were shifting to U.S. Calrose over the same grade of Egyptian camolina. The U.S. rice has a certain cachet.[56]

Some countries such as Nigeria prefer parboiled rice, which requires a special milling process.[57]

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[55] As of March 1999, long grain rice prices were declining and medium grain prices had strengthened. U.S. medium grain rice prices were as high as they had been since the late 1970s and early 1980s, due to tight supplies and large early 1998/99 season sales to Japan.

[56] In addition to positive brand recognition, U.S. rice producers have a good reputation as reliable year-round suppliers of a consistently high quality product that meets standards of cleanliness (no foreign matter), good packaging/bagging, and correct moisture content.

[57] Parboiled rice undergoes a steam pressure process prior to milling which softens the kernel. Then the water is drained, the kernels steam dried, and the dried rice sent through machines to remove the hull and polish the kernels with bran layers still intact. For regular milled white rice, the hull and bran layers are removed in the milling process, then the kernel goes through a polishing machine, resulting in a white kernel. Brown rice is only passed through sheller machines to remove the hull, which produces the brown kernel.

In many poor and middle income countries, low grades are sold, at very discounted prices compared to higher grades, to poor consumers who typically do a final cleaning and sorting at the household. Price spreads can be substantial; prices in March 1999 are $202/mt for long-grain Thai 100% brokens and $275/mt for long-grain Thai Grade B 100% no brokens (both fob Bangkok), compared with high-quality U.S. long-grain at $369/mt (fob Houston). On the high end, there are specialty rices such as organic browns, basmati, and some *japonicas* that obtain high price premiums. One offer from a California producer of a specialty *japonica* for the Japanese market quoted prices of between $1,500 and $1,800/mt fob Sacramento for rice to be air-freighted to Japan in April 1998.

One consistent pattern among rice types is that even though price spreads vary from year to year, the direction of increase or decrease is the same across types, as prices move roughly in parallel (see Table 7-2 and Figure 7-1).[58] In addition to basic taste preferences, rising incomes and population growth affect rice demand, sometimes in positive but also negative ways. For example, rising population growth in high rice-consuming countries that increases demand may be countered by income effects as consumers change their dietary patterns away from rice to meat, fish, and vegetables. This, as well as the moderate population growth of these countries, contributes to the fact that they provide a small but growing market for rice.

7.3 The International Rice Milling Industry

The quality of the milling sector is key to the competitiveness of a country's industry in international markets. In many countries, millers are responsible for the purchasing and storing of paddy (rough) rice, and this is the first step in the quality control process. Moisture levels are important as paddy that is too dry will crack in the milling process and increase the percentage of brokens. Producers must supply quality raw material to the millers, as high quality rice has certain size, grade and color standards. The international market pays a premium for consistency and cleanliness, and while the miller does the cleaning, dehulling, and sorting of rough rice and grading of the milled rice, quality paddy (rough) rice is essential. The miller will process and package finished rice[59], and depending on the market, may be involved in its distribution. There are two basic types of mills, producing regular and parboiled rice.

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[58] Although world prices move roughly together for different types of tradable rice, the degree of correlation varies. Within the Thai export rices, prices are highly correlated (r=0.99 and r=0.97 among high grades and r=0.75 between the highest grade long grain Thai rice, 100% grade B, and 100% broken Thai A1 rice). Over the 1986/87 to 1998/99 period, the correlation between prices of the highest grade Thai long grain and medium grain, California rice is 0.65. Surprisingly, California medium grain rice prices were weakly correlated (r=0.32) with Egyptian export unit values (all grades of *japonica* combined) over the period January 1993 through August 1998. This probably has to do partly with the fact that the Egyptian price data are unit values calculated from trade data, but it may have something to do with the weak link between Egyptian rice prices and world market prices. The Egyptian export prices (unit values) were more highly correlated with five different export grades of Thai long grain rice (r=0.58 to 0.64).

[59] While bulk shipments are not rare, and certainly were more common from the U.S. for rice shipped under the PL-480 program, much of the rice trade is bagged prior to export.

7.4 World Export Trends

As shown in Table 7-3, Thailand is clearly the leading exporting country with 6.2 million mt shipped in 1998, representing 30.8 percent of overall world trade. Thailand competes with the United States in certain high quality long grain rice markets — primarily in the Middle East — and with India, Pakistan, and Vietnam in the low quality, long grain market. Thailand supplies countries in Africa with low-cost, 100 percent brokens, although market growth potential lies with high quality rice (having a low percentage of brokens). Consumers also increasingly demand consistency in color, grade, age, appearance, and size. At the same time, the U.S. is declining as an exporter of milled rice and is shifting to rough (paddy) in the international market. Another trend in the U.S. domestic markets is the increased consumption of rice, especially due to the increased proportion of ethnic Latin and Asian citizens, whose per capita consumption far exceeds the U.S. average,[60] while use in processed foods and beer has flattened. Vietnam's world market share is expanding rapidly and it has claimed the number two position in the world export market for the last three years. A major growth market for the U.S. has been Latin America for rough rice (paddy), which few other countries supply. Increased production in the U.S., due to higher yields, has resulted in lower prices for milled rice and consequently an increase in the exports of long grained varieties.

India exports both premium-priced basmati to higher income countries (in the Middle East, EU and United States) and low quality non-aromatic long grain milled rice to Russia and developing countries in southern Africa and the Middle East. India has high domestic milling and transportation costs, and it faces stiff competition from Vietnam and Pakistan in the low and medium quality markets. Exports from India, anticipated to have reached 3.0 million mt in 1998, are 29 percent below 1995. Even with this decline, India's annual average exports from 1994 to 1998 — at 3.179 mmt per year — were second only to Thailand's exports of 5.671 mmt over that same period. Pakistan's exports approached those of India in volume terms at an estimated 2.0 million mt. While much of its trade is in intermediate and low quality non-aromatic long grain rice, Pakistan is also a major shipper of premium basmati rice. China's rice production continues to grow as the government keeps rice-producing land in rice, and producers benefit from increased yields. Australia, a leading supplier of high quality *japonica* rice to Japan, Papua New Guinea, and the Middle East, is facing limits on the supply of irrigated land and water available for its rice crop, which in turn is expected to restrict its export levels. Burma, once a significant exporter of long grain rice, exported only 50,000 mt in 1998, a figure higher than the previous year's very low volume of 15,000 mt. Burma's problems include lack of quality seed, undeveloped agricultural extension and production technology, and inefficient milling.

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[60] USDA, ERS, *Rice: Situation and Outlook Yearbook*, RCS-1997, December, 1997, p. 9. Total U.S. per capita consumption in 1996/97 for food use is 21.3 lbs (9.9 kgs), twice the amount recorded for 1980 but less than the amount of rice per capita used for brewing beer, 25.4 lbs (11.5 kgs).

Table 7-2: U.S & Thailand FOB Export Prices, 1986/87 to 1998/99

Figure 7-1: U.S. and Thai FOB Export Prices for Various Rice Types, 1986/87 to 1998/99

Table 7-3 World Rice Trade: Exports and Imports of Selected Countries

7.5 World Import Trends

Weather conditions influenced world imports significantly in 1998, as drought conditions forced Indonesia, the Phillippines, and Brazil to increase their purchases compared with 1997. North Korea suffered severe drought affecting its domestic production and supply, but it cannot afford imports and must rely on international food aid. It is expected to import 250,000 mt in 1998.[61] Indonesia was the leading importer in 1998 at an estimated 5.7 million mt.[62] In the 1980s, Indonesia implemented a rice self-sufficiency program but growing consumption and decreasing profitability, combined with weather difficulties, have made Indonesia the largest importer of rice. According to USDA baseline projections, the Philippines is expected to increase imports by 50 percent between 1997 and 2007, as local production does not meet consumption needs. Estimated imports in 1998 were 2.0 mmt—a record high—and are forecast to drop to 900,000 mt in 1999.

A growing market for high quality rice is the wealthier countries of the Middle East, which were projected to import 3.4 million tons in 1998. These countries are now the world's largest market for high quality rice, especially parboiled premium long grain varieties, basmati, and medium grain. This market will have steady growth due to strong per capita income growth, increasing population, and stable or rising consumption levels. The EU imports high quality long grain from the United States, although the Mediterranean countries of southern Europe import medium grain basmati from India and Pakistan.

The dynamics of the rice trade in Asia are affected by trade policies and agreements. China — once self-sufficient in rice production — while nominally a net importer, is a major exporter of low quality rice for Africa and the Middle East. China imports a high quality long grain rice for domestic consumption. Japan and South Korea — both consumers of medium grain *japonica* — have been required to open up their import markets to rice in order to meet the UR-GATT minimum access import criteria. South Korea purchases rice primarily from China, Thailand, and India, while Japan is purchasing its import requirement from the U.S. Bangladesh imported 100,000 tons in 1998, primarily parboiled rice, because of increased demand from population growth, as production has not kept up with consumption levels. Sub-Saharan Africa as a region will import 3.1 million tons. Consumers there, especially in West Africa, prefer low-cost 100 percent Thai brokens, which can be rolled by hand into a sticky ball for eating. Africa will continue to import significant quantities of rice as production is stagnant due to low yields.

A trend-setting market for rice is Latin America, which has become a major buyer of rough rice from the U.S. Part of the reason for this is that the Latin American countries have some

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[61] North Korea's imports were modest from 1989 to 1993, averaging 70,000 mt a year. Imports soared to 683,000 mt in 1994 and have remained in the 250-350,000 mt range per year since 1994.

[62] Indonesia approached the GOE about importing 400,000 mt of Egyptian rice in the fall of 1998. However, no government to government deal has ever been consummated. Millers and exporters familiar with the discussions said that the Indonesians requested that Egypt supply *japonica* rice cheaply with a high proportion of brokens (25-35%), well above what Egyptian commercial mills typically are set up to produce.

overcapacity in milling. Furthermore, these countries prefer rough rice, because they want to mill rice according to their own specifications. Total imports were projected to reach 2.7 million tons in 1998, an increase due to rising populations and steady income growth. Most imports are high quality although if prices increase, consumers will shift to intermediate and low quality rice. Brazil, once erratic in the market, is now a regular importer, and is projected to have imported 1.2 million mt in 1998.

7.6 The Market for Egyptian Rice

The most important markets for Egyptian rice traditionally are the Middle Eastern countries of Jordan, Syria, Turkey, Libya, and Saudi Arabia. However, several important marketing changes have occurred affecting Egypt's position in the world market. First, there is increasing consumer demand for high quality U.S. medium grain rice, and importers are adding paraffin oil to make *camolino*. Second, Turkey has begun importing and storing paddy for its domestic milling industry, reducing its demand for milled rice. Third, increasing demand for intermediate and low quality Egyptian rice from Eastern European and former Soviet Union countries has shifted the sights of Egyptian millers to these new markets. Finally, the multi-year commitment of Japan and South Korea to import minimum quantities of rice — mostly *japonica* — will help bolster world price levels for medium grain.

Syria and Turkey are Egypt's most important markets. Except for a very small quantity (no more than 100 mt), rice is not produced in Syria, which relies on rice imports of between 150,000 and 250,000 mt per year. Imports from Egypt are made by both public agencies and the private sector. The public sector mainly imports from India, Vietnam, and Thailand, while the private sector imports from the United States, Australia and to a lesser extent Thailand, Egypt, and Italy. In 1996/97 and 1997/98, Syria imported 36,855 and 83,483 metric tons respectively from Egypt. Rice from the United States is preferred and totaled 45,000 mt in 1997 and 75,000 mt in 1998.

Turkey is an equally important market for Egypt, but has different purchasing requirements, as it is a rice-producing country with significant milling capacity that has begun importing paddy to keep its mills operating at higher capacities. The bulk of imports remain milled rice, however, and in 1997, Turkey imported 250,000 mt of rice, 175,000 of which came from the U.S. Egypt supplied 49,805 metric tons to Turkey in 1996 (according to CAPMAS calendar year trade data); 1997 figures are not yet available. Egyptian rice exports to Turkey were only 17,307 mt in the 1996/97 marketing season but rebounded to 117,868 mt in the 1997/98 season. As shown in Table 8-2, Egyptian rice exports to Turkey have been quite volatile during the 1990s, swinging from 72,514 mt in 1993/94 to 19,739 mt in 1994/95 and 42,751 mt in 1995/96. Clearly, the competitiveness of Egyptian rice in the Turkish market is affected by its price levels vis-a-vis American medium grain rice and other competing export rices.

One potential market for Egyptian rice may be Saudi Arabia, which in 1998 was projected to import 700,000 mt, a six percent increase from the 659,000 mt imported in 1997. Saudi Arabia does not produce any rice, but there is a rice cleaning and bagging facility located at Jeddah port. The United States is expected to provide 25 percent of 1998 imports, although India remains the dominant supplier with 50-60 percent of the market, especially for basmati rice. Note that Egyptian exports of rice to Saudi Arabia have been modest throughout the 1990s, averaging only

3,333 mt per annum during eight marketing seasons of this decade.

Two other important export markets for Egypt have been Jordan and Libya. As shown in Table 8-2, their imports of Egyptian rice have varied significantly from year to year. Jordan imported 28,091 mt of Egyptian rice in 1997/98, up from 8,375 mt in 1996/97 but well below the record level of 61,500 mt in 1995/96. Libya was an important customer in 1997/98, importing 15,000 mt of Egyptian rice. This contrasted sharply with no imports in 1996/97 and imports of over 21,000 mt in 1994/95 and 1995/96.

Finally, the Eastern European market of Romania was the third largest importer of Egyptian rice in 1997/98, importing 49,321 mt (some of it cargo, which is further processed in Romania). Egypt shipped an average of 45,206 mt per year to Romania over the past three marketing seasons, greater than exports to Jordan (which averaged 32,655 mt) and Libya (12,133 mt), but less than Syria (58,737 mt) and Turkey (59,309 mt).

8. EGYPTIAN RICE EXPORTS

With the liberalization of markets in the 1990s, rice production for both domestic and export markets has increased. This has been driven in part by the introduction of a private commercial milling industry that has expanded greatly since 1995 (see chapter 9). Policy reforms implemented in the early 1990s under APCP eliminated mandatory procurement, post-harvest milling and transportation restrictions, and the public sector monopoly on rice exports. Hence, the dramatic increases in rice area planted and outputduring the 1990s can be seen in large part as a lagged response to significant APCP reforms.

Restrictions on rice area planted, if effectively enforced, will affect national production negatively, which could reduce the surplus for export, despite rice's high private profitability.[63] Domestic rice consumption will also continue to rise, if only due to population increases.

8.1 Trends in Egyptian Exports

Although Egyptian rice exports fell within the 128,000 to 176,000 mt range for five years during the 1990s, exports have been significantly higher in 1993/94, 1995/96 and 1997/98. Exports to Turkey and the NIS/Eastern European countries have increased strongly, particularly during those three years of higher export volume. Average rice exports have generally been higher in the 1990s (at 219,345 mt per year) than during the 1980s, when they exceeded 100,000 mt in only two years and averaged 55,774 mt/year from 1981/82 to 1989/90 (see Table 8-1). During the 1990s, the variability in the magnitude of exports implies that Egypt has been an uncertain supplier, from which other countries buy when Egyptian export prices for rice are competitive vis-a-vis other suppliers.

Rice exports in the APRP base year of 1996/97 were 167,296 mt, representing a 53 percent drop from 1995/96, when 355,229 mt were shipped. Rice exports rebounded in 1997/98 to 408,193 mt, the highest recorded level since calendar year 1973, for which CAPMAS reported exports of 429,000 mt.

The base year of 1996/97 appears by all counts to have been an anomaly. Domestic paddy prices were bid up by a large number of rice traders, many of whom are alleged to have been

[63] MPWWR fines on some rice producers, who exceed area allowed or grow paddy in areas that are not designated for rice cultivation, will help to bring the private profitability of rice more in line with its social profitability. A final, somewhat offsetting, factor to keep in mind is the water-saving potential of new rice varieties that are shorter season, high-yielding varieties. Reduced planting of Giza 171, a 155 day variety grown on 45 percent of total rice area cultivated in 1997, and increased plantings of shorter season varieties such as Giza 177 and 178, and Sakha 101 and 102, will shorten the rice growing season by 20 to 35 days (see section 2), reduce the number of required irrigations, and economize on scarce Nile River water.

Table 8-1: Exports of Egyptian Rice by Region, 1981/82 to 1997/98

part-timers and non-professionals.[64] Wholesale and retail prices for milled rice were also high. The import tariff of 20 percent (plus sales tax and other import-related fees) has discouraged imports. Export volume in 1996/97 was dampened by high paddy procurement prices, squeezing export margins.

Many observers think that a lot of paddy purchased after the 1996 harvest was held by rice traders at the village level. Estimates of carryover from the 1996/97 marketing season to 1997/98, based on approximate calculations using aggregate data, ranged from 250,000 to over one million mt (see section 4.4). No one in Egypt has empirically based estimates of paddy stored on the farm or rice stored in private warehouses. It is also alleged that much of the paddy sold at the beginning of the 1997/98 marketing season was carryover from 1996/97. According to some sources, the Holding Company purchased much of the 517,600 mt of paddy supplied to the public mills from the previous year's stocks. Unfortunately, MVE was not able to verify this.

It is important to note, however, that paddy and milled rice prices declined in 1997/98 relative to 1996/97 (see chapter 6). Although tariff rates have not changed, and rice imports remain insignificant, the 1997 summer crop harvest of 5.42 mmt was the largest ever in Egypt. Paddy was plentiful and more rice became available for export at prices that allowed millers and exporters to obtain positive returns, although many have complained of competitive pressure in procuring and milling paddy domestically, as well as in selling on the export market.

Given the unusual characteristics of the baseline year, 1996/97, MVE will take a three-year average for export volume. Hence, baseline period exports are 310,239 mt, of which 59,309 (19.1%) were shipped to Turkey, 58,737 (18.9%) to Syria, 45,206 mt (14.6%) to Romania, and 32,655 (10.5%) to Jordan, and 17,986 mt (5.8%) to Sudan. Shipments to the five largest export destinations totaled 213,894 mt or 68.9 percent of average exports over the three year period.

Based on APRP policy reforms and related changes, MVE anticipates that rice export volume may actually decline by the endline year. A number of APRP policy benchmarks are aimed at reducing rice area cultivated in order to conserve water for new lands (Sinai, Toshka). Independent of this, rice consumption continues to rise in Egypt, lowering national marketing surplus available for export. Furthermore, the international market, particularly the regional Mediterranean market and the Arab countries, has become an increasingly competitive market for Egypt, contested by the United States and Australia, which have aggressively promoted rice exports to the region. The combined impact of these factors should be to lower rice exports over a two- or three-year endline period (1999/2000 to 2000/01, or 1999/2000 to 2001/02).

[64] Some of the anecdotes about participants in the rice trade border on the absurd. One official claims that doctors in Kafr el Sheikh left hospitals to enter the paddy trading business. Some even purport that celebrities bought and sold paddy. School teachers are also reported to have been among the participants.

Table 8-2: Egyptian Rice Exports by Country, 1990/91 to 1997/98

Table 8-3: Egyptian Rice Exports by Destination Region and Relative Regional Shares

8.2 Principal Markets for Egyptian Rice Exports

As shown in Tables 8-2 and 8-3, the largest major single market for Egyptian rice is now Turkey. Over the past five marketing years (1993/94 to 1997/98), Egyptian exporters have shipped an average of 54,036 mt per year, with a record 117,868 mt shipped in 1997/98. Exports to Arab countries have trended downward in percentage terms from 1993/94, when 50.7% of Egypt's rice exports were shipped there. This proportion declined to 37.8% in 1996/97 and 37.0% in 1997/98. A disturbing subcomponent of this overall trend is the decline in Egyptian rice exports to wealthy Arab countries (see Arab 2) since 1994/95 and 1995/96, when an average of 28,057 mt was shipped per year. Exports to these countries had decreased to 6,006 mt in 1996/97 before rebounding to 26,620 mt (including 5,000 mt shipped to Iraq) in 1997/98.

Exports to NIS and Eastern European countries have varied significantly from one year to the next, but the former Soviet bloc is an important market for Egypt, taking a five-year high 42.5% of rice exports from Egypt in 1996/97. These countries have been an important market for Egypt since the 1980s, though rice exports dipped at the end of the 1980s and early 1990s. Western European countries have been a minor market for Egypt since 1993/94, when 21,513 mt were shipped, which was well below the five-year average of 45,409 mt from 1986/87 to 1990/91.[65] African countries, defined to include Tunisia and Morocco (but not Libya), have been a secondary market for Egyptian rice, taking an average of 19,520 mt per annum from 1995/96 to 1997/98. Note that 92.1% of Egypt's rice shipments to Africa have gone to Sudan over this three-year period. Asia, Israel and other markets are minor ones.

As noted above, the wealthier Arab countries have bought less Egyptian rice over the past five years, a disturbing sign. Western European countries have also imported less since 1992/93 and 1993/94, when they imported an average of 22,744 mt of Egyptian rice, buying an average of 7,631 mt a year during the past four years. Spain has been the largest volume importer of Egyptian rice, importing 8,201 mt in 1995/96 and 7,994 mt in 1997/98. The Eastern European and CIS countries have resurged as a market, and a number of exporters have taken advantage of this by shipping grade 2 or 3 milled rice and cargo rice to these countries.

8.3 Composition and Concentration of Exports

As shown in Table 8-4, the share of the public sector rice exporters has declined over time, from 86.3 percent in 1991/92, to 48.1 percent in 1993/94, and to only 6.4 percent in 1996/97. In 1997/98, the public sector share increased to 12.2 percent. Clearly, the private sector is well established and will continue to export the majority of the rice shipped from Egypt. Public sector trading companies, which exported the bulk of the rice in the early 1990s, have

[65] Spain was the principal export destination for Egyptian rice in Western Europe in 1993/94 (13,410 mt or 62%), 1995/96 (8,201 mt or 48%), and 1997/98 (7,994 mt or 77%). One miller reported exporting some 11,000 mt of paddy to Spain in 1997/98, which is equivalent to 7,370 mt of milled rice using a 67% conversion ratio. While the exports were in the form of paddy or rough rice, MTS appears to have reported the data in milled rice equivalent terms.

Table 8-4: Breakdown of Rice Exports by Private & Public Exporters, 1991/92-1997/98

struggled in recent years. The GOE has announced its intention to privatize these companies, but they will probably prove to be as difficult or more difficult to privatize than the public sector cotton trading companies. Barriers to entry into international trading are not high; knowledge of different foreign markets and contacts with prospective buyers are key. Some of the required expertise can be obtained by hiring the talented managers away from public companies. Other private export companies, which are family-owned and -managed enterprises, typically have or place family members in key foreign markets.

During the past four years, a large number of private Egyptian traders have participated in exporting, but most of these ship less than 2,000 mt a year. In 1996/97, 42 private exporters shipped less than 2,000 mt each, while ten shipped 2,000 mt or more, with the top five private exporters capturing 52.6% of total exports by private sector firms. The (top) five-firm concentration ratio for private companies was similarly high in other recent years: 51.0% in 1997/98, 45.4% in 1995/96, and 42.1% in 1994/95. Note that the public sector market share of rice exports was only 12.5% in 1995/96 and 6.4% in 1996/97, though it rebounded to 21.8 percent in 1997/98. During the last two years, only one public company has been a significant exporter—Al Wadi shipping 7,760 mt in 1996/97 and the Rice Marketing Company shipping 30,635 mt in 1997/98. The share of public sector companies in total rice exports is expected to decline further, though the Holding Company for Rice and Flour Mills made a spirited re-entry into the domestic rice market in 1997/98, after a 1996/97 season of minimal participation. In 1997/98, the public rice mills exported some rice directly (34,297 mt, including exports by the Holding Company) and far more (an estimated 145,042 mt) through both public and private export companies.

8.4 Improving Understanding of Egypt's Major Export Markets

Although the MALR/CAAE has begun to produce a periodic rice situation and outlook report, largely using information downloaded from USDA internet sites, this information alone does not constitute timely and in-depth market intelligence. Egyptian exporters, millers, traders and producers would benefit from such market intelligence, and numerous millers and traders are probably willing to pay for it. A potentially important task of the emerging rice federation should be to provide market intelligence to its members on a fee basis. The federation could consider hiring an analyst who would designate his time to compiling and analyzing available data on important markets for Egyptian rice, including Turkey, Syria, Jordan, Saudi Arabia, Libya, Lebanon, and selected Eastern European and NIS countries. The federation might also be interested in monitoring and better understanding rice consumption patterns and preferences of different groups of consumers in current and potential markets. A public agency such as MALR/CAAE is better tasked with providing timely paddy area and production estimates, collecting and reporting producer and wholesale paddy price data, and incorporating available MTS/GOCEI statistics on the volume of rice exports to different destinations in its analyses.

9. EGYPT'S RICE MILLING INDUSTRY

9.1 Introduction

The growth in private commercial mills has flourished with liberalization, with many of the commercial mills starting up since 1995 on investments ranging from less than LE 50,000, for small Chinese mills, to more than LE 4 million, for mills equipped with Japanese or European machinery. There is a gradient of sizes of commercial mills, ranging from small mills operating at 10-15 mt per day to larger mills with as much as 150-200 mt/day capacity. The larger mills sell for both the domestic and export markets, depending on what commercial relationships they have developed with exporters. While most of the commercial mills only process rice, the exporters are diversified into other agricultural products, both dry and produce. One exporter emphasized that he is forced to trade in other products because of uncertainties he faces in the rice market, largely due to competition from the public sector, which does not have to account for the real costs of its operations. Another exporter claimed that he faces uncertainty due to inaccurate data estimates for production of rice.

While public mills are mentioned as a problem because of overcapacity, no private millers reported any restrictions on milling or trade. One private miller suggested that the Cereals Chamber should advise businesses not to enter into rice milling. All the exporters and millers (both public and private) expressed concern over world market conditions in 1997/98, that is, low prices and intense competition, making margins on milling and trading in rice very low. Many accused other countries of unfair subsidies, price fixing, and non-tariff barriers (EU does not allow imports during the summer, claiming insect infestation), but no one had specific details or documentation on the actual mechanics or economics of such practices.

9.2 Regional Distribution of Rice Mills

The distribution of small village rice mills and commercial mills reflects the regional distribution of rice production, as one would hypothesize ex ante. Investment in new commercial mills has also been concentrated in the Delta producing zones. There has been some investment near the major domestic markets, namely Cairo and Alexandria, where approximately one third of Egypt's consumers are concentrated. These investments near Cairo and Alexandria are concentrated in industrial cities, such as 6th of October and Borg el Arab, where land is cheap and tax and investment incentives have been offered. Nevertheless, the vast majority of commercial rice mills are found in the rice-producing areas of Lower Egypt.

Tables 5-2 and A-7 and A-8 in the Annex show the regional distribution of village rice mills. According to the HC-RFM survey (see Table 5-2), nearly one third (31.4%) of the mills are located in Dakhalia and another fifth (21.9%) in Sharkia; over half (53.3%) of the mills are found in these two key rice-producing governorates. The tables in the Annex show a similar concentration of village mills in major rice-growing governorates.

Table 9-1 summarizes the geographic distribution of 211 private sector commercial mills, most of which have been registered with the Rice Branch of the Cereals Industry Chamber, as well as

eight public sector milling companies and five cooperative mills.[66] The pattern of mill distribution parallels rice production distribution closely. In fact, there are very high

Table 9-1: Regional Distribution of Private Sector Commercial Rice Mills from the MVE Sample Frame, December 1998

Governorate	Total Paddy Prod., 1997 (mt)	Population in 1996[1]	Priv. Mills	Publ. Mills[3]	Coop Mills	Est. Priv. Capacity[4] (mt/day)	Est. Tot. Capacity[4] (mt/day)
Beheira	902,202	3,981,209	35	1 (5)	2	1325	2080
Dakhalia	1,658,171	4,223,655	42	1 (5)	0	1975	2702
Kafr el Sheikh	914,434	2,222,920	51	1 (3)	1	1673	2483
Sharkia	879,253	4,287,848	35	1 (4)	1	1100	1674
Four Largest Prod. Gov.	4,381,060	14,715,632	163	4 (17)	4	6073	8939
Damietta	237,232	914,614	13	1 (6)	0	383	852
Fayoum/B.S.[2]	110,478	3,850,061	2	0	0	75	75
Gharbia	534,056	3,404,827	13	1 (4)	1	368	1016
Qalubeya	76,913	3,302,860	6	0	0	295	295
Metropolitan	12,390	14,897,540	6	2 (10)	0	570	1624
Other	156,669	18,186,848	8	0	0	195	195
TOTAL	5,483,795	59,272,382	211	8 (37)	5	14032	12,996

Sources: Production data from MALR; population estimates for CAPMAS; no. and capacity of rice mills from the Rice Branch of the Cereals Industry Federation, private sources, and the MVE survey of commercial rice mills of late 1998.

Notes: 1) Population estimates are for actual residents in Egypt and reported from the national census of 1996. 2) One mill listed under Fayoum is located in Beni-Suef. 3) For public sector mills, the number outside of parantheses is the number of rice milling companies, while the number inside the parantheses is the number of rice mills operated up through 1997/98 by the public sector companies. 4) Capacity is stated as paddy throughput.

correlations between paddy production and private sector commercial rice milling capacity (r=0.92) and the number of private sector mills per governorate (r=0.84). Note that 24.8 percent

[66] Our list also includes five additional mills that appear in the KOMPASS *Directory of Industry and Commerce of Egypt, 1996-97*, 26 mills noted by exporters, and 46 mills noted by other millers or identified by MVE staff.

of national private sector capacity is found in Dakhalia, the leading paddy producing governorate; shares for Kafr El Sheikh, Beheira and Sharkeya are 21.0, 16.6, and 13.8 percent respectively. Therefore, 76.3 percent of national private sector capacity is located in the top four rice producing governorates, where 79.9% of paddy production takes place. There is also significant total milling capacity, 1624 mt/day, in the Metropolitan governorates of Alexandria, Giza and Cairo. Sixty-five percent of this capacity (1,054 mt/day) is found, however, in two public sector mills in Alexandria (Alexandria and Rashid Rice Milling Companies).

9.3 Investment in Commercial Rice Mills Over Time

The total capacity of the known private sector commercial rice mills is 7,959 mt/day.[67] Assuming 190 operating days a year (see section 5.1), this capacity equals 1.512 mmt per annum. This is close to the capacity of the public sector mills, which is 1.65 mmt a year, assuming 221 working days.[68] As shown in Table 9-2, the commercial capacity came on line in several concentrated periods. Nearly sixty percent (59.5%) of private commercial milling capacity came on stream in 1995 and 1996. Other periods of concentrated private sector investment were 1990-91 (one-sixth of capacity) and 1997-98 (12.1 percent of capacity), although private investment in commercial rice milling slowed down in 1997-98 relative to 1995/96. The vast majority of private sector investment following rice market liberalization, particularly from 1995 to 1997, is a remarkable achievement in a short period of time. Rice Branch officials and private millers state that additional milling capacity is coming on stream every month. Although the rate of investment may have slowed down, investment is still vigorous in light of the widespread perception by industry insiders and analysts that national capacity is now excessive.

The massive investment in 1995-1997 is a lagged response to the early 1990s liberalization of the domestic rice trading and export businesses and the declining procurement of paddy by the public sector mills that began in the early 1990s and became quite pronounced by 1993/94. The coming-on-stream of this significant capacity in 1995-96 may also be a factor that drove in part the frantic buying of paddy and bidding up of its price during the 1996/97 rice marketing season. These new mills likely competed vigorously for paddy to process. The record harvest of 1997 and the reported sale of large stocks of 1996 paddy early in the 1997/98 marketing season dampened prices and hyper-competition among the mills. In the

[67] Our enumeration of commercial rice mills revealed 29 additional mills that are not members of the Cereals Industry Chamber, Rice Branch. These were reported to us by industry sources. Since our survey of the milling industry was not exhaustive, there is doubtless other private sector commercial capacity that was not reported.

[68] If capacity of private commercial mills is calculated assuming 221 working days, total commercial milling capacity equals 1.76 mmt, exceeding public sector milling capacity by 7 percent.

Table 9-2: Timing of Investment in Private Sector Commercial Rice Milling Capacity (MVE List Frame Only)

Year of Investment	No. of New Mills	Capacity (mt)	Cumulative Capacity (mt)	Cumulative Capacity as % of 1998 Total Capacity
Before 1980	5	160	160	2.5%
1980-1989	4	165	325	5.1%
1990-1991	34	1029	1354	21.3%
1992-1994	15	448	1802	28.3%
1995-1996	88	3785	5587	87.9%
1997-1998	48	770	6357	100.0%
Total	194	6357		

Source: Rice Branch, Cereals Industry Chamber, various industry sources, MVE survey of late 1998.
Notes: MVE obtained the start-up date of 194 of 211 private commercial mills in its enumeration.

future, smaller rice crops could lead to a situation of intense competition for limited paddy stocks. Smaller and/or less efficient mills might find their margins squeezed, their throughput diminished, and ability to survive in an ultra-competitive market environment limited. What appears to be excessive private sector investment in rice milling during the 1990s could lead to an industry shakeout that forces less efficient mills out of business in the future.

9.4 How Many Commercial Rice Mills Are There?

Note that MVE's list frame understates the total number of commercial rice mills in Egypt. Most industry observers are convinced that there are well over 211 commercial mills, although the only other known enumeration was carried out by MALR/CAAE in 1998 and cited in the recent APRP/RDI study by Krenz et al. (1999). This enumeration of 178 commercial mills, when compared governorate by governorate with MVE's listing in Table 9-3, does not match up closely. The two sets of estimates for five of seven governorates are far apart. If the larger of the two sets of estimates is taken for each governorate, we arrive at a total of 234 mills, to which 20 other mills (in governorates outside the seven rice producing ones) enumerated by MVE can be added for a grand total of 254 mills. Krenz et al. argue that the MVE estimate of 211 mills should be inflated by 50-100 percent to arrive at a more plausible estimate of commercial mill numbers. These analysts choose 350 mills as a realistic estimate. MVE believes that this estimate may be slightly on the high side, because MVE asked millers in a November-December 1998 survey to name other commercial mills in their governorates (i.e., competitors). The current MVE list frame includes additional mills identified by the survey participants that were not duplicative of mills already appearing on the list. MVE places the number of commercial mills in 1998/99 at approximately 300, though this could reach 350 units within a couple years if current millers and new investors continue to expand capacity.

Table 9-3: Comparing MVE and MALR/CAAE Estimates of Commercial Mills in Major Rice Producing Governorates

Governorate	Beheira	Dakhalia	Kafr el Sheikh	Sharkia	Gharbeya	Damietta	Fayoum	Total
MVE	35	42	51	35	13	13	2	191
CAAE	37	22	37	13	43	24	2	178
Difference	-2	20	14	23	-30	-11	0	13
Larger Estimate	37	42	51	35	43	24	2	234

Source: MALR/CAAE estimates are from Krenz et al., 1999.
Notes: Difference = MVE - CAAE. Larger Estimate takes the larger of the two series of estimates as the "best estimate" of the number of commercial rice mills. CAAE estimates for Gharbeya and Damietta are the most out of line with MVE estimates and may be exaggerated. MVE has identified 20 other commercial mills in governorates other than those appearing in the table.

Whatever the true number of commercial mills, it is clear that private investment has been vigorous since 1995. Krenz et al. (1999) point out that the new commercial mills that have come on stream have in good part displaced the small village mills in many production areas. Producers continue to use the village mills, *mawani*, for their own consumption requirements, but the processed volume of these mills has fallen since the boom years of 1991/92 to 1994/95, when *mawani* significantly expanded throughput as the rice market was liberalized and private trade flourished. Private traders used primarily the small village mills to process paddy that they purchased from farmers for processing, in order to sell white rice to domestic urban consumers and private exporters. As noted by Krenz et al. (1999), the estimated annual throughput of the village mills, obtained from sample surveys, fell from 395 mt in 1993/94 (University of Arkansas, 1995) and 572 mt in 1994/95 to 112 mt per mill in 1997/98, as found by Krenz et al. in their survey of 33 village mills in November 1998. They found out that the small village mills do not process much paddy for traders any longer.

9.5 Characteristics of Private Sector Commercial Rice Mills

Based on an enumeration of private sector commercial mills, which relied heavily on the records of the Rice Branch of the Cereals Industry Chamber, MVE learned that most mills produce at least some export grade rice. Earlier studies (University of Arkansas, 1995; Ragaa el Amir et al., 1996) concluded that public sector mills produced export grade rice and private mills produced rice primarily for the domestic market. Eighty-one percent of the commercial mills (144 of 177 respondents) in MVE's initial (June 1988) enumeration are reported to be producing milled rice for both the domestic and export markets. Only 19 percent (33 of 177) are milling rice solely for domestic consumers. Most millers (121 of 144) who produce rice for export, 84 percent, sell their rice through private exporters. Only 16 percent export directly; this seeming low proportion can probably be attributed to the large number of exporters who participate in the

export market.[69] Many newer rice mills use Chinese (and to a lesser extent Korean) machines, which are far less costly than Japanese (Sataki) or Swiss (Buhler) mills. The cost of establishing a Chinese roller mill with capacity of 50 mt/day is reported to be LE 600,000 to one million, far below the cost of investing in Japanese or Swiss technology.

Without a more in-depth survey of commercial mills and their activities, the details of how these mills operate, including the extent of direct purchasing of paddy for milling vs. custom milling for others (wholesale traders and exporters), as well as information on how/to whom milled rice is sold, remain unclear. These issues will be addressed in a forthcoming report on the findings of a survey of commercial rice mills in Egypt (see Holtzman et al., 1999).

9.6 Private Commercial Milling Equipment and Capacity

The private sector commercial milling industry has invested mostly in economical equipment that is Chinese-made (one miller reported Chinese-Korean), installing different models having specified capacities ranging from 40 to 100 mt/day, and with actual operational capacity reported at 10-75 mt/day per production line. Some millers paid LE 120,000 for a small mill (40 mt/day rated capacity) while others invested up to LE 2.0 million (150 mt/day capacity). A few mills supplemented their operation with a Sortex sorter, at an approximate cost of LE 600,000, to produce a better export grade. The most costly milling equipment purchased by some of the largest private commercial mills was either Swiss made (Buhler) or Japanese made (Sataki), typically at a capacity level of 100-200 mt/day. Some of the public sector mills operate with sophisticated technology manufactured by Buhler and Sataki and purchased in the 1980s, but others have hold equipment dating back to the 1960s.

Quality control laboratory equipment is an important component of a modern operation, especially for meeting export standards, which on the food safety side are becoming more stringent throughout the world. One mill had a pilot plant to mill small sample lots for testing purposes. Moisture testing is also important as rice purchased early in the season typically arrives at moisture levels of 17 percent or higher, well above the maximum acceptable level of 14 percent.

The main indicator of technical performance for a mill is the milling rate, which can vary by the variety of paddy rice milled as well as the specifications for milling the final product. In the U.S. the average milling rate is 70 percent. Milling rates typically are lower for higher grades, which accounts for the lower proportion of brokens obtained for a given volume of paddy. Milling paddy to a higher grade also produces more bran, husks and impurities. Preliminary findings from the survey of commercial rice mills in late 1998 show that millers attained higher transformation rates for varieties such as Gizas 171 (66.9%), 172 (66.7%) and 173 (69.2%) in 1998/99 and lower rates for Gizas 176 (62.5%), 177 (57.6%) and 178 (61.7%) and Sakha 101/102 (61.2%). From millers' perspective, Giza 171 is the preferred variety, particularly for export markets.

[69] Most of the exporters ship relatively small volumes (less than 2,500 mt/year). The top five private exporters have shipped from 51.9% to 65.2% of the rice exported by the private sector during the past three marketing seasons.

Milling by-products are an important source of revenue for millers, who sell the bran and hulls (sometimes mixed together) as animal feed. Bran prices ranged from 281 to 341 LE per mt in 1997/98, although a few millers report that prices can be as high as LE 500/mt during periods of short feed supplies. Prices were even higher in 1996/97: LE 337 to 412/mt. Reported prices for bran in early in the 1998/99 milling season (through November 1998) ranged from 225 to 256 LE/mt. Demand for feed is seasonal; prices obtained for bran and hulls increase during time of the year when "green" feed, i.e. berseem, is in short supply. According to one source, bran was sold as animal feed for as much as LE 750/mt in 1996/97 when supplies were tight. At the beginning of the 1998/99 season, millers reported that prices for bran were at a low level compared to recent years and that hulls could not be sold. Millers report that the collapse of the market for hulls is due to an increase in the volume of imported maize used for animal feed. Millers interviewed in November-December 1998 complained of problems in disposing of the large volumes of husks generated by the milling process.

9.7 Commercial Mill Operations, Quality Control and Costs

9.7.1 Mill Operations and Operating Levels

Mills in Egypt typically produce three grades of *camolino*[70] and *natural rice*, with operations starting up in September as the first harvest of paddy rice comes in.[71] The key challenge for a commercial mill is to obtain a steady supply of paddy so it can continuously operate throughout the season, at least until the end of May (in some cases mills operate year round). A typical private commercial mill, operating Chinese-made equipment, can mill 1.5-1.6 mt of paddy per hour and run up to 20 hours/day (with up to four hours for cleaning). If the mill operates an average of 25 days per month, it can produce 500 mt of milled rice per month and 4,500 mt for a nine-month season. Some smaller commercial mills operate at levels well below this capacity, because they have limited working capital to buy paddy and limited storage space, typically outdoors, for paddy. Other smaller millers face irregular electricity supply to run their equipment.

A larger commercial mill of 100-120 mt/day capacity will typically operate two separate milling lines, using two 8-10 hour shifts of workers per day. During the milling season, beginning in September, such a large mill will operate every day until December, when operations continue at a somewhat slower rate, but still no less than 25 days per month for a six-month period between December and May. Millers do continuous maintenance during the milling season, yet shut the mill down for a full month at the end of the season, typically in July or August, for a complete overhaul. The annual throughput of this type of large commercial mill may attain as

[70] Paraffin is added at a rate of 0.5% in order to make *camolino* rice, which is polished and hence shinier and more attractive to Middle Eastern consumers . One miller referred to the Japanese method of making a "pearled" rice, at one time done in Egypt using a combination of talc and glucose.

[71] As new short-season varieties such as Giza 178 and Sakha 101/102 substitute increasingly for longer season varieties such as Giza 171 and 172, the milling season will begin earlier, in mid-August.

much as 19,200 mt per season.[72] The largest mills usually buy large volumes of paddy early in the rice marketing season in order to ensure continuous mill operation for as many months as possible. These larger mills tend to have access to greater financial resources for paddy procurement than the smaller commercial mills. They also have significant storage capacity for paddy, primarily outdoors (where bags are stacked on wooden pallets).

Another characteristic annual cycle of milling operations was reported by a small commercial mill, Chinese made, that operates 18 hours/day during the peak milling season, using two eight-hour shifts per day, with two hours for maintenance. This mill processes 1.0 mt of paddy per hour or 16 mt/day during the month of September, yielding 10 mt of white rice per day. Milling operations are reduced from October through March to an average of 12 mt of paddy per day for 20 days per month, yielding nearly 8 mt of milled rice per day, while in April and May this mill only operates an average of 15 days. The annual milled rice total reaches 1,460 mt.[73] Typically, millers' estimates of annual processed output are somewhat lower than what is calculated from their stated operational levels and paddy throughput by season. Many commercial mills do not have detailed records on their operations. Their stated mill capacities and monthly operating levels are typically overestimated, while downtime for maintenance and repairs are often underestimated.

9.7.2 Rice Milling Costs and Processing Charges

Milling costs vary as a function of the milling technology used, the age and maintenance of the milling equipment, the capacity of the mill (its scale) and actual operating levels, and the quality of the paddy raw material used in processing.[74] MVE's survey of 55 commercial rice mills in November-December 1998 attempted to gather detailed information on milling costs and charges with mixed success; many millers, particularly smaller and medium scale commercial mills, do not keep detailed records or think systematically about costs and their breakdown. Millers' financial management tends to be focused on the bottom line and how the milling enterprise is doing overall, and not on the magnitude (and range) of each individual milling cost component and how some of these cost components might be reduced to enhance competitiveness. This report will only summarize average milling costs for commercial mills, without disaggregating the analysis of cost by mills of different technologies, scale, and operating level (see Holtzman et al., forthcoming 1999). We will also compare milling costs and charges by mill type over time.

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[72] A mill processing 120 mt/day of paddy would produce 80 mt/day x 30 days/month for 3 months (September-November) for 7,200 mt during the peak season. Output for the second six months (December-May) would be 80 mt/day x 25 days/month for 12,000 mt.

[73] This calculation is as follows: September output (30 days @ 10 mt/day with 2 shifts/day = 300 mt) + October-February output (20 days/month @ 8 mt/day * 5 months = 800 mt), and 15 days for March-May (15 days/month @ 8 mt/day * 3 months = 360 mt) for a full season total of 1,460 mt.

[74] The moisture level of paddy is a key variable affect milling costs and the quality of milled rice. Ideally, the moisture content should not exceed 14 percent. In practice, it does—often reaching as high as 18-20 percent—which leads to lower out-turn, as more grains are damaged in processing.

The most thorough and systematic analysis of rice milling costs was done by the University of Arkansas (Wailes et al., 1995) for the 1993/94 season and updated by Ragaa el Amir et al. (1996) for 1994/95. Their mill operating and cost data are summarized in Tables 9-4 and 9-5 and show the highest costs for public sector mills and the lowest costs for village single-pass mills. Average milling costs for private commercial mills were reported as LE 26.6 per mt of milled rice in 1993/94 and LE 29/mt in 1994/95, marginally higher than for village mills (LE 21.8/mt and LE 24/mt respectively. Public rice milling costs are at least double those of private commercial mills—an estimated LE 73.5/mt in 1993/94 and LE 59/mt in 1994/95.

Available and initial estimates of rice milling costs for 1996/97, 1997/98 and 1998/99, summarized in Table 9-6, should be treated with caution and viewed as approximate, based on small samples and informal interviews with millers. Nevertheless, they are instructive and show that milling costs have risen and differ by an increasingly wide margin by mill type. In particular, the differences between milling costs of village mills, commercial mills and public mills have increased over time. This is expected for public mills, whose operating levels have fallen significantly relative to capacity since the early 1990s. Hence, less paddy has been processed over time, relative to high fixed costs (debt servicing, salaried labor, overhead costs). Increases in milling costs for small village mills have been modest, reflecting competitive pressure from commercial mills, many of which came on stream after 1994. The range of milling costs is most likely greatest for commercial mills, whose scale, operating levels, technology and target markets vary more widely than they do for public or small village mills. There appear to be two discernible tiers within the commercial mill category: large commercial mills processing over 50 mt of paddy per day in large part for the export market (and high-end domestic market), and small to medium scale mills operating usually at 10-40 of paddy mt per day and targeting the mass domestic market. The costs of the former tier seem to be higher than the latter group of mills, unless the larger mills are run at very high levels of capacity. Larger mills have larger investment costs to amortize, and their fixed costs tend to be higher.

Quality Control on Exported Rice. Quality control is an increasingly important function for millers and exporters, especially in light of rising standards on international markets. Sortex machinery is found at most large commercial mills, which allows millers to produce higher grade, more homogeneous milled output. Exporters will typically do an initial check at the mill they use for processing paddy, but they may also use an independent international survey company, such as SGS, to conduct a laboratory analysis of samples from mills they buy from to ensure that shipments meet both grade requirements and food safety standards. Finally, the government requires a phyto-sanitary check on all shipments, which is then a final quality control prior to export.

Table 9-4 : Average Operating and Cost Data for Three Types of Egyptian Rice Mills, 1993/94

Item	Village Mills	Commercial Private	Public Mills
Average Capacity	75.6	228.7	2974
Milling Cost (LE/mt)	21.8	26.6	73.5
Milling Yield (%)	68.3	68.5	69.5
Head Yield	78.9	93.6	92.4
Brokens (%)	11.8	5.8	8
Paddy Sales (mt)	18.4	-	-
Milled Rice Sales (mt)	59.2	381.2	15,400
Average Paddy Purchases (mt)	184	702	28,639
Paddy Purchase Price (LE/mt)	409.5	412	418
Paddy Selling Price (LE/mt)	446.5	-	-
White Rice Selling Price (LE/mt)	737.1	717	827
Paddy Received (mt)	393.1	1154	21600
Number Surveyed	101	8	13

Source **:** 1993/94 Rice Mill Survey
Reported in University of Arkansas, **Impact of Agricultural Policy Reforms on Rice Production, Milling, Marketing and Trade in Egypt**, March 1995.

Table 9-5 : Average Operating and Cost Data for Four Types of Egyptian Rice Mills, 1994/95

Item	Small Village Mills	Commercial Private		Public Mills
		Old	New	
Number Surveyed	66	10	8	8
Average Year Established	1972	1970	1993	1969
Average Capacity (mt/mo)	137	138	177	3006
Average Capacity Utilization (%)	50	79	93	72
Paddy Purchases (mt)	571	659	1066	25,988
Average Paddy Purchase Price (LE/mt)	679	545	684	537
Average Milling Rate (%)	66	68	71	69
Average Milling Cost (LE/mt)				
mill only	24	29	29	59
mill and polish	na	na	na	95
Average Milled Rice Sales Price (LE/mt)	1020	989	957	958
Average Milled Rice By Product Price (LE/mt)	199	263	194	292
Average Milling Margin (LE/mt)	38	181	20	154/177

Source : 1994/95 Rice Mill Survey
Reported in Datex Inc., **Analysis of Egypt's Rice Marketing System**, March 1996.

Table 9-6: Milling Costs for Different Types of Mills

(LE/mt of milled rice)

Year	Public Sector Mills	Private Sector Commercial Mills	Village Mills
1993/94	73.5	26.6	21.8 (12-35 range)
1994/95	59 (mill only) 95 (mill & polish)	29	24
1995/96	120-150 (mill & polish)	--	--
1996/97	120-150 (mill & polish)	37.6 (mill only) 54.2 (mill & polish)	
1997/98 (prelim.)	120-150 (mill & polish)	36.8 (mill only) (21-70 range) 54.3 (mill & polish)	25-30 (mean falls within this range)
1998/99 (prelim.)		45.0 (mill only) (25-67 range) 63.1 (mill & polish)	10-35 (range)

Sources: 1) 1993/94, University of Arkansas study. 2) 1994/95, Ragaa el Amir et al.; these estimates are based on surveys of mills done in 1994 and 1995. 3) 1997/98, Holding Company estimate and MVE's structured informal interviews with private millers in May 1997 and May 1998. 4) MVE survey of commercial rice mills, November-December 1998. 5) Krenz et al., 1999 survey of small village mills conducted by MALR/CAAE.

Notes: 1) Commercial milling costs and cost ranges for the last three years were obtained from MVE survey data, Nov.-Dec., 1998. 2) Village milling costs reflect actual charges for custom milling. 3) Polishing costs for commercial mills are for applying paraffin oil to make *camolino* rice only.

9.8 Public Sector Rice Milling

9.8.1 Significant Capacity

The public sector rice mills dominated rice milling in Egypt through the 1980s and produced all of the export-grade milled rice. As noted earlier, the public sector held a majority of the rice milling capacity in Egypt through the end of the 1980s. It was only in 1997 that private sector commercial milling capacity surpassed public sector capacity. Detailed estimates of public sector rice milling capacity and storage by milling company are presented in Table 9-7. This capacity is significant and most of it is usable, and the GOE hopes that public milling companies privatized through ESAs will be able to maintain and utilize this national resource. Over-investment by the private sector in milling capacity, and the generally lower costs of operation per mt of private mills, will make it difficult to retain this once public, but soon-to-be entirely private, capacity.

Table 9-7: Estimated Annual Mill Capacity and Storage Space Available for Public Rice Mills in 1994

9.8.2 Declining Market Share

With liberalization of the rice subsector in the 1990s, particularly after 1991, the market share of the public sector mills has eroded sharply. As shown in Table 9-8, the public sector procured 42 to 50 percent of the total paddy rice crop during the 1980s. This proportion slipped steadily in the early 1990s to 13.8 percent by 1993/94 and fell to only 2.0 percent of the paddy crop by 1996/97. In 1997/98, the Holding Company for Rice and Flour Mills procured substantial loans of 270 million LE with which to procure paddy starting early in the marketing season. By the end of December 1997, the public mills had purchased 517,600 mt of paddy or 9.6 percent of the record 1997 harvest. The public sector mills operated at 31.6 percent of their capacity in 1997/98, a major reversal from 1996/97, when the public mills operated at only 5.9 percent of capacity. The aggressive return of the public sector milling industry to the market led to private sector complaints in 1997/98. Private exporters, who were shipping significant volumes for the public sector milling industry by 1994/95, alleged that public milling and trading companies offered deep discounts to foreign customers in 1997/98. Three public sector milling companies exported directly to foreign customers in 1996/97 (1,198 mt) and 1997/98 (21,201 mt), the Holding Company for Rice and Flour Mills exported 13,096 mt in 1997/98, and public sector trading companies exported 8,341 mt in 1996/97 and 55,042 mt in 1997/98 .[75] In 1997/98, the public sector exported about half of the exports of rice produced by public millers, while private firms exported the other half.

9.8.3 Problems Facing Public Mills

Public sector rice mills suffer from problems of both heavy cumulative debt and excess labor.[76] Table 9-9 summarizes the situation of the public sector rice mills in 1996/97 and 1997/98. Other salient characteristics deserving mention are as follows:

- Eight of 45 public sector rice mills, reported as potentially functional in 1997/97, are not operating.
- The annual cost of labor for the rice milling companies, estimated at LE 54.2 million, is considered by the Holding Company as a fixed cost, but it varies as a function of throughput. With utilization at 1997/98 levels, this cost represents LE 155/mt of milled rice. Note that this represents an overestimate of labor cost per ton, as a certain amount and cost of labor can be attributed to non-rice milling operations (animal feed production, pasta factories).
- MVE figures, obtained from individual mills, show long-term debt of LE 501 million. The Holding Company reports, unofficially, that the debt is over LE 400 million.

The operating costs of the public sector mills are reported to be much higher than those of private sector mills: LE 120-150/mt of milled rice for the former vs. LE 25-67/mt for the

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[75] Note that the main public sector shipper in 1997/98 has been the Rice Marketing Co., which is part of the HC-RFM. This public trader exported 30,635 mt of milled rice in 1997/98.

[76] The public sector rice milling labor force of approximately 10,500 workers is only a fraction — less than five percent — of the number of workers in the public sector textile firms.

Table 9-8: Quantity of Rice Milled and Sold by Public Mills, 1981/82 - 1997/98

Table 9-9: Public Rice Milling Companies: Background Data

Basic Data \ Company	Dakahlia	Damietta & Belkas	Rashid	Gharbia	Alex.	Behira	Kafr El Shiekh	Sharkia	Total
Full capacity (mt of paddy/day)	727	469	520	623	534	650	710	544	4777
Actual utilization, '97/98	83	50	50	88.5	33	58	70	102	534.5
No. of total mills	8	8	6	5	5	5	3	5	45
No. of working mills	5	6	6	4	4	5	3	4	37
No. of stopped mills	3	2	0	1	1	0	0	1	8
No. of workers (as of 01/04/97)	(1050) ↓	(1100) --- 3386----	(1080) ←	2101	1300	1391	1243	1409	10,924
Annual cost of labor (LE million)	6.0	6.2	6.5	13.03	6.99	6.31	6.29	6.54	57.9
Long term debt, mid-1997 (LE million)	70	65	60	86	84	70	60	6	501

Source: Data collected from the interviewed companies and the Holding Company for Rice and Flour Mills.

Notes: a) Actual utilization for 1997/98 are rough estimates which do not correspond exactly to paddy purchases by the public sector. b) No. of workers: the 3,386 workers in the Damietta & Belkas column includes workers in two other "Delta" companies, Dakhalia and Rashid. c) Annual labor cost estimates for the 3,386 workers of the Delta rice mills provided by the Holding Company appear to be too high. Figures obtained from interviews with company chairmen are used instead.

latter in 1998/99. Actual public sector milling costs may be higher, if the Holding Company permitted a thorough accounting of all costs. On account of the large differential in public and private milling costs, the Cabinet resolved in October 1996 to provide rice exporters with a 50% discount on the milling cost of rice obtained from public sector mills. This measure has never been implemented. Private exporters, who have faced greater competition in 1997/98 in export markets from the public sector, claim that public mills and the Holding Company are able to undercut them and sell below cost, because as public entities they can incur debt.[77] They also claim that public mills obtain cheap credit, which was true in 1997/98. As the rice marketing season of 1997 approached, the Holding Company was able to obtain credit from numerous banks at below market rates (averaging 10 percent). Private firms pay 14 percent or higher on loans for working capital.

By 1998/99, the Holding Company and MPE were in the process of privatizing the public sector mills through ESAs. These employee-owned and -managed firms were expected to compete with private sector mills, despite excess labor and burdensome debt. Furthermore, the ESA firms had been operating at well below capacity since 1992/93. With some eight individual plants idled, and probably some other equipment in functional mills operated little or not all, it will be difficult to return to 1980s or early 1990s operating levels anytime soon. Finally, the problem of finance remains primordial. Without access to bank loans for working capital, the former public mills will have difficulty operating at anything approaching an economic level. The once significant public sector capacity risks becoming redundant and being scrapped.

[77] Most public sector companies have a top-line as opposed to bottom-line orientation. Their incentive is to maximize throughput (production and sales/exports), as opposed to profits.

10. RICE SUBSECTOR PERFORMANCE

Performance is a multi-dimensional concept with a number of potential measures. Key dimensions include allocative efficiency, operational efficiency, technical efficiency, progressiveness, employment (especially in the Egyptian context), market coordination, and market responsiveness and competitiveness. These measures or attributes are defined below:

Allocative Efficiency refers to the extent to which an economy, industry or commodity subsystem allocates resources to their highest value uses in production.[78] A resource can be said to be efficiently allocated within an economy, industry or subsystem if it is employed in production or marketing activities that maximize its value product. Excessively high or low domestic commodity prices, relative to world prices, indicate inefficient resource allocation (typically brought about by price and trade policies that drive a wedge between domestic and international price levels). Large commodity stocks or carryover relative to annual requirements, and too much productive capacity at any stage of a subsystem, suggest over-allocation of resources.

Operational Efficiency refers to the extent to which firms in a subsystem minimize costs to produce output (which matches consumer needs and preferences). In an operationally efficient set of firms, prices reflect real economic costs and a modest return. Over time, firms' operating costs approach their long-run average costs of operating. Excessive returns over a few years are usually evidence of monopoly or oligopoly. Individual firms achieve operational efficiency by choosing types and combinations of inputs and a product mix that maximize returns, taking into consideration the costs of the inputs and the prices of alternative outputs.

Technical Efficiency refers to maximizing output per unit(s) of input(s) in an economic engineering sense. In contrast, operational efficiency implies minimal cost/price relations. An input/output combination might be technically efficient but not operationally efficient (as when crop yields are maximized but not economic returns to farmers).

Progressiveness measures the ability of a subsector or industry to identify and adapt suitable technical, management and organizational innovations that enhance productivity. Progressive firms continually seek to upgrade their technology, management practices,

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[78] Productive efficiency has several dimensions. At the individual firm level, firms strive to allocate resources efficiently among the goods that they can produce. Among firms, resources should be allocated so that the marginal physical product of any resource in production of a particular good is the same no matter which firm produces the good. An efficient combination of outputs among firms is achieved when firms producing the same outputs have the same rates of transformation among alternative products (production possibilities). In order to achieve both productive and exchange efficiency, the marginal rate of substitution for any two goods must be equal to the rate of product transformation. In the final analysis, only when the trade-off rates for certain costs and benefits are the same will resources be efficiently allocated among all economic agents. (Paraphrased from *Microeconomic Theory: Basic Principles and Extensions* by Walter Nicholson, 1972).

market intelligence and understanding of consumer requirements, as well as the way they organize themselves to procure inputs, produce (process) outputs, and market what they produce.

Employment is a particularly important performance dimension in Egypt, as the country has a large population on a limited land area, significant unemployment, and many new entrants to the labor market each year.[79] In the Egyptian context, generation of increased employment and choice of labor-intensive production and processing techniques are critical performance norms. Hence, MVE will track changes in employment in the cotton subsector. Broad participation in the production, processing and marketing functions of a commodity subsystem is an important objective, although some subsectors lend themselves more to capital intensive production and processing. A necessary condition of *broad participation* is relative ease of entry into a subsystem, though certain stages of a subsector necessarily require higher levels of investment.

Market Coordination refers to the effectiveness of market participants and coordinating institutions and mechanisms (particularly exchange arrangements) at matching supply and demand at each level of the subsector production/marketing system. Sub-dimensions of coordination include complementary public and private investment and market transparency that promotes efficient exchange. Coordination mechanisms include physical marketplaces, direct marketing, integration (forward or backward) by major subsector participants, contracts, auctions, organizations such as producer groups and industry/trade associations, government programs, and market information.[80]

Market Responsiveness and Competitiveness is similar to progressiveness but goes beyond it in emphasizing how demand drives commodity subsystems. It refers to how effectively firms, a subsector, or an industry track changing domestic and international demand (tastes and preferences), and adjust input and output mix, output quality/grades, and production levels to respond to changing market conditions. *Competitiveness* is the ability of a subsector or industry to exploit a natural comparative advantage by expanding market opportunities, creating new market niches, continually searching out new technology and improved methods of management to enhance productivity, and improving the quality and mix of products (that respond to the requirements of different market segments).

10.1 Allocative Efficiency

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[79] Dr. Akhter Ahmed of the Food Security Research Unit reports that the current Egyptian labor force is 18 million people, defined as "economically active" among the resident population of 60 million inhabitants. To accomodate new entrants to the labor market of some 504,000 people per year (2.8% * 18 million) over the next few years, as well as employ the unemployed backlog of potential workers, the Egyptian economy must generate some 550,000-600,000 jobs per year. The 2.8 percent figure reflects the demographic boom of the 1976 to 1986 period, when population grew at 2.8 percent per annum. This rate dropped to 2.2 percent per year in the 1986-1996 census period.

[80] An excellent discussion of the concept of market (or vertical) coordination is found in *The Organization and Performance of the U.S. Food System* (1986) by Bruce W. Marion and the NC 117 Committee.

Based on the private profitability of rice production compared to cotton and maize, Egyptian farmers have made privately efficient choices to increase area planted to paddy. Placing a low value on irrigation water makes rice the most profitable and preferred summer crop. Although some 85 percent of rice growers (see Greencom's Knowledge, Attitudes, Practice survey findings in El-Zanaty et al., 1998) pump irrigation water from the irrigation canals to their fields, buying pumps and paying for the diesel fuel and maintenance, the irrigation water is made available to them at essentially no charge. Farmers responded to these incentives to grow rice by expanding area cultivated 47.4 percent from 1990 to 1997. In response to fines (or the threat of fines) levied on growers of rice in zones where rice cultivation was not permitted and on farmers who exceeded their rice acreage allotment in 1998, producers reduced area cultivated to paddy by 18.5 percent to an estimated 1.225 million feddans. To a certain extent, these fines (assuming they are systematically levied) are moving the (high) private profitability of rice production more in line with its (lower) social profitability.

Producers faced relatively low prices for their output of paddy, seed cotton and maize following the 1998 summer growing season. Farmers have grumbled about low prices, and the MALR Extension Service has heard these complaints and wants input on how to advise producers about their cropping options during the next summer season. While winter crop rotations do determine to a considerable extent how much land will be planted to different summer field crops, groups of farmers in villages have some discretion at the margin. How producers allocate their acreage to different 1999 summer crops will be interesting to see and is difficult to predict. If rice area stays at 1.225 million feddans or drops even lower, the GOE will have achieved at least a partial victory. In this case, however, government fiat and the implicit threat of fines will have achieved what markets and farmer freedom to choose their cropping pattern have failed to achieve. Put more positively, the GOE social welfare function has substituted for an imperfect set of incentives facing producers, where the high private profitability of particular crops does not reflect the social value of the most critical input, irrigation water (on scarce irrigated land).

The high estimates of paddy carryover from the 1997/98 marketing season to 1998/99, ranging from 250,000 mt to one million mt, suggest that Egyptian farmers are over-producing rice and that the agricultural economy is allocatively inefficient. It is important to note, however, that there are no good statistics on paddy stocks and current estimates are probably on the high side. A second excellent export season in 1998/99 would also tend to draw down the level of stocks to more reasonable levels. If the Egyptian rice crop were planted on less than 1.0 million feddans in 1999 or 2000, national production would decline significantly and stocks would be greatly reduced or disappear.

In the baseline year of 1996/97, large numbers of traders bought paddy at prices which got bid up to very high levels relative to international rice prices. These prices reflected speculative pressure and not the underlying fundamentals, which included a large paddy supply (second largest crop of 4.895 mmt in Egyptian history, though this followed a marketing year of heavy exports, 1995/96). The enthusiastic entry of many buyers, which coincided with heavy investments in commercial rice milling capacity, seems to have been a response to the very bullish attitude of many people in the rice business, including rice traders, millers and producers, during the 1990s. Demand was perceived to be growing strongly, a perception reinforced by steadily rising paddy and rice prices, despite the steady

expansion in national paddy output from 1988 on.

The heavy investment in rice mills during the 1990s, which accelerated from 1994 on, was in part a response to the widespread perception that there was serious money to be made in the rice business following market liberalization. Private investors saw the decline in procurement by the public sector mills as a positive sign to enter the rice milling business. Smaller entrepreneurs could enter paddy and white rice trading with significantly less capital (lower entry barriers). Heavy investment in rice mills continues to this day, as excess capacity is coming on line. Many mills will struggle to survive and some will go out of business. This excess capacity and the possible business failure of some millers will lead to loss of some productive capacity. The overly enthusiastic investment in rice mills is evidence of misallocation of scarce financial and entrepreneurial resources in Egypt. The extent of this misallocation may be shown to be acute if paddy production drops significantly and a large number of mills are competing to buy limited paddy to mill. Note, however, that capitalism is, as Schumpeter has noted, both a creative and a destructive force. Open market economies have their excesses, as is evident when too many resources get allocated to a particular industry or type of enterprise, leading to excess capacity and the failure of some firms. After some years, however, milling capacity will be more in line with adjusted (lower) paddy production on a reduced area planted.

Part of the problem in Egypt, which has exacerbated this tendency, is the poor and incomplete information that potential investors have about the agricultural economy. In the rice subsector, production forecasts are not announced on a timely basis. Stocks at different levels of the marketing system (producer, wholesale trader, miller levels) are unknown, as is the regional distribution of stocks. Export data are made available with only a modest lag (of about one month) and seem to be distributed to some exporters and millers (but not very widely). Paddy procurement and wholesale (into-mill) prices in different production areas, ex-mill wholesale prices, and retail prices are not well known or publicly disseminated. CAPMAS collects and publishes retail rice prices with a several month lag, but paddy prices and into/ex-mill prices are not closely monitored by the GOE. Finally, very little public information is available to millers and exporters about the regional and world markets. Given the paucity of accurate and timely information, investors are bound to make mistakes and their enthusiasm might not be tempered by more realistic assessments based on better information. Overinvestment in rice milling capacity appears to be one such mistake.

Given heavy private sector investment, the GOE has faced difficulties in trying to privatize public sector rice milling companies. By 1996/97, the significant private sector investment in commercial rice mills superseded public milling capacity. In the first half of 1997, the HC-RFM made public announcements calling for bids on several rice milling companies and received low offers that it did not accept. By mid-1998, the MPE declared it would privatize rice mills using Employee Stockholder Associations (ESAs), selling the mills at book value to the workers and managers. Since the public sector mills are saddled with debt, redundant labor, and low working capital reserves, they do not represent attractive privatization prospects. Furthermore, the high value of the land where many of the mills are located is a deterrent to investors who can put up a mill in an industrial city or along one of the desert roads, paying little for the land and receiving lengthy tax holidays. If the public sector mills are not successfully privatized, they will fail and significant high-end milling capacity will be

sold for salvage or put out of production. The uncertainty and delays in privatizing the public sector mills represent strategic errors that ultimately may not be rectifiable. Hence, too little privatization too late will probably render too much public sector high-quality milling capacity redundant and unusable. Employee-owned and -operated mills will have trouble competing with smaller, more efficient private sector mills that have come on stream since liberalization of the subsector.

10.2 Operational Efficiency

Once a policy of liberalizing the rice market in Egypt was announced, the public sector mills began to procure a declining proportion of the paddy crop. Only 96,300 mt of paddy was procured and milled by the public mills in 1996/97, representing gross under-utilization of public milling capacity. Procuring 517,600 mt of paddy in 1997/98, the public mills bought enough paddy (early in the marketing season) to be a force in the rice market. Nevertheless, the public mills have operated for years at well below the capacity needed to operate profitably, let alone break even.

There is evidence that quite a few private sector commercial mills do not operate efficiently, under-utilizing their significant capacity. Two of 55 sample commercial mills, interviewed by MVE in November-December 1998, have not yet milled rice this year and can be considered out of business. Six of the 160 commercial mills registered by the Rice Branch of the Cereals Industry Chamber by June 1998 had recently gone out of business. This rate of business failure of 3.5-4.0 percent per annum is not unusually high, but it will likely surprise many GOE officials and prospective private investors, who view the rice industry as booming and vibrant.

Private commercial mills often state higher operating costs per metric ton of throughput than smaller village mills; this may be due in large part to their lower rates of capacity utilization, though. At high levels of throughput, private commercial mills should be nearly as efficient, charging comparable rates for milling paddy. The reported processing costs of commercial mills have risen from LE 26.6/mt in 1993/94 to LE 45/mt in 1998/99, an increase of 69.2 percent over a five-year period during which the urban CPI rose 44.7 percent and the wholesale price index rose 28.5 percent.[81] The reason for the increase in real milling costs is unknown; it may reflect the heavy investment in new rice milling equipment during the period between 1993/94 and 1998/99 and millers' factoring of those investment costs into their calculations of processing costs.

10.3 Technical Efficiency

This study did not focus on assessing the technical efficiency of rice milling in Egypt. The paddy to milled rice conversion ratios are reasonably high (58-72 percent, depending on the variety). More costly milling equipment is able to obtain higher conversion ratios than less costly equipment. Another variable that affects the conversion ratio is the desired grade as

[81] The increase in the price indices is calculated for calendar years, as opposed to market years, while the milling costs are reported for market years.

reflected by the percentage of brokens. The lower the percentage of brokens desired, according to millers, the less milled rice obtained per ton of paddy input.

The equipment in the public sector mills dates from the mid-1980s to the early 1990s. Although many analysts maintain that this equipment (mainly Buhler and Sataki) is superior to most of the commercial mills that have come on stream since 1991 (which are largely Chinese), it has been operated intermittently during the past 2-3 years. Most of the equipment that is operating is performing sub-optimally, at low levels of output per day and per worker, and with significant down-time (due to limited paddy supplies). The idling of this equipment in the public mills is not good for the machinery, given the amount of dust, sand and dirt found in typical factory sites in Egypt.

10.4 Progressiveness

A progressive industry is driven by consumer demand (tastes and preferences) and the competitive imperative to produce the highest quality goods at the lowest possible cost. The massive private sector investment in rice mills during the past 6-7 years has been driven by the progressive exit of public mills from the industry as well as most Egyptian consumers' preference for medium grade milled rice produced at low cost. Household income constraints dictate that consumers buy mediocre but acceptable rice (with technical specifications barely meeting or not meeting domestic grade standards[82]) of relatively low cost. Highly polished rice with a low percentage of brokens and few impurities and discolored or immature grains is destined for the export market, particularly wealthier Arab countries and Turkey.

The large investment in Chinese mills has corresponded with increasing exports of second and third grade white rice (and some cargo rice) to Eastern European markets. Consumers in Romania, Ukraine, Bulgaria, Moldova and other former COMECON countries prefer *japonica* rice, but their incomes constrain them to buy lower grades.

If the Egyptian rice industry were to compete vigorously in Gulf markets against U.S. and Australian imports, larger private commercial millers with the best equipment would have to take the lead. One costly though indispensable investment appears to be a Sortex machine, which can remove discolored and immature grains, as well as foreign matter from rice coming out of the milling process. The technically best mills have this equipment (or something like it), and they are able to target more demanding markets such as Saudi Arabia, Turkey and Libya (as well as Syria and Jordan).

[82] Quality standards for local rice, expressed as maximum tolerances in percentage terms, are as follows: 15.0% brokens, 0.5% foreign matter, 1.5% red grains, 1.0% yellow grains, 2.5% chalky grains, 0.02% paddy, and 14.0% humidity. See Ouedraogo and Abdel-Rahim Ismail (1997) for a more detailed discussion.

10.5 Employment

The rice subsector is an important source of employment for many people. It is estimated that there are over one million people growing rice. Expansion in private sector rice trading and milling has created jobs for many workers. Employment in public sector rice milling companies remained at slightly over 10,000 workers in 1997/98, well below public sector textile employment.

In 1996/97, farmers planted 1,405,268 feddans to paddy. The MVE producer survey (see Morsy Fawzy et al., 1998) conducted in April-May 1997 showed that 97 producers (of 181 surveyed) planted 401 feddans of paddy, or 4.13 feddans per rice grower. Using this average planted area as a nationally representative figure, an estimated 340,259 producers grew rice in 1996/97. Assuming that farmers planted the same area per farm to paddy in 1997/98, nearly 370,000 producers grew paddy that year.

Krenz et al. (1999) estimate that the 1997/98 labor required to cultivate 1.527 million feddans of paddy was 68.7 million man-days.[83] This is equivalent to 274,935 jobs (assuming a work year of 250 days per person).

MVE obtained data, shown in Annex Table A-14, on employment in the public sector Rice Marketing Company, which is an affiliated company in the RFM-HC. In 1997/98, this company reported 749 permanent workers and 56 seasonal workers for a total of 805 employees. At the 1997/98 export level of 30,635 mt, the Rice Marketing Company exported 38 mt/employee. Assuming a level of one employee per 40 mt exported for the other public trading companies that exported rice in 1997/98,[84] an estimated 938 additional public sector employees participated in rice exporting.[85] MVE also estimates that there were 10,800 workers required to handle and transport paddy and milled rice by truck within Egypt. This figure appears in the private sector column of Table 10-1, as most of it is done by private truckers for private traders or contracted out to private truckers by public companies. Some of this work may be done by public sector employees, including workers already counted under public mills and public sector trading companies.

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[83] Labor requirements to cultivate paddy were obtained from studies done by CAAE, AERI, GTZ (1998) and Krenz et al. (1994) and adjusted by Krenz (1999) for the increasing proportion of the paddy crop harvested by machine.

[84] In 1997/98, seven public sector entities, including the Holding Company, exported 68,138 mt of milled rice (see Table A-12). The Rice Marketing Company (30,635 mt), Al Nasr for Import and Export (14,219 mt), the Holding Company (13,096 mt), and Al Wadi Trading Company (8,850 mt) were the leading public sector exporters. Three public sector milling companies also exported 21,201 mt of rice.

[85] There is clearly redundancy in public sector employment in rice trading and export. Note that Krenz et al. (1999) assume that 375 full-time workers of 52 private exporting companies exported 319,779 mt of milled rice in 1997/98, or 853 mt per full-time equivalent worker. The implicit assumption is that productivity in the private sector is over 21 times greater than the public sector (853 mt of exports per private sector employee vs. 40 mt per public sector employee).

Table 10-1: Employment in the Rice Subsector, 1997/98

Subsector Stage	Private Sector Employment	Percent of Stage	Public Sector Employment	Percent of Stage
Rice Production	274,935	100.0	0	0.0
Paddy Buying [3]	2,166	> 90	?	< 10
Rice Milling	6,527[1]	40.0	9,745[2]	60.0
Rice Trading/Export[4]	800	31.5	1,743	68.5
Domestic Rice Distribution[3]	1,000	> 90	?	< 10
Misc. Transport & Handling[5]	10,832	100.0	?	?
Total	296,233	96.3	> 11,488	3.7

Sources: MVE estimates. Some estimates are taken as is or adapted from Krenz et al. (1999). Other sources include the Holding Company for Rice and Flour Mills, and MVE surveys and interviews.

Notes: 1) The private rice milling estimate includes workers in private commercial mills (3,795), cooperative mills (430), village mills (1,969), and tractor-mounted mills (333). Krenz et al. distinguish between *old* and *new* village mills, where the latter employ 1.9 workers per mill and the former 1.1. Assumptions are: 1) commercial mills = 275 mills * 13.8 workers/mill; 2) village mills = 5,750 mills * 1.37 workers per mill (weighted average of number of workers in old and new village mills, per Krenz et al., 1999); 3) tractor mills = 2,000 mills * 1 worker/mill * 0.167 yr. (2 mos per year).

2) Public rice milling employment of 9,745 includes 9,095 permanent workers and 650 temporary workers in the public mills in late 1998. Not all these workers were employed in rice milling; some worked in other enterprises, such as macaroni plants, animal feed mixing mills, and cattle feedlots, and in overall company administration. Others undoubtedly procured paddy in 1997/98 (when 517,600 mt where bought by the public sector) and worked in domestic milled rice distribution. MVE is not able to disaggregate employment for several of the public sector marketing functions.

3) Private sector paddy buying assumes that each person involved in trading handled 250 mt of paddy; using a marketed surplus of 2,166,493 mt (40% of the crop), MVE estimates that 8,666 traders purchased paddy. Assuming that this was a quarter-time job, paddy buying generated 2,166 full-time equivalent jobs. Public sector employees involved in paddy buying and domestic rice distribution are largely included in the category public sector rice milling. The numbers appearing in the former two categories are derived from employment in the Rice Marketing Company and the RFM-HC. Domestic wholesale distribution of milled rice generated an estimated 1,000 jobs, assuming each wholesale trader handled an average of 250 mt. This assumes conversion of the commercial paddy crop at a 65% milling rate, yielding 1,408,221 mt of milled rice, less 409,118 mt of exported rice to give 999,103 mt. Dividing this by 250 mt/worker in the wholesale trade yields 3,996 wholesale workers quarter-time, or about 1,000 full-time equivalent workers.

4) MVE assumes that there is one employee per 450 mt exported in the private sector. This is half of the level of exports per employee assumed by Krenz et al. (1999). Dividing 319,779 mt of milled rice exports for 1997/98 by 450 mt/employee yields 799 workers.

5) Miscellaneous transport and handling is a rough estimate derived as follows: a) 40% of the paddy crop of 5.416 mmt, or 2.167 mmt, was commercialized in 1997/98; b) It is assumed that the labor required for handling and transporting this paddy before processing and the milled rice output after processing equals five person-years per 1,000 mt. Determining the public sector share is difficult, as the RFM-HC and the public mills may contract out the transport/handling functions.

If the public sector rice milling companies are successfully privatized as employee-owned companies, their employees will be counted as private sector workers, yet there will be no net job creation. The rapid increase in the number of private sector commercial rice mills, however, has generated significant employment. MVE estimates, based on a November-December 1998 survey of 55 commercial mills, are that 3,795 jobs have been generated for the estimated 275 commercial mills in operation during 1997/98.[86] In addition, Krenz et al. (1999) estimate that small village mills require a weighted average of 1.37 workers who work approximately quarter-time over the year.[87] Hence, if there were 5,625 small village mills in 1997/98 (MVE estimate, not Krenz et al. estimate), they employ at least 7,706 quarter-time workers or 1,927 workers full time equivalent workers.[88] Krenz also notes that tractor-mounted mills in the rice producing governorates generate about two months per year of employment per mill. The number of such mills is estimated at 2,000 in 1997/98, and they generated 333 jobs. Last, Krenz et al. estimate cooperative mill employment at 430 workers.

The RDI Unit's study of employment in the rice subsector has generated better baseline data and a mid-program picture of employment generation since the early 1990s (see Krenz, 1999). A more comprehensive assessment of net employment impacts of liberalization and privatization measures in the overall agribusiness system requires a broader general equilibrium perspective and goes beyond what MVE plans to accomplish by June 2000 (see Zalla et al., 1998). IFPRI has expressed an interest in making this type of assessment.

To sum up, the most prominent changes underway during the life of APRP to date that have increased private sector employment in the rice subsector include the following:

- increased participation by traders in paddy buying under APCP and APRP relative to the pre-reform period;
- a steady increase in the number of workers in the private sector rice milling industry, as heavy investments came on stream late in APCP and continued during APRP; and,
- a modest decrease in public sector employment in rice milling (including the ESA mills in that category), as workers in some companies receive early retirement packages and as some companies are beginning to be privatized.

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[86] The MVE survey revealed that there were an average of 13.8 workers per commercial mill, of which 8.1 permanent and 5.7 seasonal. This preliminary estimate will be refined in the forthcoming MVE report on commercial rice milling by Holtzman et al., 1999.

[87] Krenz et al. estimate that there are 1,700 new village mills that employ 1.9 workers per mill and 4,500 mills that employ 1.1 workers per mill.

[88] Note that western notions of full-time work and full-time equivalents may not apply in the Egyptian context. Egypt faces tremendous demographic pressure, with many workers entering the job market each year. In light of this pressure, it may be appropriate to consider a half-time job as a full-time job. The fact that a worker is under-utilized (if mill capacity is under-utilized) is irrelevant, so long as that worker continues to draw an income from the job. If the work is done on a piece-rate basis (5-10 LE/mt of paddy processed, for example), and a worker is truly unemployed when a mill is not working, the notion of half- or quarter-time work makes more sense. Some milling jobs, such as loading/unloading and packing, are often paid on a piece-rate basis. In most small village mills, the 1-3 workers per mill split their time between rice, maize and wheat milling enterprises.

10.6 Market Coordination

Despite significant progress in liberalization of the Egyptian rice market and major private sector investment in rice milling, the rice subsector remains poorly coordinated. The domestic rice market has been characterized by fluctuating prices and marketing margins over the past several years, showing significant inter-annual variability. The baseline marketing season of 1996/97 witnessed hyper-competitive paddy buying by a large number of rice dealers, a speculative run-up in paddy (and milled rice) prices, very thin export margins, and heavy storage of paddy under reportedly poor conditions (humid rice stored improperly), which led to higher than normal losses.[89]

The strategies and operations of the public sector rice mills have also shifted during the past three years, which have contributed to market uncertainty and volatility. In 1996/97, public sector procurement of paddy was very low at about 96,300 mt. The public sector looked as if it would bow out of the rice milling business and offered several mills for privatization in the first half of 1997. Disappointed by the handful of bids well below Holding Company and MPE valuations, the Holding Company entered the paddy market aggressively early in the 1997/98 season, procuring 517,600 mt by the end of December 1997. Private millers and exporters were surprised and dismayed at this reversal, especially since they felt that public mill operations were subsidized and paddy procurement financed with cheap credit. The strong public sector presence in the market (though well below early 1990s' levels) contributed to firm paddy and white rice prices, which might have dropped lower in a record paddy production year had the public sector not been a major buyer from the outset of the 1997/98 season.

There are also signs that private investment in commercial rice mills has been excessive during the past 3-4 years, and there is increasing evidence of under-utilization and financial problems facing a number of commercial mills. While it is not government's role to place restrictions on private investment, and the GOE has no agribusiness investment advisory service,[90] excessive investment is in part due to a rather non-transparent rice market. The MALR has begun to release periodic situation and outlook reports, which focus almost exclusively on the world market for rice, but there is little systematic collection of price data and timely analysis and dissemination of domestic rice market information.

Wailes and Ragaa El Amir (1998) state that domestic grades and standards require re-thinking and that the industry itself is in the best position to establish and enforce workable ones. Export grades and standards are more widely understood and followed for white rice,

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[89] Note that no one in Egypt has good, scientifically based estimates of post-harvest handling and storage losses for paddy or milled rice. Dr. Ragaa El Amir conducted some surveys of farm to rice mill losses in the early 1980s.

[90] Such an advisory service could be part of an agribusiness trade and investment promotion center. Whether this center would be under public or private management is an open question. Some analysts argue that an agribusiness center might be established, endowed and partially funded by donor and GOE money, but that the center should not be a GOE agency or under the authority of any GOE office.

and exporters have the freedom to ship rice with a high percentage of brokens to less demanding foreign buyers who specify standards below those laid out in the lowest Egyptian export grades. Nevertheless, export grades might be revised based on a better understanding of the requirements and preferences of foreign markets. A logical task for an Egyptian rice industry federation, as argued by Wailes and El Amir (1998(, is improving foreign market intelligence.

There appears to be good coordination among exporters and private millers who supply those exporters. Millers process paddy to meet exporters' (and ultimately their clients') specifications. Milling equipment can be adjusted to produce rice of different grades, with Sortex units helping to meet the very highest grades.

Allegedly high levels of carryover and excessive paddy storage in 1996/97 and 1997/98 are indicators of poor market coordination. Without better data on storage (amounts by area, by participant type), it is risky to make strong statements. Nevertheless, large carryover paddy stocks in poor and declining condition from the 1996 crop especially (and the 1997 crop to a lesser extent) would be evidence of poor matching of supply and demand. In fact, persistently high paddy stocks would partially prevent market signals from being transmitted to producers. Traders would appear to be buying up available paddy, speculating that prices paid by millers and consumers would rise, when in fact successive years of high paddy production and attendant high storage costs and losses would ordinarily dampen paddy prices. Only by early in the 1998/99 marketing season had paddy prices dropped to a lower level that seemed to reflect large carryover stocks and relative abundance, although paddy prices began to firm by December 1998 as carryover stocks were being depleted, the shortfall in the 1998 paddy crop had become evident, and as export demand remained strong from the 1997/98 season into the 1998/99 season.

10.7 Market Responsiveness and Competitiveness

The investment in private sector rice milling capacity has been responsive to domestic market requirements and the diversified export market for medium grain rice. Many smaller private mills do not meet domestic standards, but they mill at low cost for lower income consumers. The market segment of rural consumers and lower-income town residents prefers the lowest possible price for rice, not high quality at a high price. The investments in Chinese and Korean milling equipment respond to foreign demand for lower grade export rice in countries of Eastern Europe, the NIS, Africa (particularly Sudan), and lower income Arab countries. This milling equipment will not produce export grade one rice without a Sortex machine; those millers targeting high-income Arab markets or niche European markets invest in a Sortex-type machine that will enable them to meet the more exacting specifications of these markets, or they invest in expensive Japanese or Swiss milling machines.

As area cultivated to paddy and the supply of milled rice decline, the number of private commercial mills may also decrease. The most efficient millers, whose mills run at reasonably high capacity and who keep procurement and milling costs down, will succeed in milling rice for the domestic market and lower-income foreign markets. Some upper-end mills will produce very high quality rice (grade 1 and 2 mainly) for the most demanding foreign customers willing to pay a premium for top quality *japonica*. The least efficient

commercial mills that have low rates of capacity utilization and high per unit milling costs will go out of business. This may lead to allegations of GOE irresponsibility in withdrawing completely from the rice market, leaving a disorderly market and risky investment climate in its wake. There are, of course, ways in which the market can be made more orderly (provide timely, accurate market information) and less risky as an investment opportunity (more timely estimates of area planted and production, as well as GOE announcement and discussion of the stated MALR strategy to reduce area planted over the next few years to realize water savings). The emerging Rice Federation of Egypt can help in generating and disseminating market information and as both a forum for publicizing and discussing GOE policies and strategies, and a vehicle for achieving a consensus on industry messages to convey to GOE policy-makers.

As rice area and production decline in Egypt, and as domestic consumption of rice rises with population and income increases, supplies available for export could decline. Exports of 408,000 mt of *japonica* rice could dwindle to a quarter that volume or less. Declining supplies will tend to push up prices for export grade rice. It is possible, though not likely, that imports of inexpensive milled rice could supply the lower end of the Egyptian market (i.e., poor consumers) while higher quality *japonica* rice is reserved for export. Top rice experts in Egypt feel that this is an unlikely scenario, however. They argue that Egyptian consumers prefer low amylose content, sticky shorter-grain rice and will not willingly substitute cheap *indica* rices (with a high proportion of brokens) from Thailand or Vietnam.

For the time being, Egypt's main competitors in export markets for medium grain *japonica* rice are the U.S. and Australia, whose rice is exported to Japan, Korea and the Persian Gulf countries. High levels of paddy production in Egypt and abundant supplies will make Egyptian rice exports very competitive in international markets, as was demonstrated in 1997/98. Significantly lower levels of paddy production will put upward pressure on domestic prices, including prices of export grade rice, and make Egypt less competitive as an exporter. This latter scenario appears to be most likely in the future, although higher yields may offset the decline in area planted somewhat.

11. AGENDA FOR FURTHER RESEARCH AND POLICY ANALYSIS

As in quite a few agricultural commodity subsystems in Egypt, the rice subsector faces important knowledge gaps which can make it difficult to do policy analysis and prescribe regulatory and policy reforms. Prescribing reforms on the basis of an incomplete understanding of a subsector can lead to unintended consequences and less than ideal subsector performance. Some examples of information gaps are as follows:

11.1 Price and Market Information

There is significant scope to improve the collection, dissemination, and analysis of price data for paddy and rice. Existing price information collected by public agencies is either disseminated with a lag (CAPMAS and MALR), methodologically flawed and not suitable for analysis (MTS), and generally restricted in distribution (all three). Public agencies could not satisfactorily explained how price data are collected at the most disaggregated level (district) and aggregated up to the governorate and national levels. Upon examining the price data, it appears as if data are not collected scientifically and systematically from random samples of traders or millers; too many observations remain the same for months on end, there are gaps in time-series (many series are quite partial and incomplete), and monthly prices are not specified for particular marketplaces (i.e. data collection points) but rather reported for entire governorates.

The MALR initiative in producing situation and outlook reports provides a good opportunity to upgrade price and market reporting for paddy and rice. While the current S&O reports offer a detailed picture of the world market situation, they need to add far more discussion and analysis of the domestic market for rice and how it relates to world market trends and conditions. Prices for paddy and milled rice, collected systematically and regularly, could be reported in the monthly S&O report for rice, representing a valuable addition.

11.2 Poor Understanding of Producer and Trader Storage Behavior

Estimates of paddy and milled rice storage by private sector participants are based on questionable aggregate data and assumptions about private sales and storage behavior. There are no sound, empirically derived estimates of private storage. Although it is alleged that many producers store paddy for months, speculating on price rises (particularly in 1996/97), paddy is perishable, subject to post harvest losses, and not suitable for storage from one season to the next (unless stored under optimal conditions). In order to make better storage and marketing decisions, rice subsector participants need more accurate information about the volume of paddy (and to a lesser extent, milled rice) in storage at different points of the year. Exaggerated GOE perceptions of very large carryover stocks of paddy in 1997/98 contributed to delaying of lowering the tariff on imported rice.

11.3 Possible Effects of Lowering the Tariff on Imported Rice

Following a 1997 study by the DEPRA project, which recommended reducing the tariff on imported rice from 20 to 5 percent, the MTS decided not to lower the tariff. The Ministry

was concerned about high carryover of paddy from 1996/97 to 1997/98, losses that many private sector participants would suffer if they faced cheap imports, and the potentially negative impact of significant imports on the overall profitability of the rice milling industry. Some GOE officials overestimated the likely size of the rice carryover, which led to exaggerated concerns about how this carryover might affect rice traders and millers. Allowing for rice imports might help to meet the food consumption needs of poor households, particularly urban ones, put downward pressure on domestic paddy and milled rice prices, which have often been high relative to world prices, and dampen private incentives to grow paddy (which are too attractive, leading to excessive planting). These factors would also contribute to the MALR and MPWWR objectives to reduce area planted to paddy, a crop requiring a lot of irrigation water, as new irrigated lands come on stream in the New Valley and the Sinai.

If the GOE does reduce the tariff on imported rice, it needs to monitor and assess the impacts of greater imports on the viability and competitiveness of the Egyptian rice industry. Reducing or removing the tariff will affect the volume, value and types of rice imports, domestic rice price levels (for different rice types), domestic paddy planted area and production, producer incomes, milling industry capacity utilization and margins, and export performance. Ideally, the potential impacts of reducing the tariff should have been analyzed and forecast ex ante, although this would have proved to be a very difficult exercise given the information and knowledge gaps concerning the rice subsector.

11.4 Demand for Egyptian Rice in the Middle East/Mediterranean Region

This baseline study did not focus on demand for *japonica* Egyptian rice outside of Egypt, although it did examine trends in export volume to different markets. While exports to some countries, such as Turkey and several Eastern European countries, have increased during the 1990s, exports to traditional Arab markets (particularly more wealthy Arab countries) have stagnated or declined. It is not entirely clear what factors underlie the increases or decreases, although there are some hints that the quality of Egyptian rice exports does not measure up to the competition (U.S. and Australian) in the most discriminating markets, and that Egyptian exporters are not the most reliable suppliers. Foreign market research and intelligence would provide a better picture of how Egyptian rice measures up to the rice of competitors on price, quality, consumer acceptability terms, as well as in reliability of delivery and ease in doing business.

The MTS has commercial attaches in major embassies in the Middle East/Mediterranean Region, but they have very broad responsibilities and cannot conduct in-depth investigations on any particular export commodity. Improving the knowledge base and understanding of selected foreign market characteristics is a potentially important function of the newly formed rice federation, which has representatives of each segment of the industry. With this better information, the federation could help members to target particular foreign markets to expand market share, protect Egypt's competitive position in key markets such as Syria and Turkey, and perhaps to regain at least some lost market share (particularly in Gulf countries).

In improving knowledge of foreign markets for rice, the public sector does not have a comparative advantage. While organizations such as the Egypt Export Promotion Center

(EEPC) of MTS can play a facilitating and supportive role, the private sector needs to be heavily involved in carrying out foreign market research. An industry-wide trade association is an appropriate vehicle for generating and disseminating market information of broad utility to many private sector participants. An APRP and industry initiative to create an organization serving as an umbrella for the entire rice subsector is already underway.

11.5 Role of the Newly Created Egyptian Rice Federation

This initiative appears to be off to an excellent start, with active participation by key players in the rice milling industry and among exporters. It is important that this organization focus on issues and problems related to the competitiveness of Egyptian rice both in domestic and foreign markets. Although quite a few members of the federation seemed intent on reducing the variability of paddy and milled rice prices and dampening producer paddy price rises, the initial foci of the organization appear to be on solving industry problems, improving domestic and foreign market information and intelligence, and improving public-private sector dialogue (and not on fixing prices). These are appropriate emphases which should contribute to a successful launch and ongoing effectiveness of the federation.

12. LIKELY IMPACTS OF POLICY REFORMS AND RICE MARKET LIBERALIZATION

Table 12-1 summarizes in a concise format some anticipated impacts of ongoing rice market liberalization and reform, as well as the APRP program of assistance to the rice subsector. The most prominent changes are likely to be as follows:

- Total area cultivated to paddy and national production will decline. Area planted to shorter-season, high-yielding varieties will expand, leading to water savings, higher average yields for rice, and perhaps some changes in crop rotations.

  Delta producers have enthusiastically grown paddy, even in areas where it is supposedly prohibited and in violation of area restrictions in other zones. This has had significant implications for use (and re-use) of Nile River irrigation water. The GOE, with assistance from APRP, is addressing the complex issues of limiting rice area cultivated (and water consumption) and introducing new, shorter season paddy varieties (that consume less water). Within several years, a high percentage of area cultivated to paddy will be planted to these varieties, lowering overall water consumption by the rice crop. Rice area will also likely decline as enforcement of area restrictions improves.

- Lower paddy output will lead to less labor allocated to rice production, harvesting, marketing, milling and export as compared with the record production and export year of 1997/98. As aggregate production declines, the rice milling industry could contract, shedding excess capacity.

- Domestic rice consumption will continue to increase steadily, driven mainly by population growth. With decreased aggregate rice production and expanding consumption, surpluses for export will probably decline.

- A lower tariff on imported rice will likely lead to imports of some lower-grade rice (probably long grain). To the extent that these imports substitute for higher-quality *japonica* rice in domestic consumption, they could help maintain late 1990s' export levels.

  A benchmark under APRP's Tranche II was designed to lower the tariff by five percentage points by 30 June 1998, but this was only a nominal decrease and not accomplished. There are a lot of poor Egyptian consumers who might be willing to buy cheaper imported long grain rice with a high percentage of brokens. If the tariff on rice is lowered, it will be important to track the impact on rice production and its profitability, paddy and rice prices, capacity utilization and profitability of rice milling, entry/exit into the milling industry, and rice consumption, particularly among poorer households. Under APRP's Tranche III, a benchmark calls for lowering of the tariff on imported rice to 10 percent or less.

- The rapid growth of investment in private commercial mills since liberalization will slow as many mills will face increasing difficulties in maintaining high enough levels of throughput to operate profitably (this problem will be most acute for the highly indebted millers). By 2002, some mills will be forced out of business.

- The remaining public sector mills and the most of the recently privatized milling companies will face significant financial difficulties, leading to closure of most of their rice milling operations. How and at what levels the MPE chooses to price their milling assets will determine whether significant public and former public milling capacity is put to productive use or scrapped.

Table 12-1: Some Anticipated Impacts of Policy and Regulatory Reform on the Rice Subsector

Variable	Direction & Relative Magnitude of Change	Likely Lag fr. 1996/97	Comments
Number of Varieties	reduction in number; shift to short-season, high-yielding varieties	2-6 yrs	Giza 171 & 172, longer-season varieties, will be replaced by Giza 178 and Sakha 101/102.
Rice Area Planted & Production: 0) Aggregate 1) Giza 171/172 2) Giza 178 3) Sakha 101/102 4) Other longer-season vars (G 173/176/177/181)	 significant decrease strong decrease moderate increase strong increase continued decline	 3-4 yrs 3-4 yrs 3-4 yrs 3-6 yrs 3-4 yrs	Overall area in the Nile River valley will decline significantly. Not clear which crops will expand to replace declining area to rice and cotton in the Nile River Valley. Rice will not be grown in new lands of the New Valley or N. Sinai.
Domestic Rice Prices & Price Volatility	initial decline (to early 1998/99), then increase to higher but more stable levels	3-6 yrs	Decreased production will lead to higher prices than in 1997/98 & early 1998/99. Lower duty will enable world prices to act as a ceiling on domestic prices. Price volatility will decline as the Egyptian rice market is opened up to imports.
Rice Exports 0) Aggregate 1) Giza 171/172 2) Giza 178 3) Sakha 101/102	 expand, then decline strong decrease strong increase modest increase	 2-4 yrs 3-5 yrs 2-4 yrs 3-5 yrs	Rice exports hit record levels in 1997/98, but decreased area planted and steadily growing domestic demand will lead to a decline (unless significant lower-quality *indica* imports enable exporters to maintain export volumes).

Variable	Direction & Relative Magnitude of Change	Likely Lag fr. 1996/97	Comments
Rice Milling Industry Capacity: 0) Aggregate 1) Village mills 2) Commercial mills 3) Public mills	 strong increase, then decline slow, steady increase strong increase, then leveling off strong decline, phasing out entirely	 3-6 yrs 4-6 yrs 3-6 yrs 2-4 yrs	By 1997/98, excess rice milling capacity had emerged in the private sector. Agro-entrepreneurs will continue to invest in commercial mills, but over time less efficient mills will close. Village mills will continue to serve the rural producer & consumer niche. Public mills will be privatized or liquidated. Most privatized (ESA) milling companies will close down by 2001/02, unless they are quickly split into more efficient & manageable units (i.e., separate mills).
Rice Imports	a) slight increase in medium run b) indeterminate in longer run	3-4 yrs 7-10 yrs	Some imports of cheap *indica* rice with high brokens could be consumed by poorer households. It is unclear if these imports will reach a high level in the longer run, permitting Egypt to maintain exports of *japonica*.
Private Sector Market Share in: 1) paddy buying 2) milling 3) domestic rice sales 4) rice export	 100% share strong increase; eventual 100% share 100% share	 3-6 yrs 2-4 yrs 1-3 yrs 3-6 yrs	The increase in market share in milling will come from continued strong private sector investment and privatization. As public rice mills privatized, export of rice by public sector trading companies will cease.
Net Employment Changes: 1) paddy production 2) paddy buying 3) milling 4) domestic sales 5) rice export 6) rice imports	 decrease as area planted declines remain constant, then decrease minimal net change; then decrease remain constant, then decrease decrease as public trading companies close could expand	 3-6 yrs (for all items)	Decrease in area planted will be partially offset by greater labor requirements for harvesting higher-yielding new varieties. Paddy buying & milled rice sales are already private, and a smaller rice crop will decrease overall employment in these segments. With closure/privatization of public milling and trading companies, which are overstaffed, overall employment will decrease. Smaller rice crop and export volume will decrease employment in milling and export businesses. Remaining private firms will use labor more efficiently. If imports expand, employment could expand in import businesses (though rice exporters may dominate importing as well).

Variable	Direction & Relative Magnitude of Change	Likely Lag fr. 1996/97	Comments
Quality of Milled Rice for Domestic & Export Markets and Import: 1) Domestic market 2) Export market 3) Imports	 decline decline to EE/NIS markets; increase to Arab markets decline	 2-6 yrs 2-6 yrs 3-10 yrs	As public sector mills close or are scrapped, and as small to medium scale Chinese mills increasingly dominate the industry, milled rice quality will decline overall. There will be expanding exports to EE/NIS markets of lower-grade rice. High-end private mills will ship highest-quality export grade rice to Arab countries. Minimal imports of expensive, very high quality rice will continue but be overtaken by larger volume imports of lower-grade *indica* rice.
Net Resource Allocation to (total investment in) the Rice Subsector	will decline as paddy area and production fall	2-10 yrs	In the longer run, fewer people, firms and mills will be required to buy, transform, sell and export the smaller rice crop. Less efficient private firms will close, as there has been excessive entry following liberalization. Resources will be shifted to other enterprises. Scrapping of public and ESA mills will mean a net loss to the economy of once productive capacity.
Coordination within the Rice Subsector	will increase significantly	3-6 yrs	Creation of Rice Federation and grain commodity council will improve market coordination and feedback on policies & regulations to GOE.
Quality and Dissemination of Market Information	will improve significantly in private sector & moderately in public sector	3-10 yrs	As the Rice Federation invests resources in improving domestic market information & foreign market intelligence, quality and dissemination to private sector will increase. MALR S&O reporting will strengthen.
Grades & Standards	will become better defined for domestic & import markets	3-10 yrs	Export grades are well-defined and understood. Grading of domestic and imported rice for the domestic market will be examined & improved.

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ANNEX

List of Annex Tables

Table A-1: Rice Data Sources

Data Type	Level of Aggregation	Periodicity	GOE Office (and Contact)
Production, Area, Yield	National, Governorate	Annual, published with a lag	MALR/CAAE
	District	Unpublished	MALR/CAAE
	Variety by governorate	Annual	ARC, *Rice Production Campaign* (summary) and MALR/CAAE
Paddy Producer Prices	Governorate	Annual. Monthly prices collected during harvest period (but not published/available).	MALR/CAAE
Wholesale Paddy Prices	Do not exist	Not collected	
Wholesale Milled Rice Prices Min/max for MTS Mean for CAPMAS	Governorate	MTS collects monthly min/max in up to 26 governorates, but not published. CAPMAS publishes monthly national wholesale prices quarterly.	MTS: Hamdi Allam, Dept. of Cereals and Legumes CAPMAS: see publications
Retail Milled Rice Prices Min/max for MTS Mean for CAPMAS	Governorate	MTS data collected monthly, but not published. CAPMAS data monthly, but published quarterly.	MTS: Cereals & Legume Dept. CAPMAS: see publications
Rice Export Volume	By importing country and exporting firm by market year	Monthly updates during marketing season, which are not published but distributed to exporters & some GOE agencies. Annual summary of exports by destination & export firm at end of marketing year.	MTS: Tallat Zaied, Gen. Director of Technical Office of the Minister. GOCEI: Information Center in Alexandria
Rice Export Volume and Value	National and by importing country	Annual with lag of over one year. Reported for calendar year, not marketing yr.	CAPMAS *Annual Bulletin of Foreign Trade.* FAO Agrostat data base with lag.

Data Type	Level of Aggregation	Periodicity	GOE Office (and Contact)
International Trade Volume/Value and Prices	Global, and by major country exporter and importer.	Quarterly Annual	USDA/ERS: Nathan Childs US Rice Federation FAO Agrostat (with lag)
Public Sector Rice Milling Capacity, Throughput & Sales	National	Unpublished	Holding Company for Rice & Flour Mills
	By public company	Unpublished	Interviews with company chairmen
Private Sector Rice Milling Capacity	Company by company	Unpublished	Rice Branch, Cereals Industry Chamber: Ezz El Din Aly Mohammed. Interviews with company owners/managers.
Rice Consumption	National & by broad urban, rural, regional aggregates	Periodic household budget & expenditure surveys, once every 5-10 years.	CAPMAS Household Expenditure Surveys, 1981-82, 1990-91, 1995-96. IFPRI Household Survey, 1997.
	Governorate and by income stratum	Periodic surveys	same as above
Rice Balance Sheets	National	Annual, but not done since 1994	AERI (Dr. Moussa Abdel Azim)
Rice Supply and Use Data	National	Annual (to 1996)	FAO Agrostat data base

Table A-2a : Average Per Capita Consumption of Major Foodstuffs in Urban Egypt

Food Commodities	Units	1964/65	1974/75	1981/82	1990/91	1995/96
Wheat Grain	Kg.	12.40	12.37		2.16	1.85
Wheat Flour	Kg.	26.60	28.83		10.32	21.25
Macaroni	Kg.	5.60	6.03		7.54	7.06
White Rice	Kg.	21.20	25.43		21.08	21.21
White Maize	Kg.	13.60	8.30		1.21	0.90
Meat	Kg.	9.30	9.60		8.91	8.46
Poultry	Kg.	3.50	3.70		10.08	10.64
Fresh Fish	Kg.	6.90	6.13		6.37	6.95
Eggs	Number	45.00	42.00		68.00	95.00

Source : Household Budget and Expenditure Surveys, CAPMAS

Table A-2b : Average Per Capita Consumption of Major Foodstuffs in Rural Egypt

Food Commodities	Units	1964/65	1974/75	1981/82	1990/91	1995/96
Wheat Grain	Kg.	19.20	57.50		27.40	26.02
Wheat Flour	Kg.	15.20	45.35		25.70	63.54
Macaroni	Kg.	1.40	2.00		4.00	5.34
White Rice	Kg.	17.60	24.25		29.69	19.79
White Maize	Kg.	47.20	42.60		21.48	10.23
Meat	Kg.	4.40	6.55		6.82	7.23
Poultry	Kg.	2.40	2.75		7.33	9.91
Fresh Fish	Kg.	2.40	4.25		3.60	3.99
Eggs	Number	25.00	37.00		50.00	80.00

Source : Household Budget and Expenditure Surveys, CAPMAS

Table A-3 : Per Capita Food Consumption by Regions in Egypt, 1990/91

Food Commodities	Unit	Metropolitan	Lower Egypt	Upper Egypt	Frontier	Average
Urban						
Wheat Grain	kg	0.13	4.59	2.70	0.00	2.16
Wheat Flour	kg	4.28	8.93	20.54	18.55	10.32
Macaroni	kg	8.94	6.94	6.13	5.88	7.54
White Rice	kg	18.20	36.01	9.71	13.00	21.08
White Maize	kg	0.23	2.95	0.87	0.00	1.21
Meat	kg	8.99	7.70	10.13	8.59	8.91
Poultry	kg	11.68	9.37	8.53	7.71	10.08
Fresh Fish	kg	7.37	7.29	4.59	8.63	6.37
Eggs	Number	70.23	64.00	67.50	67.66	67.59
Rural						
Wheat Grain	kg	na	34.79	18.30	2.14	27.40
Wheat Flour	kg	na	17.22	35.61	66.10	25.70
Macaroni	kg	na	4.23	3.46	8.77	4.00
White Rice	kg	na	46.03	7.16	23.24	29.69
White Maize	kg	na	24.16	9.08	18.73	21.48
Meat	kg	na	6.16	7.79	5.74	6.82
Poultry	kg	na	8.97	5.11	5.90	7.33
Fresh Fish	kg	na	4.79	2.02	1.95	3.60
Eggs	Number	na	49.94	50.64	28.71	49.81

Source : Estimates from the 1990/1991 Household Expenditures Survey, CAPMAS. Table taken from Univ. of Arkansas, 1995.

Notes : Metropolitan governorates include Cairo, Alexandria, Port Said and Suez; the Lower Egypt governorates include Damietta, Dakahlia, Sharkia, Kalyoubia, Kafr El Sheikh, Gharbia, Menufia, Behira, and Ismailia; The Upper Egypt governorates include Giza, North Sinai, and South Sinai, Beni Suef, Fayoum, Minia, Assuit, Sohag, Qena, and Aswan; and the Frontier governorates include Red Sea, El Wadi El Gidid, Marsa Matrouh.

Table A-4 : Per Capita Food Consumption by Regions in Egypt, 1995/96

Food Commodities	Unit	Metropolitan	Lower Egypt	Upper Egypt	Frontier	Average
Urban						
Wheat Grain	kg	0.14	3.39	2.40	1.46	1.85
Wheat Flour	kg	4.48	10.01	32.55	37.94	21.25
Macaroni	kg	8.71	7.08	6.01	6.45	7.06
White Rice	kg	15.78	32.04	12.85	24.16	21.21
White Maize	kg	0.04	1.99	1.46	0.92	1.10
Meat	kg	9.60	7.31	8.61	8.30	8.46
Poultry	kg	13.87	11.45	9.13	8.11	10.64
Fresh Fish	kg	8.95	8.38	4.75	5.71	6.95
Eggs	Number	112.00	102.00	89.00	77.00	95.00
Rural						
Wheat Grain	kg	na	36.74	19.75	21.56	26.02
Wheat Flour	kg	na	21.82	63.50	105.31	63.54
Macaroni	kg	na	4.78	3.62	7.63	5.34
White Rice	kg	na	47.77	8.49	3.12	19.79
White Maize	kg	na	15.67	14.17	0.85	10.23
Meat	kg	na	4.92	6.97	9.79	7.23
Poultry	kg	na	11.54	7.20	10.98	9.91
Fresh Fish	kg	na	6.45	2.36	3.15	3.99
Eggs	Number	na	83.00	76.00	81.00	80.00

Source : Estimates from the 1995/1996 Household Expenditures Survey, CAPMAS.

Notes : Metropolitan governorates include Cairo, Alexandria, Port Said and Suez; the Lower Egypt governorates include Damietta, Dakahlia, Sharkia, Kalyoubia, Kafr El Sheikh, Gharbia, Menufia, Behira, and Ismailia; The Upper Egypt governorates include Giza, North Sinai, and South Sinai, Beni Suef, Fayoum, Minia, Assuit, Sohag, Qena, and Aswan; and the Frontier governorates include Red Sea, El Wadi El Gidid, Marsa Matrouh.

Table A-5: Retail and Wholesale Rice Prices (CAPMAS), 1990-1998

(retail prices in LE/100 kg.; wholesale prices in LE/mt)

Year	CPI All Items	CPI Food &	Wholesale	Retail Rice Price																
	Urban Pop.	Beverages	Price	Damietta	Dakahlia	Sharkia	Qalubeya	Kafr El Sheikh	Gharbia	Menoufia	Beheira	Ismailia	Giza	Beni Suef	Fayoum	Menya	Assiut	Sohag	Qena	Aswan	Average
1990	178.9	188.4	845	109	104	106	112	96	101	115	99	100	119	117	101	124	90	93	79	100	98
1991	214.3	219.8	955	105	96	100	100	90	97	105	99	100	146	125	113	127	121	103	107	100	108
1992	243.5	238.0	958	103	95	98	98	91	100	102	97	101	112	109	105	110	105	102	105	103	102
1993	273.0	256.4	960	91	90	88	92	89	88	94	92	95	99	94	91	100	100	101	106	100	95
1994	295.1	281.2	1140	112	100	97	102	95	96	102	99	101	115	111	109	115	114	118	116	117	107
1995	319.9	310.1	1270	130	119	115	124	118	115	123	119	117	137	129	123	140	133	139	145	143	128
1996	366.3	346.8	1350	135	133	123	131	127	128	132	133	130	140	135	130	144	146	142	146	141	135
1997	383.2	361.1	1290	138	134	130	132	127	129	133	134	130	147	139	131	147	150	151	151	146	138
1998	395.0	371.2	1185.6	140	135	130	131	129	130	131	142	130	142	135	134	143	149	147	151	145	138

Source : CAPMAS

Note : Data for 1998 are for the first eight months only.

Table A-6: Retail Rice Price Correlation Matrix for 17 Governorates

Governorate	Damietta	Dakahlia	Sharkia	Qalubeya	Kafr El Sheikh	Gharbia	Menoufia	Beheira	Ismailia	Giza	Beni Suef	Fayoum	Menya	Assiut	Sohag	Qena	Aswan
Damietta	1.00	0.95	0.95	0.96	0.95	0.95	0.91	0.94	0.92	0.69	0.88	0.92	0.91	0.90	0.92	0.83	0.92
Dakahlia	0.95	1.00	0.92	0.95	0.97	0.96	0.91	0.96	0.94	0.61	0.82	0.87	0.86	0.87	0.88	0.80	0.89
Sharkia	0.95	0.92	1.00	0.94	0.93	0.96	0.90	0.92	0.90	0.69	0.87	0.88	0.88	0.88	0.84	0.75	0.84
Qalubeya	0.93	0.95	0.94	1.00	0.96	0.96	0.93	0.91	0.92	0.64	0.85	0.88	0.88	0.85	0.85	0.77	0.88
Kafr El Sheikh	0.95	0.97	0.93	0.96	1.00	0.96	0.89	0.95	0.95	0.58	0.79	0.87	0.85	0.88	0.91	0.85	0.92
Gharbia	0.95	0.96	0.93	0.96	0.96	1.00	0.90	0.96	0.95	0.63	0.84	0.89	0.86	0.87	0.87	0.81	0.88
Menufia	0.91	0.91	0.90	0.93	0.89	0.90	1.00	0.86	0.87	0.66	0.85	0.85	0.88	0.82	0.79	0.70	0.80
Beheira	0.94	0.96	0.92	0.91	0.95	0.96	0.86	1.00	0.96	0.67	0.84	0.90	0.86	0.92	0.91	0.86	0.90
Ismailia	0.92	0.94	0.90	0.92	0.95	0.95	0.87	0.96	1.00	0.63	0.80	0.87	0.83	0.89	0.89	0.85	0.90
Giza	0.69	0.61	0.69	0.64	0.58	0.63	0.68	0.67	0.63	1.00	0.91	0.82	0.85	0.86	0.61	0.60	0.58
Beni Suef	0.88	0.82	0.87	0.85	0.79	0.84	0.85	0.84	0.80	0.91	1.00	0.92	0.94	0.92	0.76	0.69	0.75
Fayoum	0.92	0.87	0.88	0.88	0.87	0.89	0.85	0.90	0.87	0.82	0.92	1.00	0.90	0.92	0.84	0.82	0.83
Minya	0.91	0.86	0.88	0.88	0.85	0.86	0.88	0.86	0.83	0.85	0.94	0.90	1.00	0.92	0.81	0.75	0.81
Assiut	0.90	0.87	0.88	0.85	0.88	0.87	0.82	0.92	0.89	0.86	0.92	0.92	0.92	1.00	0.93	0.92	0.88
Sohag	0.92	0.88	0.84	0.85	0.91	0.87	0.79	0.91	0.89	0.61	0.76	0.84	0.81	0.93	1.00	0.95	0.97
Qena	0.83	0.80	0.75	0.77	0.85	0.81	0.70	0.86	0.85	0.60	0.69	0.82	0.75	0.92	0.95	1.00	0.93
Aswan	0.92	0.89	0.84	0.88	0.92	0.88	0.80	0.90	0.90	0.58	0.75	0.83	0.81	0.88	0.97	0.93	1.00

Table A-7 : MTS Estimates of Village Rice Mills in Seven Rice Producing Governorates, 1998

Governorate	Licensed Rice Mills	Unlicensed Rice Mills	All Rice Mills	Percent Unlicensed	All Licensed Mills
Kafr El Sheikh	160	340	500	68.0%	353
Beheira	233	100	333	30.0%	330
Gharbia	150	7	157	4.5%	352
Dakahlia	534	612	1146	53.4%	575
Damietta	40	45	85	52.9%	56
Sharkia	664	0	664	0.0%	664
Fayoum	46	5	51	9.8%	135
Others	157	271	428	63.3%	-
Total	**1984**	**1380**	**3364**	41.0%	**2465**

Source : MTS data reported in Krenz, Ronald D. with Abdel Sattar Ahmed Shenashan and Lawrence Kent, January 1999. *The Effect of Liberalization and Privatization on Employment: the Case of Rice* . APRP/RDI Report No. 53. Cairo, Egypt.

Note : All licensed mills includes wheat and maize grinders.

Table A-8 : Other Estimates of Village Rice Mills in Rice Producing Governorates

Governorate	1989 Licensed Rice Mills	MALR, 1998		CAPMAS, 1996 All Grain Mills
		Licensed Rice Mills	Unlicensed Rice Mills	
Kafr El Sheikh	532	396	178	983
Beheira	343	463	230	1,171
Gharbia	151	447	224	1,079
Dakahlia	538	893	245	1,690
Damietta	36	54	35	236
Sharkia	196	460	92	1,780
Fayoum	22	138	55	493
Others	86	--	--	--
Total	**1904**	**2851**	**1059**	**7432**

Source : 1) 1989 estimates from Ahmed El-Miniawy and Ismail Gamal El Din. 1989. Economic Working Paper No. APAC-89-(3).
2) MALR/CAAE, Sampling Section, 1998.
3) CAPMAS census, 1996.
Data reported in Krenz, Ronald D. with Abdel Sattar Ahmed Shenashan and Lawrence Kent, January 1999. *The Effect of Liberalization and Privatization on Employment: the Case of Rice* . APRP/RDI Report No. 53, Cairo, Egypt.

Table A-9 : Estimated Annual Milling Capacity of Public Mills : 1989, 1994 and 1998

Milling Company	1989		1994		1998	
	# Mills	Milling Capacity	# Mills	Milling Capacity	# Mills	Milling Capacity
Alexandria	6	740	6	696	4	534
Rashid	8	593	6	504	6	520
Behira	6	700	5	624	5	650
Kafr El Sheikh	6	680	6	648	3	710
Gharbia	6	580	5	528	4	623
Dakahlia	7	715	7	816	5	727
Damietta	8	827	7	744	6	469
Sharkia	5	660	5	552	4	544
Total	**52**	**5495**	**47**	**5112**	**37**	**4777**

Source : Ronald D. Krenz et al., January 1999. *The Effects of Liberalization and Privatization on Employment: The Case of Rice.* APRP/RDI Report No. 53. They cite the following sources: 1) El Miniawy and El Din, 1989; 2) Adapted from El Amir and Gamal El Din, 1994; 3) Holding Co. for Rice & Flour Mills, 1998.

Table A-10: Estimated Milling Capacity and Utilization in Egypt, 1997/98

(figures in mt paddy, unless noted)

Estimated Milling Capacity in Egypt, 1997/98						
Mill Category	**No. Mills**	**Capacity per day**	**No. Days of Operation/Yr.**	**Individual Mill Capac.**	**Capacity of All Mills in Category**	**% Total Capacity**
Public Mills	37	200	221	44,200	1,635,400	22.3%
Co-op Mills	5	78	221	17,238	86,190	1.2%
Commercial Mills	275	50	200	10,000	2,750,000	37.5%
Village Mills	5,625	4.0	120	480	2,700,000	36.8%
Tractor Mills	2,000	1.0	80	80	160,000	2.2%
Total					**7,331,590**	**100.0%**

Estimated Utilization of Mills in Egypt, 1997/98							
Mill Category	**No. Mills**	**MT proc. per day**	**No. Days of Operation/Yr.**	**Individual Mill Input**	**Input of All Mills**	**% Total Input**	**% Capacity Utilization**
Public Mills	37			13,959	516,467	11.9%	31.6%
Co-op Mills	5	52	221	11,492	57,460	1.3%	66.7%
Commercial Mills	275	35	200	7,000	1,925,000	44.5%	70.0%
Village Mills	5,750	2.5	120	300	1,725,000	39.9%	63.9%
Tractor Mills	2,000	1.0	50	50	100,000	2.3%	62.5%
Total Milled					**4,323,927**	**100.0%**	**59.0%**
Retained for Seed					70,200	1.3%	
Estimated Prod.					5,416,233	100.0%	
Paddy Losses					812,435	15.0%	
Processing Gap					209,671	3.9%	

Notes: 1) Seed retention is estimated at 50.4 kg./feddan for feddans planted the following area.

2) The processing gap is the gap between estimated production and estimated paddy processed, less paddy retained for seed and post-harvest & storage losses.

Estimated Excess Capacity : 35.4%

Table A-11: Estimated Milling Capacity and Utilization in Egypt, 1998/99

(figures in mt paddy, unless noted)

Estimated Milling Capacity in Egypt, 1998/99						
Mill Category	**No. Mills**	**Capacity per day**	**No. Days of Operation/Yr.**	**Individual Mill Capac.**	**Capacity of All Mills in Category**	**% Total Capacity**
Public/ESA Mills	37	200	221	44,200	1,635,400	21.4%
Co-op Mills	5	78	221	17,238	86,190	1.1%
Commercial Mills	300	50	200	10,000	3,000,000	39.2%
Village Mills	5,750	4.0	120	480	2,760,000	36.1%
Tractor Mills	2,100	1.0	80	80	168,000	2.2%
Total					**7,649,590**	**100.0%**

Estimated Utilization of Mills in Egypt, 1998/99							
Mill Category	**No. Mills**	**MT proc. per day**	**No. Days of Operation/Yr.**	**Individual Mill Input**	**Input of All Mills**	**% Total Input**	**% Capacity Utilization**
Public/ESA Mills	37			0	0	0.0%	0.0%
Co-op Mills	5	52	221	11,492	57,460	1.4%	66.7%
Commercial Mills	300	35	200	7,000	2,100,000	52.7%	70.0%
Village Mills	5,750	2.5	120	300	1,725,000	43.3%	62.5%
Tractor Mills	2,100	1.0	50	50	105,000	2.6%	62.5%
Total Milled					**3,987,460**	**100.0%**	**52.1%**
Retained for Seed					64,800	1.5%	
Estimated Prod.					4,450,237	100.0%	
Paddy Losses					333,768	7.5%	
Processing Gap					64,209	1.4%	

Notes: 1)Seed retention is estimated at 50.4 kg./feddan for feddans planted the following area.

2) The processing gap is the gap between estimated production and estimated paddy processed, less paddy retained for seed and post-harvest & storage losses.

3) Part of the processing gap of 64,209 mt may be accounted for by milling by public and ESA mills.

4) Paddy losses are assumed to be lower at 7.5% of the crop in 1998/99, as compared to 15.0% for the previous two years.

Estimated Excess Capacity : 71.9%

Table A-12 : Rice Exports by Private and Public Exporters

Year: 1991/92				Year: 1993/94				Year: 1994/95			
No.	**Company Name**	**Volume**	**Share**	**No.**	**Company Name**	**Volume**	**Share**	**No.**	**Company Name**	**Volume**	**Share**
	Private Exporter				**Private Exporter**				**Private Exporter**		
1	Wakalex	9,685	40.1%	1	Wakalex	60,900	45.8%	1	Wakalex	26,018	23.3%
2	Al Safa for Trading Co.	3,300	13.7%	2	Sudanco	14,500	10.9%	2	Kamitrade	13,975	12.5%
3	Al Massria Al Motaheda	3,240	13.4%	3	Carlofiori	12,000	9.0%	3	Intl Trading	11,000	9.9%
4		2,000	8.3%	4	Misr Exporting Rice	11,600	8.7%	4	Al Badry	8,261	7.4%
5	Port Said Maritime Business	1,200	5.0%	5	Adel Amin	6,700	5.0%	5	Fresh Fruit	6,300	5.6%
6	Arab World Organization	1,050	4.3%	6	Al Massia El Motheda	4,100	3.1%	6	Ti Ti	5,350	4.8%
7		725	3.0%	7	Wasat El Delta	3,000	2.3%	7	Port Said	5,150	4.6%
8	Al Badry Import/export	664	2.7%	8	Port Said	2,800	2.1%	8	Al Masria Al Motaheda	4,826	4.3%
9	Lotus El Dawlia	544	2.3%	9	Al Iman	2,600	2.0%	9	Said Abdel Hamid	4,000	3.6%
10	Great for Commercial Eng.	500	2.1%	10	Others	14,800	11.1%	10	Sudanco	2,700	2.4%
11	Mazex	420	1.7%					11	Al Bader	2,600	2.3%
12	Abd Al Radi Hassan	300	1.2%		**Total**	**133,000**	**100.0%**	12	Adel Amin	2,340	2.1%
13	National Service	200	0.8%					13	Al Sharkia Maritme	2,000	1.8%
14	Tanta Co.	100	0.4%					14	Alfania for projects	1,950	1.7%
15	Al Karam Organization	100	0.4%					15	Al Yanabil	1,775	1.6%
16	Karintex	42	0.2%					16	Al Alamia for trading	1,500	1.3%
17	Intl for Trade and Export	40	0.2%					17	Ahmed Amin and Sons	1,500	1.3%
18	Arab Exporters	23	0.1%					18	Al Iman	1,250	1.1%
19	Al Haramein Organization	15	0.1%					19	Misr for Exporting Rice	1,120	1.0%
20	Minostar	11	0.0%					20	Ebn El Nile	1,048	0.9%
	Total	**24,159**	**100.0%**					21	Egyptian Traders	1,000	0.9%
								22	Vitarix	1,000	0.9%
								23	Others	4,929	4.4%
									Total	**111,592**	**100.0%**
	Public Exporters				**Public Exporters**				**Public Exporters**		
1	Al Nasr Import/Export	79,243	52.0%	1	Al Wadi	50,800	41.2%	1	Arabian Co. for Foreign Trade	11,000	25.0%
2	Al Wadi	50,026	32.8%	2	Al Nasr Import/Export	34,000	27.6%	2	Al Nasr Import/Export	8,860	20.1%
3	Rice Marketing Co.	10,277	6.7%	3	Misr Import	20,800	16.9%	3	Al Wadi	8,052	18.3%
4	Misr for Foreign Trade	7,305	4.8%	4	Rice Marketing Co.	7,700	6.3%	4	Rice Marketing Co.	7,795	17.7%
5	Misr for Import/Export	3,260	2.1%	5	Sharkia Mills	5,700	4.6%	5	Dakahlia Mills	3,310	7.5%
6	General Co. for Trading and Chem.	2,300	1.5%	6	Armed Forces	3,600	2.9%	6	Misr for Import	2,970	6.7%
7	Arabian Co. for Foreign Trade	20	0.0%	7	Alexandria Mills	600	0.5%	7	Damietta Mills	1,529	3.5%
	Total	**152,431**	**100.0%**		**Total**	**123,200**	100.0%	8	Gen. Co. for Trading and Che	500	1.1%
									Total	**44,016**	100.0%
	GRAND TOTAL	**176,590**			**GRAND TOTAL**	**256,200**			**GRAND TOTAL**	**155,608**	

Total for Season 1991-92			Total for Season 1993-94			Total for Season 1994-95		
Exporter	Volume	Share	Exporter	Volume	Share	Exporter	Volume	Share
Private	24,159	13.7%	Private	133,000	51.9%	Private	111,592	71.7%
Public	152,431	86.3%	Public	123,200	48.1%	Public	44,016	28.3%
Total	176,590	100.0%	Total	256,200	100.0%	Total	155,608	100.0%

Source: GOCEI, MTS

Note: Private exports were allowed as of the end of September 1991.

Table A-12 : Rice Exports by Private and Public Exporters

Year: 1995/96				Year: 1996/97				Year: 1997/98			
No.	Company Name	Volume	Share	No.	Company Name	Volume	Share	No.	Company Name	Volume	Share
	Private Exporters				**Private Exporters**				**Private Exporters**		
1	Wakalex	66,899	21.5%	1	Al Fostat	36,656	26.3%	1	Wakalex	93,290	29.2%
2	Al Fostat	55,000	17.7%	2	Kamitrade	12,644	9.1%	2	Al Fostat	70,669	22.1%
3	Kamitrade	18,356	5.9%	3	Wakalex	12,074	8.6%	3	Al Mabrouk	20,337	6.4%
4	Sharkia Maritime	11,070	3.6%	4	Al Mabrouk	10,551	7.6%	4	Fresh Fruit	13,357	4.2%
5	Al Dawlia Import	10,000	3.2%	5	Adel Ahmed Amin	6,575	4.7%	5	Egyptian Traders	10,929	3.4%
6	Fresh Fruit	10,600	3.4%	6	Ahmed Ali El Badry	6,530	4.7%	6	Wassat Al Delta	9,667	3.0%
7	Sudanco	9,250	3.0%	7	Karkoura Group	5,562	4.0%	7	Kamitrade	7,168	2.2%
8	Ahmad Rabier	8,800	2.8%	8	Abd El Wahab El Badry	3,835	2.7%	8	Adel Amin	6,575	2.1%
9	Arabian Group	8,400	2.7%	9	Al Walili Export - Import	2,500	1.8%	9	Al Waha Misr	6,280	2.0%
10	Abd El Wahab El Badry	7,922	2.5%	10	Al Kawafel Export - Import	2,000	1.4%	10	Al Dawlia for Packaging	5,200	1.6%
11	Gargil Ltd	7,850	2.5%	11	Mehalla Center for Int. Trad	1,820	1.3%	11	Abd El Wahab Ali El Badry	4,645	1.5%
12	Mohsen Attia	6,713	2.2%	12	Fresh Fruit	1,750	1.3%	12	Karkoura Group	4,288	1.3%
13	Port Said	6,053	1.9%	13	Francisco Agency	1,694	1.2%	13	Al Youser	4,120	1.3%
14	Adel Amin	5,300	1.7%	14	Geffeco Mills	1,600	1.1%	14	Pharaohs	3,780	1.2%
15	Al Masria Al Motaheda	4,903	1.6%	15	Moh. Abdalla Mohamed	1,500	1.1%	15	Al Badry for Importation	3,665	1.1%
16	Al Alaam El Arabi	4,352	1.4%	16	Al Badr	1,490	1.1%	16	Egyset	3,570	1.1%
17	Egyptian Traders	4,000	1.3%	17	Pharaohs	1,450	1.0%	17	Lotus	2,306	0.7%
18	Lotus	3,353	1.1%	18	Al Nil for Int. Trade	1,424	1.0%	18	Al Alaam El Arabi	2,243	0.7%
19	Wasat El Delta	3,325	1.1%	19	Al Alaam El Arabi	1,420	1.0%	19	Moh. Abdalla el Gobeli	2,014	0.6%
20	Egytex	3,192	1.0%	20	Al Salam For Trading	1,178	0.8%	20	Cargil Ltd.	2,000	0.6%
21	Al Alamia for trading	3,140	1.0%	21	Egyset	1,120	0.8%	21	Trade & Investment Co.	1,907	0.6%
22	Karkoura Group	3,011	1.0%	22	Egyptian Traders	1,000	0.7%	22	Agro Food	1,893	0.6%
23	Ebn El Nile	2,543	0.8%	23	Abdel Azim Al Ridy	1,000	0.7%	23	Hourse Factory	1,590	0.5%
24	Al Badr	2,416	0.8%	24	Abdel Fatah Abu Al Enin	900	0.6%	24	Al Basha	1,578	0.5%
25	Tristar	2,015	0.6%	25	Trading Center for Export	800	0.6%	25	Al Alamia Import & Export	1,520	0.5%
26	Al Mabrouk	2,000	0.6%	26	AL Hosan for Import	790	0.6%	26	Al Dawawi Import & Export	1,500	0.5%
27	Abnaa Ahmed Amin	2,000	0.6%	27	Al Shaam	735	0.5%	27	Ahmed Ali El Badry	1,366	0.4%
28	Ahmed Ali El Badry	1,982	0.6%	28	Salahco for Export	735	0.5%	28	Al Walili	1,144	0.4%
29	Al Waha Misr	1,921	0.6%	29	Al Masria Al Motaheda	720	0.5%	29	Al Nowaihi for Linen Exports	1,135	0.4%
30	Al Iman for Export	1,905	0.6%	30	Wasat El Delta	710	0.5%	30	Al Amal Trading	1,097	0.3%
31	Al Basha	1,870	0.6%	31	Royal for Trade	700	0.5%	31	Sharkia Maritime	1,050	0.3%
32	Al Shaam	1,700	0.5%	32	Amal for Trade & Agencies	636	0.5%	32	Tiba Al Togaria	1,000	0.3%
33	Abdallah Abd El Atty	1,627	0.5%	33	Lotus	590	0.4%	33	Al Nagah	1,000	0.3%
34	Al Ekhwa El Arab	1,520	0.5%	34	Al Waha Misr	572	0.4%	34	Youjin Co.	1,000	0.3%
35	Passent	1,430	0.5%	35	Mostafa Al Talkhawi	572	0.4%	35	Al Saffa	968	0.3%
36	Egset	1,270	0.4%	36	Al Badry for Export	570	0.4%	36	Al Dawlia Import - Export	937	0.3%
37	Mena Al Togaria	1,013	0.3%	37	Al Alamia for trading	540	0.4%	37	Al Asmaa Trading	851	0.3%
38	Al Nagary	1,011	0.3%	38	Dokki Trade	500	0.4%	38	New Hebton	840	0.3%
39	Al Dawlia Industry	1,000	0.3%	39	Al Mansour Export - Import	500	0.4%	39	Geffeco Mills	802	0.3%
40	Ibrahim Mostafa	1,000	0.3%	40	Al Dawlia Industry	488	0.3%	40	Al Badry for Trading	715	0.2%
41	Al Iklass	1,000	0.3%	41	New Hebton	480	0.3%	41	Amin Anis Ghaly	660	0.2%
42	Al Geindry	1,000	0.3%	42	Montreal Group	430	0.3%	42	Al Karim for Export	638	0.2%
43	Others: < 1000mt each	17,140	5.5%	43	Al Dawlia for Packing	400	0.3%	43	Al Masria for Crops Marketing	600	0.2%
	Total	**310,851**	**100.0%**	44	Mohamed Nabil Sayed	400	0.3%	44	Egytex	595	0.2%
				45	Uni Mybel	398	0.3%	45	Abnaa Al Sahel	595	0.2%
				46	AL Safa	392	0.3%	46	Monteril Group	588	0.2%
				47	Abnaa Al Sahel	391	0.3%	47	Al Taef Exporting	577	0.2%
				48	Ibrahim Mostafa Ramadan	377	0.3%	48	Golden S (Hussein Hammam)	532	0.2%
				49	Abdel Salam Al Said	355	0.3%	49	Al Hoda Import - Export	524	0.2%
				50	Mohamed Nour El Din	330	0.2%	50	Ebn El Nile	500	0.2%
				51	Al Hana	325	0.2%	51	Al Togaria for Exports Development	500	0.2%
				52	Al Sonbola	300	0.2%	52	Al Iman Importing	500	0.2%
				53	Others	6,584	4.7%	53	Others (<500)	12,974	4.1%
					Total	**139,593**	**100.0%**		**Total**	**319,779**	100.0%
	Public Exporters				**Public Exporters**				**Public Exporters**		
1	Al Wadi	21,600	48.7%	1	Al Wadi	7,760	81.4%	1	Rice Marketing Co.	30,635	34.3%
2	Misr Import	8,229	18.5%	2	Misr for Export & Import	581	6.1%	2	South Mills Co. (Sharkia Mills)	15,600	17.5%
3	Rice Marketing Co.	4,250	9.6%	3	Dakahlia Mills	400	4.2%	3	Al Nasr for Imp. & Exp.	14,219	15.9%
4	Dakahlia Mills	3,640	8.2%	4	Rashid Mills	598	6.3%	4	Holding Company for Milling	13,096	14.7%
5	Damietta Mills	3,460	7.8%	5	Kafr El Sheikh Mills	200	2.1%	5	Al Wadi	8,850	9.9%
6	Al Nasr	3,200	7.2%		**Total**	**9,539**	**100.00%**	6	Damietta & Belkas Mills	4,500	5.0%
	Total	**44,379**	100.0%					7	Misr for Export & Import	1,078	1.2%
								8	Dakahlia Mills	1,101	1.2%
								9	Al Amma for Trade & Chemicals	252	0.3%
								10	Misr for Foreign Trade	8	0.0%
									Total	**89,339**	100.0%
	GRAND TOTAL	**355,230**			**GRAND TOTAL**	**149,132**			**GRAND TOTAL**	**409,118**	

Total for Season 1995-96			Total for Season 1996-97			Total for Season 1997-98		
Exporter	Volume	Share	Exporter	Volume	Share	Exporter	Volume	Share
Private	310,851	87.5%	Private	139,593	93.6%	Private	319,779	78.2%
Public	44,379	12.5%	Public	9,539	6.4%	Public	89,339	21.8%
Total	355,230	100.0%	Total	149,132	100.0%	Total	409,118	100.0%

Source: GOCEI, MTS

Note: 1996/97 data are incomplete, as total exports were 166,163

Table A-13: Egyptian Rice Imports, 1991-1997

Year	Volume mt.	Value mill LE	Average Unit Value per mt.
1991	0	0	na
1992	61	0.2	na
1993	90	0.2	na
1994	307	0.5	na
1995	795	2.2	na
1996	307	0.9	2837
1997	694.3	1.4	2003

Source: MTS, Foreign Trade Sector and CAPMAS.

Note: na means "not available"

The CAPMAS trade statistics before 1996 are not sufficiently precise to calculate accurate import unit values.

Table A-14: Number of Workers in the Rice Marketing Company (1990/91 - 1997/98)

Year	Permanent Workers	Seasonal Workers	Total
1990/91	747	222	969
1991/92	742	220	962
1992/93	733	203	936
1993/94	704	166	870
1994/95	737	147	884
1995/96	797	80	877
1996/97	772	64	836
1997/98	749	56	805

Source: Rice Marketing Company