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Egypt's Agriculture in a Reform Era

Edited by LEHMAN B. FLETCHER

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FOREWORD

DURING THE PAST DECADE the agricultural sector of Egypt has been gradually transformed by shifting away from central planning and government controls to increased reliance on market forces. This transformation preceded the more general structural adjustment that has been taking place throughout the economy since 1991. Early indications are that the move to a free market system improved sector performance in significant ways. Real farm income has increased by over 25 percent since market reforms began. Production of major food crops has increased dramatically, with wheat output surging from 2.0 mt in 1982 to 5.7 mt in 1994. Imports of wheat fell from 6.1 mt to 5.0 mt during the same period. Cotton yields increased after the 1993 market liberalization, achieving in 1993 one of the highest levels reached in the past 60 years (7.8 kentars per feddan).

While the impact of policy changes has indeed been positive, especially in relation to the areas of crop production and farm income, much remains to be done. Farmers, especially the smaller farmers, still face obstacles in marketing and access to inputs. A remaining overshadowing problem is inefficiency in the publicly owned agricultural processing and marketing industries. High costs in such industries both cause farm prices to be depressed and increase prices to consumers. Our government's primary task during the next decade is thus to encourage private investment and competition in these industries. This will increase economic efficiency and provide employment in the broad agricultural and food system, defined to include marketing, processing and trade as well as production.

Social improvements have been important along with economic growth in the countryside. Employment is up, population growth is slowing, more children—especially girls—are being educated and more women are moving into the economic mainstream. However, many of these farm families and other rural people may not have adequately benefitted from the market reforms alone. Growth in the industrial sector will help. In addition, as short-term and remedial measures, food assistance will be provided to the very poorest and disadvantaged families, and land will be reclaimed with priority given to settlement by the landless and smallest farmers. And perhaps employment programs for public works will be introduced.

The analytical studies and the conference undergirding this book have served to review successes and limitations, have pointed out necessary mid-term

corrections in the economic restructuring process and have identified an economic policy reform agenda for the coming decade. Completing that agenda will be difficult, but the path ahead is now much more clearly marked.

YOUSSEF WALLY
Cairo, Egypt

P R E F A C E

THIS BOOK IS THE PRODUCT of a large number of people working over a long period of time. All have been involved in some way in formulating, implementing, monitoring and evaluating the Egyptian agricultural policy reforms. Some appear as authors of the chapters in this book. Many others, although too numerous to name, are no less deserving of recognition for their contributions.

Since 1987 I have had the opportunity to intermittently observe the policy reform process, occasionally assist in providing analytical support for the reforms and periodically participate in assessments of them. Editing this book has provided me a privileged place in the conduct of an eight-year benchmark evaluation designed to take stock of the scope and accomplishment of the reforms. Its publication will make the results of that evaluation more easily available to a wider audience both in and out of Egypt.

Publication of this volume, as well as the analytical results it reports, reflects the unwavering commitment and generous financial support of the Ministry of Agriculture and Land Reclamation of Egypt (MALR) and the mission of the United States Agency for International Development (USAID) in Cairo. These two organizations, along with other government ministries and international donors, have provided the vision and continuous leadership that were essential for successful formulation and implementation of the reforms.

This book and the conference on which it was based, held in Cairo, March 26-28, 1995, were made possible by the full cooperation of the senior leadership of both the MALR and the USAID. It is not feasible to name all the officials individually, so grateful acknowledgment of the support of their organizations must suffice.

I do, however, feel obligated to identify a few individuals who were primarily responsible for the day-to-day planning and implementation of the analytical studies and the conference. They are: Mahmoud Noor, Senior Advisor to the Principal Bank for Development and Agricultural Credit, and Rollo Ehrich and Fenton Sands of the Office of Agricultural Credit and Economics, Directorate of Agriculture of the USAID, along with their Egyptian colleagues in that office, Mohamed Omran and Ali Kamel. While I absolve these close professional associates of responsibility for any errors of fact or interpretation in this book, I do thank them for the quality and continuity of their intellectual collaboration.

LEHMAN B. FLETCHER
Ames, Iowa, USA



OPENING SESSION of the conference "Taking Stock: Eight Years of Egyptian Agricultural Policy Reforms" held March 26-28, 1995, in Cairo, Egypt.

Seated left to right: Ahmed Ragai El Maraghy, Vice Chairman, The Principal Bank for Development and Agricultural Credit; Hassan Khedr, Chairman, The Principal Bank for Development and Agricultural Credit; John Lewis, US Agency for International Development, Washington, DC; Ahmed Goueili, Minister of Supply and Domestic Trade; Mahmoud Mohamed Mahmoud, Minister of Economics; Mahmoud El Sherif, Minister of Local Administration; Atef Ebeid, Minister of Public Enterprises; Youssef Wally, Deputy Prime Minister and Minister of Agriculture and Land Reclamation; Youssef Boutros Ghali, Minister of International Cooperation; Abdel Hadi Rady, Minister of Public Works and Water Resources; Ibrahim Fawzi, Minister of Industry; Edmund Hull, Deputy Chief of Mission, Embassy of the United States; Patrick LeClercq, Ambassador of France; Garth Castren, Ambassador of Finland.

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GLOSSARY

APCP	Agricultural Production and Credit Project, funded by USAID
ARC	Agricultural Research Center of the Ministry of Agriculture and Land Reclamation
ardab	Egyptian volume unit used for grains; 1 ardab = 150 kg
bale	unit of lint cotton weighing 480 pounds
berseem	Egyptian clover
long-season	grows for the entire winter season
short-season	grows for only part of the winter season
CAPMAS	Central Authority for Public Mobilization and Statistics (central statistical office)
els cotton	extra-long-staple cotton (1 $\frac{3}{8}$ " and longer)
ERSAP	Economic Reform and Structural Adjustment Program, begun in 1991
feddan (fd)	Egyptian area measure; 1 fd = 0.42 hectares
GARPAD	General Authority for Rehabilitation Projects and Agricultural Development
GATT	General Agreement on Tariffs and Trade, now the World Trade Organization
Uruguay Round	recently concluded trade negotiations that included agriculture
GOAPS	General Organization for Agricultural Price Stabilization
GOE	Government of Egypt
governorate	a province; Egypt has 26
ha	hectares
IFAD	International Fund for Agricultural Development, Rome
IFPRI	International Food Policy Research Institute, Washington, D.C.
kentar	Egyptian cotton unit; 1 kentar = 157.5 kg of unginned cotton or 50 kg of lint cotton
ls cotton	long-staple cotton (1 $\frac{1}{4}$ " to 1 $\frac{3}{4}$ ")
MALR	Ministry of Agriculture and Land Reclamation
mt	metric tons
OECD	Organization for Economic Cooperation and Development, Paris
PBDAC	Principal Bank for Development and Agricultural Credit, a government-owned agricultural credit bank
SFPP	Small Farmer Production Project, funded by USAID
USAID	United States Agency for International Development, mission in Cairo

I

International Perspectives
on Economic Transitions
and Policy Reforms

1

Introduction and Overview

LEHMAN B. FLETCHER

This book pertains to one of the premier economic events of the century—the transition from socialism to a market economy. However, it deals not with rapid systemic transformation subsequent to a political shift, as occurred in the countries of Eastern Europe and the former Soviet Union, but rather with the gradual transition of Egypt out of its socialist stage to a more liberalized economy. It reminds its readers that, well before the dramatic fall of communism around and in the Soviet Union and without radical political changes, a number of developing countries began to reform their economic systems and policies.

Much attention has been given to the timing and sequencing of policy and systemic reforms within the transition process. The comparative benefits and costs of “big bang” rapid transitions versus more gradual transformations have been extensively debated. For both types of transitions, there is widespread agreement that a credible and sustained political commitment to reform is necessary for success. Egypt confirms that principle and also illustrates that the political will to reform may be more steadfast in some parts of the economy than in others.

Although analysts generally agree that specific reform actions must be customized for each country, the individual reform elements are still regarded as interdependent and reinforcing. As such, implementation of one or a few reforms without others is regarded as unlikely to succeed. If a successful transition thus requires a seamless web of simultaneous systemic and policy reforms, then what is the fate of a reform process that is partial and sequential, as in Egypt? This book provides a case study of that crucial question.

The most celebrated example of gradual implementation of partial economic reforms is China. Its transition, although spread over the years since 1978 and

still incomplete, nonetheless has led China's economy along a path of rapid growth to the brink of a market system. The Chinese reforms began in agriculture and resulted in an enormous one-time increase in agricultural productivity. After agricultural growth slowed in the mid-1980s, rural manufacturing enterprises owned by local governments emerged as a dynamic source of growth. These mostly small, light-manufacturing village and township firms, producing for both domestic and export markets, now contribute half of China's industrial output and employ fully one-fifth of the country's labor force.

Egypt's transition has much in common with the pace and agriculturally led pattern of China's reforms. Has Egypt experienced a similar surge in agricultural productivity from reforms that have been faster and more far-reaching in the agricultural sector than elsewhere in its economy? This book provides a definitive assessment of that intriguing possibility.

In developing countries, the reform package usually deemed necessary to rescue a country from socialist stagnation and return it to sustained growth consists of two main elements. One focuses on stabilizing the economy to correct macroeconomic and external imbalances and to reduce inflation. The other addresses supply-side structural adjustments through policy reforms intended to eliminate policy distortions, liberalize trade, reduce the scope of the public sector and deepen financial markets. These reforms enhance the importance of the private sector and recast the fundamental role of government to that of providing the legal, institutional and regulatory frameworks that support markets and private economic activity. This book explains and evaluates this latter micropolicy reform process in Egypt's agricultural sector within an overall framework of macroeconomic stabilization and structural adjustment.

The costs as well as the benefits of economic transitions and policy reforms have become much more apparent. These costs arise from growing unemployment, falling real wages, higher prices for basic goods and social services, and widespread loss of economic security. At best these costs can slow the pace of the reform process and threaten the political commitment to the transition. At worst they can result in reversal of the reforms, as has occurred in several African countries. This dialectical tension between the benefits and costs of policy reforms in Egyptian agriculture and in the overall economy is explored in several of the following chapters.

Economic Transitions: What? When?

Egypt's socialism was a blend of the central-planning, state-ownership Soviet model with the policy-distorted capitalism of developing countries. Large, state-owned enterprises dominated industry, commerce, and banking. Agricultural producers, largely on small, privately owned farms, received subsidized inputs as in-kind credit from a state-owned bank and government-controlled cooperatives, followed a government cropping

plan, and delivered products to the same coops and bank at government-fixed prices. Strong import-substitution policies protected industry, overvalued official exchange rates, reduced export incentives and lowered costs of food imports. The negative effects of those trade and exchange-rate policies on Egyptian agriculture are documented in Chapter 4.

The Egyptian transition has included both stabilization measures and structural reform policies. The speed and success of Egypt's program should be assessed in light of the general guidelines for financial reforms and sequencing discussed in Chapter 2. Those principles resonate clearly in Egyptian agriculture, especially in relation to the real exchange rate. The author posits an incipient tendency for official and private capital inflows to cause the Egyptian real exchange rate to appreciate and thus to impair incentives for export and import-substitute production. Such exchange-rate appreciation would again adversely affect agriculture, whose products are mostly tradables or close substitutes for tradables.

International Agricultural Trade: Bane or Boon?

During the protracted negotiations on agricultural trade under the GATT Uruguay Round, much research indicated that anticipated reductions in agricultural subsidies in the United States and Europe would lead to higher international prices for cereals, meat and milk. Food importers such as Egypt would face higher prices and reduced availability of subsidized imports. Now that the agreement has been ratified, this concern has largely dissipated: The reductions will be sufficiently small and spread out over time to have little impact on world prices.

What the new trade environment does offer countries like Egypt is enhanced access to export markets for the high-value products in which they have, or can create, a comparative advantage. The important implications of these enlarged trading opportunities for domestic agricultural and trade policies in Egypt are provocatively drawn in Chapter 3.

Egypt's Agricultural Policy Polyphony

Agricultural policy reform is hardly ever accomplished through a few one-time decisions by an agriculture ministry. It is more often a protracted process of sequential actions involving all of the country's highest political authorities. When government intervention is pervasive and state participation extensive, many interrelated decisions are required, and impacts reverberate throughout all sectors of the economy. Chapter 4 provides a comprehensive and detailed overview of the nature and rationale of specific agricultural policy reform measures implemented in Egypt. Readers will become more aware of the complexity and path-dependency of policy decision-making.

It was neither simple to, nor obvious how to, meld many discordant public and private interests in Egypt into a harmonic reform process.

Taking Stock of the Policy Reforms

Policy reforms are means, not ends in themselves. They are expected to contribute to long-term objectives of economic growth and development. In Egypt in the pre-reform period, agricultural land and water resources were used inefficiently, output growth was inadequate for the consumption and export needs of the country, and rural households dependent on agriculture were too poor to create much demand for nonfarm production. How have output growth, income, employment and rural poverty changed in response to the reforms? Chapters 5, 6 and 7 give answers for the reform period, 1987-94. Detailed assessments of crop production responses, livestock production and rural income impacts are provided.

Liberalized, Not Perfect, Agricultural Markets

The most dramatic decision in regard to the private sector early in the reform period was to discontinue the monopoly distribution of fertilizer and chemicals by a state entity and permit private wholesale and retail sales. Private dealers responded by rapidly becoming dominant in fertilizer distribution. This change in market structure, and its effects on fertilizer prices and distribution costs, are discussed in Chapter 8. Second-generation problems of pricing, wholesale oligopoly and quality standards, along with the residual participation of the state-owned distribution organization, are identified.

In regard to agricultural outputs, initial policy actions freed prices for several minor crops and adjusted product prices toward international levels. Over several years, prices of major products were freed and markets were opened to private traders. Chapter 4 provides an illuminating case study of the complexity and difficulty of price and trade liberalization for Egypt's most important agricultural export, cotton. As domestic markets have been opened, concerns have arisen about their ability to efficiently discover prices with appropriate spatial and temporal patterns. As domestic prices have become more closely linked to border prices, fears that international price instability will be imported into domestic markets have intensified. Is there a need for new pricing policies to stabilize markets? Public services to support markets? Monitoring and regulatory programs? If so, what specific approaches are likely to be most cost effective? Chapter 9 surveys these crucial post-liberalization issues of market performance.

Before the reform period, government intervention in agricultural marketing extended to ownership of processing plants, distribution of subsidized foods in

public stores, and state monopoly storage and trading. State domination stunted private agricultural marketing and distorted market channels. The evolution of private agribusiness in the reform period is described in Chapter 10, which also assesses policy priorities for promoting private-sector processing, marketing and trade.

Public monopoly was nowhere more complete than in the provision of agricultural credit, where a state bank provided in-kind credit throughout the country by allocating subsidized inputs to producers to carry out the government's cropping plan. Shorn of input distribution, faced with paying positive real interest rates on loanable funds, and burdened with excess staff and physical facilities, the bank was challenged to reinvent itself as a viable credit institution. Its passage to a full-service rural bank offering a wide variety of financial services to a broad array of clients is advocated in Chapter 11.

How Macroeconomic Policies Matter

The Egyptian government has influenced agricultural prices both directly, by fixing or otherwise affecting producer prices, and indirectly, through trade and macroeconomic policies. Policies that affect the real exchange rate lower the prices of tradable goods, including agricultural tradables, relative to nontradable goods and services. Policies that provide industrial protection raise industrial prices relative to agricultural prices. Together, these policies discourage agricultural production by making farming less profitable than production in other sectors of the economy. Furthermore, they negatively affect investment, growth and income in the sector over time.

The effects of direct and indirect interventions in Egypt in the pre-reform period are recounted in Chapter 4. The agricultural policy reforms have substantially lessened the bias against agriculture from direct interventions. At the same time, as emphasized in Chapter 9, the reforms have exposed farmers and food consumers to the instability of world markets. Since 1987 Egypt has unified its exchange rates and devalued its currency. These actions decreased real exchange rate overvaluation, which raised returns for export and import-competing production. More recently, large capital inflows may be associated with real exchange rate appreciation, which could erode the incentive gains from the reforms. Moreover, continued high protection for domestic industry hurts agriculture by raising prices of manufactured inputs and of consumer goods purchased by farm households, and by exerting pressure for further appreciation of the real exchange rate. Chapter 12 uses a computable general equilibrium model for Egypt to analyze the interactions of indirect policy biases against agriculture with distortions due to direct price interventions. The policy reforms have greatly attenuated the latter while protection of industry remains high.

More Poverty, Less Food Security

The fiscal burden from food subsidies escalated so rapidly in Egypt that it led to macroeconomic imbalances that could be addressed only through fiscal reforms. Subsidy reductions have raised food prices and lowered food consumption of the population below the poverty line. At the same time, reforms in direct price interventions have exposed consumers, as well as producers, to world market instability. This means that in years of higher-than-average food prices, food-deficit rural and all urban households face additional real income losses.

Egypt's explicit food subsidies provided significant real income gains, especially to poor urban consumers, and fueled rapid growth in consumption by low-income households. Certainly the subsidies raised nutritional levels of the urban and rural poor. Because the country can no longer afford to subsidize food for its entire population, because falling real wages and growing unemployment are pushing more households below the poverty line, and because policy reforms are removing the bias against agriculture stemming from cheap food policies, the question arises: How can food security for the growing number of poor and unemployed be protected in ways that are fiscally and administratively feasible? This politically important question is the subject of Chapter 13.

Egypt's Agricultural Future

The main findings of studies of the agricultural policy reforms are synthesized in Chapter 14. In addition, that chapter makes recommendations for further macroeconomic, trade and agricultural policy reforms that will assist Egypt to accelerate its agricultural growth, achieve higher overall economic growth and reduce its proportion of poor people.

2

Issues in Financial Reforms and Sequencing in Economic Transitions

RONALD I. MCKINNON

From 1986 onwards, the centerpiece of Egypt's reform efforts has been the sweeping liberalization of agriculture. In 1979-81, China's dramatic move to break up its communes and institute the household responsibility system for improving productivity in agriculture received worldwide attention and paved the way for industrial growth. Egypt after 1986, like China after 1978, began its liberalizing reforms in the "right" place: in agriculture, where payoffs can come quickly. Unlike the situation with China, however, the outside world has yet to recognize fully how badly Egypt's agriculture had been repressed and how remarkable the reforms are that have occurred.

In 1987, the Egyptian government began experimenting with some liberalization of trade and domestic prices for industrial goods. In 1991, in response to a surge of inflation and a balance-of-payments crisis, it adopted a comprehensive Economic Reform and Structural Adjustment Program. By reducing public sector deficits and the rate of inflation, this new program is making heartening progress in controlling Egypt's macroeconomy. But much remains to be done in privatizing and decentralizing the industrial sector, which remains largely in the hands of the government as a source of patronage and employment. And, as substantial foreign private capital is now flowing into the Egyptian economy, the problem of how to prevent increased currency overvaluation remains to be resolved.

In this chapter, I begin my outsider's perspective by focusing on the cycle of repression and reform in Egyptian agriculture, although Egyptian and USAID colleagues know the story much better. Then, with particular concern for the proper order of economic liberalization, I turn to Egypt's complementary reforms in finance and foreign trade, with references to the experiences of other countries.¹

I conclude my analysis by discussing two related financial problems facing the Egyptian economy. The first is the potential problem of "overborrowing" in international capital markets as Egypt liberalizes its foreign exchange markets at a time when its domestic reforms appear to be improving the economy's future. The second is the acute problem the Egyptian authorities face to get the exchange rate "right" now that a major stabilization program is already in place.

The Repression of Egyptian Agriculture

Agriculture was never fully collectivized in Egypt in the sense that it was in the former Soviet Union or in China before 1979. Beginning in the early 1950s, however, production and distribution came increasingly under control of the state, although independent and tenant farmers continued as formal legal entities. By the early 1980s, this 30-year process of increasingly pervasive government regulation and control had left agriculture extremely repressed. Government-dictated cropping patterns were enforced by mandatory area controls and crop-delivery quotas. Farmers were obliged to deliver all of their crops of cotton and sugarcane to the government; for other crops, such as beans, lentils, sesame and groundnuts, high proportions had to be delivered to government pooling centers, although the remainder could be sold in parallel private markets. The domestic prices paid for these mandatory deliveries were generally set 40 to 60 percent below international border prices at the prevailing exchange rate. Even for those crops with no direct price controls, such as livestock and feed grains, and for the parallel private markets in other crops, high industrial trade protection and an overvalued currency tended to reduce the relative prices that farmers saw.

To some extent, these adverse effects on the farmers' terms of trade were offset by government-controlled subsidies on important inputs such as water, seeds, fertilizer and credit, with distribution at no cost or at below-market prices. But this just completed the circle of pervasive bureaucratic intervention in agriculture. Because outputs were procured, and inputs distributed, at nonmarket prices, detailed bureaucratic rules proliferated on both the output and the input side as to what farmers could or could not do. How much any one farmer could borrow (at concessional terms) would have to be predetermined bureaucratically by land size, kind of crop, and his "need" for modern inputs. And the two sides were juxtaposed in the sense that state agencies often bartered below-market inputs as a lever for enforcing delivery of farmers' crops at procurement prices well below world levels. Then, the commercial processing of farm outputs was monopolized by authorized state processing plants.

To a remarkable extent, this nationalization of agricultural trade and finance had been institutionalized in what is now called the Principal Bank for Development and Agricultural Credit (PBDAC), as described by Dale Adams and Ali Kamel elsewhere in this volume.² Although the PBDAC began life in 1931 as a

more-or-less conventional state-sponsored bank for providing low-interest rural credit, after the revolution of 1952 it was redirected to support land "reform"—a process that evolved into mandatory delivery systems for most crops. By 1976, and some reorganizations later (as described by Adams and Kamel), the Bank had become virtually the sole formal agricultural lender and had been given a monopoly over providing most modern farm inputs under the aegis of the Ministry of Agriculture. The PBDAC saturated village lending with hundreds of village banks to reach almost 80 percent of all farmers with concessional credit lines and built thousands of stores and warehouses to distribute inputs, largely as in-kind loans in return for crop procurements at prices fixed by the Ministry. The Bank also acted as a tax-collecting agency in obtaining tax monies to finance irrigation and land reclamation schemes, although the agricultural land tax was also a significant source of revenue for the rest of the economy.

In summary, on the production side, this bureaucratic intervention stifled Egyptian agriculture by severely limiting the scope for private initiative. Prices were arbitrarily determined by the government rather than by markets, and the terms of trade were directly and indirectly turned against Egyptian agriculture. Although many agricultural products were natural export goods, such as Egypt's famous long-staple cotton, commodity exports showed little or no growth. Domestic production of foodstuffs was insufficient to keep up with Egypt's burgeoning population.

Correspondingly, on the consumption side, there has been a long history of official intervention in food distribution. The Ministry of Supply and Internal Commerce purchased locally produced crops and was the sole importer of food items. In the early 1980s, flour, sugar, tea, cooking oil, rice, beans, lentils, meat, poultry and frozen fish were sold at subsidized prices under a food rationing scheme. And, of course, Egypt long provided one of the world's most famous examples of inverted pricing: Although bread itself was not rationed, it was subsidized and priced too low relative to the costs of grain inputs and milling flour. As a result, people overate bread as well as using it for cattle feed.

The Liberalization of Egyptian Agriculture

In 1986, compulsory procurement ended for all crops—with the exceptions of cotton, sugarcane and rice—and compulsory paddy procurement was ended in 1991. Floor prices for optional procurement were set for most major crops and, by 1993, virtually all input subsidies (including exchange rate subsidies for imported inputs) and crop area controls had been eliminated, although pest control and regional allocation of cotton varieties were still influenced by the government. In 1994, the private sector began to compete with the public sector in buying, selling and ginning seed cotton, although the old administrative marketing will continue before full liberalization takes place. For other crops, however, government restraints on private importing

or exporting of outputs and inputs—or participating in domestic trade—have been largely removed. Finally, the system of land tenancy is being reorganized so that, after an initial substantial boost, rents charged tenants will gradually rise to market levels over a five-year period.

Few countries have ever managed such a remarkable turnaround in their agricultural policies. Although it is too early to assess the full impact of these sweeping reforms, Khedr, Ehrich and Fletcher note in this book³ that since the early 1980s the domestic market prices of the major crops wheat, maize, rice and cotton have all risen in nominal terms. They are now close to border prices at the prevailing (unified) exchange rate. But there is a potentially disquieting aspect to these price movements. After increasing from 1981 to about 1991, “real” farmgate prices, i.e., those prices adjusted by the GNP deflator, subsequently have fallen somewhat. (This could reflect a problem with exchange-rate overvaluation—an important subject to which we shall return.) Even so, the liberalization has led to significant increases in the outputs of wheat, maize and rice (Khedr et al. 1995), although the situation with respect to cotton is less clear as mandatory planting requirements are phased out.

To an outside observer, one of the more fascinating aspects of denationalizing agriculture is what happens to the agent of nationalization. In Egypt’s case, this agent was largely the PBDAC. In this volume, the needed comprehensive transformation of this giant bureaucracy is covered in Chapter 11. The basic thrust of their argument, more or less reflecting what the Egyptian government (correctly) wants to achieve, is that the PBDAC should dispose of its warehouses and the stores it uses for selling of inputs and buying of outputs, in order to become a “pure” bank. The PBDAC has the major problem of redeploying its now largely redundant labor force into banking or into retirement from the organization altogether.

By collecting deposits, clearing payments, and making commercial loans, the PBDAC would remain by far the biggest financial institution serving agriculture. But, under the Adams and Kamel model, it would have neither special monopoly powers as a lender nor any government mandate to subsidize this or that farming activity.

Financial Guidelines for the Redeployed PBDAC

Considering the PBDAC as a pure bank, what major changes must it undergo? Use of subsidized credit lines from outside donors or from the central bank must be phased out, and loan officers cannot be allowed to continue to use the provision of subsidized inputs as in-kind credit to enforce repayments. Instead, the Bank must become an active agent for collecting deposits at close to market rates of interest and making unsubsidized loans according to commercial criteria. Although the PBDAC is now borrowing at close to market rates from other financial institutions, eventually it

must be constrained by its deposit base, currently less than two-thirds of its loans outstanding (Adams and Kamel 1995), less some "normal" reserve requirement, from which it is currently excused because of the continuing high degree of redundancy in its labor force.

The renaissance in Egyptian agriculture from improved terms of trade *and* increased monetization greatly facilitates this transformation of the PBDAC. The increase in cash incomes of farmers gives them the wherewithal to build up their financial asset positions, mainly in currency and bank deposits. The elimination of bartering outputs for inputs and credit increases the farmers' transactions demand for money, and greater price fluctuations in the open markets increases their precautionary demand for money. By providing attractive cheque-clearing and custodial services on the one hand, and positive real rates of interest on various classes of savings deposits on the other, the PBDAC could easily accommodate these new demands.

In fact, the liberalization of agriculture suggests a sea change in the nature of financial services that the PBDAC provides to small farmers. Saturating the countryside with credit lines for virtually all farmers—large and small—is not commercially feasible once these credits are no longer subsidized and once repayments cannot be enforced by direct controls over both inputs and outputs. On the basis of any reasonable profitability criterion, the administrative costs, including those incurred by the farmers themselves in loan applications, of formal bank lending to very small farmers is now prohibitive. This has been the experience of countries the world over. The provision of small loans to very small farmers may be feasible from, say, fertilizer suppliers (as seems to be happening now in Egypt as new firms enter the input supply business and are willing to provide ordinary trade credit), money lenders, family friends and small rotating credit associations, but not from formal banking institutions like the reformed PBDAC.

Even if loans to very small farmers are no longer feasible, deposit mobilization can still occur if attractive rates of return are provided on liquid deposits at convenient locations throughout rural Egypt. The PBDAC can, in competition with commercial banks, provide deposit and payments services to farmers large and small who no longer borrow from the Bank but who may now self-finance input purchases by keeping their average (interest-bearing) cash balance holdings quite high before drawing them down. From this deposit base, the PBDAC could lend to new agricultural processing industries and to private merchants who warehouse inputs and outputs, where loans are substantial in size and commercially feasible. Indeed, light manufacturing that draws heavily on rural labor, but whose outputs are not particularly agricultural, could borrow at sufficiently high rates of interest to keep yields on PBDAC deposits attractive and positive in real terms.

Is this all "pie-in-the-sky"? Although one can cite historical examples from 19th century Europe, the United States, or even Japan, of such deposit mobiliza-

tion from small-holder agriculture, the most striking recent example is that of China after the decollectivization of its agriculture in 1979-81. Besides dismantling the communes to return people to family farming, the Chinese government sharply raised its procurement prices for both voluntary and mandatory deliveries as well as freeing farmers to sell the residual portions of their crops on village markets while becoming responsible for purchasing their own inputs. Because of a history of price-level stability in China in the 1970s that carried over essentially through the 1980s (McKinnon 1993) and nominal interest rates of about 5 to 6 percent on time deposits in the early 1980s, rural household deposits increased by about 40 percent per year from 1978 to 1984. Farmers also dramatically increased their holdings of noninterest-bearing cash balances.

What caused this sudden upsurge in the demand for money in China? By 1980, newly independent Chinese farmers found themselves undermonetized for their new role as independent entrepreneurs who were suddenly responsible for the purchases of their own inputs. With the abrupt dismantling of the communes that had provided implicit financial and commercial services, the rural banks were not at all set up to lend to rural households, and negligible lending to Chinese farmers resulted. Chinese farmers therefore had to finance themselves by building up their cash balance positions, which they did in a remarkable fashion that allowed agricultural output to increase at about 8 to 9 percent per year from 1980 to 1984.

Because lending back to farm households was negligible in the 1980s, rural banks in China found themselves with excess reserves. Initially these were mainly returned to the government. But, by the mid-1980s, the newly augmented lending capacity of the rural banks was used, in part, to support the rapid development of rural light industry outside the web of bureaucratic controls that restricted and protected the old state-owned enterprises (SOEs). Initially set up as industrial monopolies, these old SOEs had been owned and controlled by higher levels of government: China's central, provincial and sometimes county-level governments. In contrast, the new, more market-driven, rural enterprises were either private or sponsored by local governments. By employing rural labor directly in the countryside, these township-village enterprises (TVEs) became, many observers believe, the most remarkable aspect of China's rapid industrial growth.

Macroeconomic Conditions for Sustaining the Liberalization: The "Overborrowing" Problem

So what overall lessons does China's experience have for Egypt? First, if price inflation is modest or absent, deposit mobilization in rural areas is much easier. In the late 1980s and early 1990s, Egypt's high inflation rate of over 12 percent per year militated against such deposit mobilization. Fortunately, with Egypt's Economic Reform and Structural Adjustment Program in place, inflation seems to have come down in 1994 and

1995. Positive real interest rates on deposits should become easier to sustain, thus making it easier for small farmers to finance their own on-farm investments.

Second, sustaining improved terms of trade for farmers (or at least not having farm prices artificially depressed) is extremely important if growth in agricultural productivity is to be preserved. (In the late 1980s and early 1990s, productivity growth in Chinese agriculture slowed as the terms of trade became much less favorable.) With Egypt's now fairly liberalized international trade in agricultural products, the average price received by farmers as a group hinges very much on whether or not the exchange rate is overvalued. As mentioned previously, the evidence presented in Khedr et al. in this volume is that farmgate prices (in real terms) increased from about 1981 to 1991 and subsequently have fallen somewhat. Therefore, perhaps it is no accident that major real devaluations of the Egyptian pound occurred between 1988 and 1991; however, despite substantial cumulative inflation of about 12 percent per year since then, the nominal exchange rate has been stable at about 3.3 to 3.4 pounds to the dollar.

For an outsider to suggest a "correct" valuation for Egypt's exchange rate is entirely out of place and beyond the scope of this chapter. Later I discuss the crawling peg as an alternative way of organizing the foreign exchanges. Because controlling inflation is as important as getting the exchange rate right, the Egyptian monetary authorities face an uncomfortable dilemma at present.

To avoid exchange-rate overvaluation, the main effort to disinflate the Egyptian economy should be an attempt to restrain domestic demand rather than relying on the exchange rate itself as the principal nominal anchor. Continued fiscal consolidation as well as restraints on central and commercial bank credits are in order. But a major potential problem here is that the economy may be trying to absorb too much foreign capital, either in the form of official grants in aid or as private capital inflows, which could undermine the efforts of the monetary authority to keep the lid on the expansion of domestic bank credit.

Insular economies, as Egypt's economy once was, that embark on a major domestic liberalization and opening to foreign trade bear substantial risk of suffering from what I call "the overborrowing syndrome," which is explained in more depth in the appendix to this chapter. First, foreign and domestic entrepreneurs suddenly have the opportunity to combine modern production techniques with low-wage labor to produce a wide variety of goods and services for world markets. In these newly opened industries, substantial discrete start-up costs lead to major demands for foreign and domestic finance, as well as foreign technology. Second, if the reforms are credible, people project that their future incomes will be higher, and their prospects brighter, than previously believed. Thus they may borrow against their imagined higher future incomes—if the capital markets will accommodate them—in order to increase current consumption.

But nothing I have yet discussed indicates *overborrowing*. If (1) these projections of high investment payoffs and higher future household income are fairly certain and (2) individual enterprises and households have hard-budget

constraints where repayment of debt is strictly enforced and (3) the banks and other financial institutions are free of moral hazard associated with deposit insurance and low or negative net worth, then otherwise unrestricted borrowing by households and firms should improve Egyptian welfare. True, current domestic saving might fall even as an investment boom is taking place. But, if (1) and (2) hold, the capital market will naturally limit “excess” consumption in the form of, say, consumer durables, as well as limiting “excess” investment in producer goods.

However, if the three conditions are violated, then the economy is prone to the overborrowing syndrome, as was seen in Chile in the late 1970s and in Mexico from 1988 to 1994. Too much foreign capital can generate huge current-account deficits, exchange-rate overvaluation, a collapse in domestic saving, and a future debt crisis. The nature of a full-blown business cycle based on excessive foreign borrowing, and what to do about it, are laid out in the appendix—which in turn is a nontechnical summary of a much longer paper on the subject.⁴

As of mid-1995, the overborrowing problem in Egypt appears to be more incipient than actual. Nevertheless, the more the government restricts domestic bank credit, the greater will be the pressure for inflows of short-term private capital. Thus, at this stage in sequencing Egypt’s liberalizing reforms, I would suggest that the authorities keep tight controls over private capital inflows, particularly at short term, as they move purposefully to restrict domestic demand. In addition, the authorities must be careful not to overabsorb official development assistance, which can also contribute to exchange-rate overvaluation.

“Post Stabilization”: A Downward Crawl for the Exchange Rate?

If Table 2.1 continued into mid-1995, it would suggest that the cumulative real appreciation (using the CPI as a deflator) of the Egyptian pound against the US dollar may have been over 40 percent between the end of 1991 and the middle of 1995. Although the real exchange rate may have been overly depreciated in 1991, the current regime of an almost-fixed nominal exchange rate, coupled with ongoing moderate inflation of 8 to 10 percent, is neither sustainable nor desirable.

Increasing exchange rate overvaluation, leading to a continuing fall in real farmgate prices, jeopardizes Egypt’s agricultural reforms in numerous ways. Rural distress could trigger attempts to reinstate subsidized farm credit programs or to block competitive imports of farm goods. In addition, as market prices fall toward the official price floors that exist for many important crops, government reintervention in purchasing and marketing crops might again become the norm. Political pressure to subsidize consumers and commercial exports could then play havoc with the public exchequer.

This “post-stabilization” problem that Egypt faces is not unusual. Other

Table 2.1 Inflation, nominal exchange rate devaluation, and domestic and foreign nominal interest rates (1991–1994, percent)

Year/Quarter	Annualized inflation	Exchange rate devaluation against the US\$	Nominal interest rate		
			Domestic (LE)	Domestic (US\$)	Foreign (*)
1991.1	12.7	17.1	16.1	8.0	6.9
1991.2	17.3	20.3	18.5	7.6	6.3
1991.3	22.2	20.5	19.4	6.1	6.0
1991.4	25.4	17.3	19.0	6.0	5.0
1992.1	23.8	9.2	18.3	5.5	4.3
1992.2	14.8	3.1	17.8	5.3	4.2
1992.3	9.1	1.0	17.3	4.6	3.5
1992.4	9.1	0.3	16.6	4.6	3.7
1993.1	11.9	0.6	16.1	4.6	3.4
1993.2	13.9	0.7	15.2	4.3	3.4
1993.3	12.4	1.1	14.7	4.3	3.4
1993.4	10.3	1.3	14.5	3.9	3.5
1994.1	7.4	1.1	13.7	3.9	3.7
1994.2	6.5	1.3	12.6	3.9	4.8
1994.3	8.2	0.9	11.6	4.3	5.0

Source: Unpublished data from USAID/Egypt and CAPMAS.

*Corresponds to the 90-day CD rate in the U.S.

developing countries have had stabilization programs, often associated with large devaluations to restore international competitiveness, to overcome high inflation coupled with major budgetary and balance-of-payments crises. After their initial success in overcoming the major crisis, however, governments become loathe to devalue further for fear of rekindling more inflation. So, despite substantial residual inflation, nominal exchange rates are typically kept fairly constant for some months or years afterwards. And so it has been with Egypt since 1993 (Table 2.1). Reform governments everywhere, not only in Egypt, see the newly fixed exchange rate to be “the” nominal anchor for the price level: an instrument for squeezing out residual inflation.

In developing countries, however, more often than not inflation is *not* squeezed out altogether after a major, and seemingly successful, stabilization program. Why moderate “residual” inflation often continues in the face of a fixed nominal exchange rate is not completely understood. I list three possibilities, which are not mutually exclusive. First, a moderate inflation tax may be necessary to cover an undisclosed gap in the public finances. Second, although governments may be frightened enough to clamp down when an inflationary explosion and major balance-of-payments crisis threatens, they are typically unwilling to face down domestic inflationary pressures—e.g., wage claims—of the “moderate” variety. Third, strong (incipient) pressure from international capital inflows may force undue credit expansion on the economy: the overborrowing syndrome, discussed in the appendix.

Whatever the source of the residual inflation problem, let us consider two countries—Chile and Israel—that encountered it and then dealt with it fairly

successfully. Israel in 1985-87, and Chile in 1982-84, both faced major financial crises that required sharp devaluations accompanied by serious fiscal consolidations and banking reforms, after which they stabilized their nominal exchange rates. But, in contrast to what the reformers had hoped, inflation did not fall to the international level in either country. Instead, CPIs continued to increase about 10 percent per year, plus or minus 2 or 3 percentage points.

Post stabilization, neither the Israeli nor the Chilean government was willing to see its agriculture and industry become increasingly less competitive as moderate inflation proceeded under a fixed exchange rate. So, *subsequent to* their main stabilization effort and discrete exchange rate adjustments, both introduced smoothly downward crawling pegs. Until as late as 1993, both maintained controlled downward crawls in their currencies, sometimes varying the cumulative rates of crawl on a year-to-year basis. Only as their domestic "residual" inflation subsided, however, did they begin to slow, and for Chile even reverse, the rates of nominal exchange depreciation that existed as of 1994.

Today, it is widely acknowledged that, since the late 1980s, both Chile and Israel have been remarkably successful in stimulating a wide range of new agricultural and industrial exports that have sustained very high rates of growth in real GNP. However, even by mid-1995 inflation had not yet been fully phased out of either economy.

Might not such a post-stabilization exchange-rate strategy be appropriate for Egypt? Clearly, this is not the place to go into the technical details on how a putative downward crawling exchange rate for the Egyptian pound should be managed, or could be introduced. That would require separate, and much more empirical, research. Without much explanation, I just list the principal considerations that would enter into any decisions that the Egyptian government might take on a crawling peg.

1. The government adjusts the central parity every two or three days in amounts so tiny that they are below the transactions costs that speculators face. Unlike discrete exchange rate changes, such adjustments are not accompanied by crises or speculative runs.

2. The band around this crawling central parity can be of greater or lesser width. In Chile, the exchange margins have been as much as plus or minus 5 percent, whereas in Israel they have been narrower.

3. Over the course of a quarter, or even a year, the government can set the cumulative amount of exchange depreciation passively or actively:

- a. in a passive decision rule, the cumulative rate of crawl corresponds mechanically to the past cumulative inflation in some pre-specified price index, such as the officially announced rate of inflation in the CPI in the previous quarter;

- b. in an active decision rule, the government adjusts the rate of crawl so

as to consciously influence the “real” exchange rate. As in Chile in the mid-1980s, the rate of nominal depreciation could be (slightly) greater than anticipated domestic inflation in order to yield some cumulative real depreciation.

4. Before introducing the new exchange rate regime, suppose the authorities determine that the current exchange rate was substantially overvalued. Then, beginning with a moderate discrete devaluation of, say, 10 to 15 percent would obviate the need for “overadjustment” in the subsequent rate of downward crawl. There is a tradeoff between the speed of active crawl and any initial discrete exchange rate adjustment.

5. Strong exchange controls, covering both outflows and inflows of financial capital, would be necessary to manage this exchange rate regime. But these capital controls do not preclude achieving current-account convertibility under the IMF’s Article VIII, which remains highly desirable.

6. After a downward crawl is introduced and is expected to last indefinitely, the exchange rate is no longer useful for anchoring the domestic price level. Instead, the authorities must redouble their efforts to disinflate by domestic means, including fiscal and monetary policy.

To illustrate point 6, an unexpected surge in inflation of about 13 percent in Israel’s CPI from the first quarter of 1994 to the first quarter of 1995 forced the Bank of Israel to undertake a draconian tightening of domestic monetary policy. The central bank’s discount rate increased from 10.5 percent in the first quarter of 1994 to 17 percent in the first quarter of 1995. But this extreme, and ultimately successful, tightening of Israel’s domestic monetary policy was possible only because of tough restrictions on capital inflows (point 5 above). These gave the Bank of Israel room to maneuver, albeit temporarily, domestic interest rates to levels far above those prevailing in international markets. Even so, some additional foreign financial capital did come in, as manifested in the unwanted buildup of over 2 billion dollars in the Bank’s foreign exchange reserves in this period.

In conclusion, the main advantage of a post-stabilization crawling-peg exchange regime for Egypt would be, potentially, to give the government much better control over the real exchange rate. Avoiding real exchange rate overvaluation is vital if the remarkable liberalizations in Egypt’s agriculture are to be preserved and strengthened and if the government is to move ahead in liberalizing the industrial sectors of the economy. The main disadvantage of an ongoing crawling peg for the nominal exchange rate is that it places a heavier burden on domestic monetary policy to anchor the (nominal) price level. Indeed, a close look at the adequacy of domestic monetary control mechanisms should be part and parcel of any official assessment of whether or not a crawling peg for the Egyptian pound should be seriously considered.

Notes

1. This part of the chapter summarizes material covered more extensively and in analytical detail in McKinnon 1993.
2. Adams, D., and A. Kamel, "Financial Reforms and Rural Credit: PBDAC'S Evolving Role," Chapter 11, this volume.
3. Khedr, H., R. Ehrich and L. Fletcher, "Nature, Rationale and Accomplishments of the Agricultural Policy Reforms," Chapter 4, this volume.
4. McKinnon and Pill 1995.

References

- McKinnon, R. 1993. *The Order of Economic Liberalization: Financial Control in the Transition to a Market Economy*, 2nd ed. Baltimore: John Hopkins University Press.
- McKinnon, R., and H. Pill. 1995. "Credible Liberalization and International Capital Flows: The Overborrowing Syndrome" in *NBER Fifth Annual East Asian Seminar in Economics*, edited by T. Ito and A. Krueger. Chicago: University of Chicago Press.

Appendix

The Overborrowing Syndrome

When undertaking reform and stabilization programs, countries are prone to excessive foreign borrowing, which ultimately proves unsustainable. This phenomenon has been variously labeled the "overborrowing syndrome" and the "Walters' Critique." This appendix is a nontechnical summary of a longer paper by McKinnon and Pill, mentioned earlier.

The McKinnon and Pill paper outlines a model, consistent with rationality on the part of private agents, in which financial market failure causes short-run deviations from sustainable behavior. Because banks fail as efficient information conduits between depositors and borrowers, excessively optimistic expectations about the success of reform are created among domestic residents, international investors and the policy authorities. Initially such optimism is borne out by improved economic performance and large inflows of foreign capital. It is only later that sustainability conditions bind and the economy collapses into a recession, financial crisis and capital flight.

Such a boom-and-bust cycle associated with excessive foreign borrowing in Mexico (1989-95) is a case in point. But LDCs, such as Chile in the late 1970s and early 1980s, offer many other examples. Even mature industrial countries embarking on what seemed to be highly credible liberalization programs, such as Margaret Thatcher's Britain in the 1980s or Spain after 1987, were swamped with capital inflows as stock and property markets boomed, before having to devalue in an economic downturn with asset deflation as capital flowed out.

Some Stylized Facts

Although all these factors are not universally associated with overborrowing problems, the main distinguishing features of an overborrowing episode include:

- Rapid growth of domestic credit, largely financed out of capital inflows intermediated through the domestic banking system, leading to higher levels of domestic consumption.
- Widening of the current account deficit on the balance of payments, when greater availability of financing from abroad eases balance-of-payments constraints.
- Weaker domestic monetary control and rising or sustained high domestic price inflation, typically associated with inability to separate the capital inflows from the domestic money supply.
- Appreciation of the real exchange rate, appropriately defined, with higher

inflation concentrated in the nontradable goods sector; typically, increased prices of domestic assets, especially land or housing prices.

- Growing deposits from overseas placed with the domestic banking system, which increase pressure on the government to broaden the base of insured deposits.
- Greater vulnerability to adverse shocks from the buildup of foreign debt and increased likelihood that the stabilization program will be derailed.
- Culmination of the overborrowing episode in a financial crisis, capital flight and recession, often forcing an uncontrolled, deep devaluation of the currency followed by a resurgence of inflation.

A fiscal improvement (consolidation) would normally be expected to reduce capital inflows as the total public borrowing requirement falls and less public debt is sold abroad. In the context of an overall liberalization program where the economy is apparently escaping from repression, however, fiscal consolidation apparently acts as a signal to international investors that the overall reform program is credible, as if the government is indeed getting the order of economic liberalization right (McKinnon, 1993). As such, the fiscal reform stimulates capital inflows.

The Model

An explicit two-period intertemporal optimization problem for consumption and investment decisions is the heart of McKinnon and Pill's theoretical framework. This formal structure explicitly describes the nature of information conditions, the special role of the banking system and the nature of market failure in the banking system. This micro-foundations approach focuses on a very specific form of market failure, namely, that induced by government guarantees of bank deposits.

Although future incomes are particularly uncertain in the liberalizing economy, deposit insurance or other bailout provisions for the banks induces economic agents to act as if bad outcomes were not possible. Thus, they act as if their gains in expected income in the future are higher than any fair bet would suggest, and they borrow too much to support current consumption and investment. This analytical approach does not, however, handle broader macroeconomic issues such as the control over the money supply or exchange-rate policy. Indeed, the results are robust in the sense they would hold whether exchange rates are fixed or floating.

The formal structure introduced by the adoption of a microeconomic foundations approach focuses attention on the forward-looking aspects of the model. If a rational-expectations approach to solving the model had been used, this would rule out the short-term deviations from sustainable behavior that appear to characterize the data. In this context, the rational-expectations paradigm is an

intellectual straitjacket rather than an aid to understanding the issue at hand. Because rational expectations require all participants in the economy to share the same structural model of economic behavior, they rule out the possibility that certain agents could become overly enthusiastic about the nature of the reform process and thus undertake what turn out to be suboptimal intertemporal choices when the true underlying model of the economy is revealed.

Within the rational-expectations framework, on average an individual's expectations of future income will be correct; the problems associated with overborrowing are just a manifestation of bad luck. Yet overborrowing recurs in all types of countries undertaking reform programs. This suggests more systematic forces than pure luck are at work. In explaining the self-sustaining macroeconomic forces underlying the creation and maintenance in the reforming economy of a "triumphalist euphoria" among firms, households and even the government, this McKinnon and Pill paper suggests what these systematic effects appear to be.

The rational-beliefs approach, if adopted, both encompasses and extends the notion of rational expectations.¹ Persistent deviations from long-run sustainable behavior are possible if the model on which they are based cannot be refuted with observable data. Because our two potential models—one embodying market failure in the financial system, the other reflecting an especially favorable realization of the underlying productivity shock—are observationally equivalent when consumption and investment decisions are being made, neither can be refuted with observed data when decisions are made. Therefore, both are consistent with the equilibrium implied by rational beliefs. Individuals make intertemporal decisions that are ultimately inconsistent with long run sustainability but that appear sustainable based on the model of the economy believed to be true when the decisions are being made. There is nothing irrational about such behavior; it merely turns out to have been wrong *ex post facto*.

More important than this theoretical nicety, this approach appears to capture the essence of behavior during overborrowing episodes. Domestic residents become enthusiastic about the success of the reform program. The reasons for this enthusiasm include the loose state of domestic credit conditions, which are typically interpreted (explicitly or implicitly) as a signal from the financial system that the reform process is achieving its desired results. Domestic firms and households borrow, consume, and invest heavily, since they believe that the possible returns have increased. The enthusiasm for the reform process is initially substantiated by the buoyant state of the macroeconomy and the associated large inflow of foreign capital.

However, the signals from the financial system may have been wrong for several reasons. We focus on market failure issues relating to deposit insurance. Other explanations would include inexperienced and naive bank employees; poor management, internal control and audit systems; and fraudulent behavior by bank staff. Eventually, the true underlying state of the economy is revealed (possibly

exacerbated by an unlucky shock) and the unsustainability of earlier behavior is apparent. A sharp correction is then required, which is generally associated with financial crisis among overextended banks, default on outstanding debt, exchange devaluation, falls in aggregate demand and a prolonged recession.

Policy Implications

How should policymakers respond to the possibility of overborrowing in the course of an otherwise successful liberalization program? Improved banking regulation with higher capital and reserve requirements could help. However, such measures are unlikely to prove fully effective, given the banking industry's inherently asymmetric information structure. The authorities may wish to undertake other financial controls to limit the potential for damage should overborrowing arise. Controls on cross-border movements of financial capital are one appropriate tool. This summary of policy options draws on the experience of East Asian countries that have successfully liberalized.

- *Restrain short-term capital flows*, particularly those intermediated through the domestic banking system (as in Japan in the 1950s and 1960s). The preferred policy instrument is probably reserve requirements rather than direct administrative controls. These level the playing field between domestic and foreign sources of funds and are harder to evade. Marginal reserve requirements could be increased if capital inflows become unduly large.

- *Be more liberal with "direct" investment*, perhaps in the form of joint ventures with domestic partners. Direct investment brings new technology into the economy and bypasses the banking system, thus avoiding the market failure problems discussed above.

- *Limit organized consumer borrowing*—for example, on bank credit cards—and *restrict access to mortgage finance* (as in Japan and Taiwan through the 1970s). Such measures should help to prevent runaway excess demand for consumer durables and nontraded services, which might reignite inflation.

- *Consolidate compulsory social security contributions into a Singapore-style provident fund*. A fully funded compulsory saving program, geared to preventing the dramatic falls in private saving seen during overborrowing episodes, should be considered earlier rather than later in the liberalization process.

After Chile's overborrowing debacle in the late 1970s through 1981, all of these measures were subsequently introduced there during the 1980s. During the successful recovery of Chile in the 1990s, these measures have helped to sustain domestic saving and prevent exchange rate overvaluation when pressure from capital inflows (now largely incipient) again have become very great.

The example, given earlier, of several successful East Asian economies that avoided the overborrowing problem during their liberalization programs in the 1960s and 1970s suggests the policy conclusions of our analysis are appropriate in the context of stabilization and liberalization policies currently being introduced in Latin America, India, Egypt and elsewhere.

Note

1. Associated, in some unpublished papers, with Mordecai Kurz of Stanford University.

3

Gaining from the GATT: Domestic Agricultural and Trade Policy Reforms in Developing Countries

JOHN W. MELLOR

Developing countries have a major new opportunity to use their agricultural resources more productively because of the establishment of the World Trade Organization and agricultural trade reforms recently negotiated under the GATT. Before they can seize this opportunity, however, they must have appropriate agricultural policies, and their institutions must be geared to implement those policies. Institutional adaptation is of the utmost importance at this juncture. Without it, the opportunity for vast improvements in productivity, income and social welfare will be lost, and many countries will sink ever deeper into an economic morass under the pressure of competition from those that do adapt to the new conditions. The choice developing countries face today is all too clear: Adapt and be much better off, or don't adapt and be worse off.

Under the GATT Uruguay Round agreement, reforms in agricultural trade are to be phased in slowly. Developing countries will in any case need time to shift their policies to take advantage of these changes. Meanwhile, industrialized countries are likely to wield market power and adjust to a lesser extent than the agreement calls for, which means that the World Trade Organization will have to be ever vigilant to ensure that the agreement is enforced evenhandedly. Fortunately, this new trade organization offers developing countries a more sympathetic forum for redressing their agricultural trade grievances than has been available to them until now.

The expectation of benefits from trade liberalization under the GATT is based in part on likely new opportunities for nontraditional exports. Agriculture certainly has immense potential for generating such exports but is now hindered from doing so by overvalued exchange rates and price distortions in many

developing countries. The opportunities lie mainly with high-value agricultural commodities, and developing countries have already begun increasing their share of world trade in these commodities. Whereas their share of exports declined in practically every major trade category from the early 1960s to the mid 1980's, their share of horticultural exports increased, from 33 percent in 1961-63 to 37 percent in 1983-85 (Table 3.1). Over this same period, horticulture as a share of total agricultural exports rose from 9 percent to 13 percent in these countries, and horticultural exports grew at the rate of nearly 9 percent a year. One country that has a clear comparative advantage in horticultural exports, and that can therefore benefit greatly from these trends, is Egypt.

Many countries, it should be pointed out, have long experimented with policy reform, but their efforts take on added urgency in the context of the new GATT rules and of the GATT's opening up of agriculture to liberalized trade. This liberalization is expected to bring agriculture closer to obtaining the full benefits of international comparative advantage and, at the same time, to increase the efficiency of production for even those agricultural products that are not likely to come into a liberalized trading regime. Agricultural policy reforms are therefore even more important than they were under the old trading rules.

In countries such as Egypt, which have a highly specialized and productive agricultural resource base, trade is vital to the economy. Egypt is unable to achieve comparative advantage in a wide variety of commodities because it does not have the broad range of agricultural production conditions found in many other countries. Thus, compared with other countries, Egypt should find it advantageous to trade a larger proportion of agricultural output. Of course, a distinction must be made between the range of commodities that Egypt has the agronomic potential to produce (that range is immense) and the range for which it enjoys or can develop a comparative advantage and thus for which major gains are to be realized from trade (that number is much smaller, and, as will be explained, the new trade economics suggests it is even smaller than was previously thought). When compared with the resource base on which expectations for Egypt are calculated, a very small proportion of Egypt's agricultural output is traded now. This low level of trade is an indication of the effects of past

Table 3.1 Developing countries' share of horticultural exports, 1961-1985 (percent)

	Share		
	1961-63	1975-77	1983-85
Share of developing countries in world horticultural exports	33	32	37
Share of horticulture in total agricultural exports of developing countries	9	10	13

Source: Based on Islam 1990.

distortions and Egypt's vast opportunities to benefit from its reforms and from the new trade opportunities.

New Rules of the Game

Under the new rules for agricultural trade, countries are to provide lower subsidies to domestic agricultural production and international exports. Instead, each country is to rely more on its comparative advantage in determining its production and trade patterns. As already mentioned, this adjustment is expected to occur over a substantial period of time, especially in the developing countries. While providing for relations in production subsidies, the GATT Uruguay Round agreement contains four special provisions, which pertain to subsidies to technology generation and diffusion; to income transfer payments to farmers; to food aid; and to health regulations. These provisions will have a pronounced effect on the working of comparative advantage, especially in countries such as Egypt.

Research and Technology Subsidies

Under the GATT, research and other aspects of a country's technology development and transfer system may continue to be subsidized. This type of assistance is not usually considered a subsidy to production, even though, in all the high-growth countries, technological advance has clearly contributed far more to growth than increased application of traditional factors of production (Solow 1956; Denison 1967; Mellor 1967). Thus, to proscribe subsidies for tradable inputs and outputs while allowing them for the most important source of growth has profound implications for international comparative advantage and income generation.

Public expenditure (subsidy) on research should pay enormous dividends in developing countries, in particular. To begin with, agricultural research is in principle much less expensive there than in developed countries, and the lower cost should add to the overall comparative advantage of developing countries in major subsectors of agriculture. Furthermore, because developing countries will initially be concentrating on simpler catch-up research, they will need only to adapt to their conditions research already in the public domain of their own countries to experience a burst of growth far greater than that seen in agriculture of mature developed countries. That growth will have favorable multiplier effects on the rest of the rural and overall economies.

The low cost of research in developing countries is due in part to the lower pay scales at comparable levels of scientific training. Thus each unit of research output will cost less, provided that the appropriate institutional structures are in place to support research and on-farm demonstrations. Because research is so

important to gaining competitive advantage under the new world trade order, developing countries must do everything possible to make their scientists highly productive as well as more numerous.

Before research productivity can be increased, however, it must be determined which research priorities need to be emphasized to gain comparative advantage under the new agricultural trade regime. Some types of research will have to be strengthened and others eliminated, at least in the short run. This question requires the immediate and full attention of policymakers throughout the developing countries.

Some ancillary public investments will also be required to make the improved agricultural technology fully effective. Fertilizers and pesticides are high on the list of such investments. Institutional structures, both private and public, must ensure that financing for these inputs is readily available, or the advantages of research will be lost. Cheap and reliable transportation is also vital to all the transactions directly involved in new technology and in trade. Enhanced trade potential will have little impact on rural people unless they are on all-weather roads of a quality consistent with low transport costs. Such roads require constant maintenance and constant upgrading.

Thus, the technology subsidies accepted under the GATT agreement call for large increases in public expenditure on research, input supply, credit, and transport infrastructure. Most important, they call for radical institutional reforms, particularly in the area of research, to ensure high levels of productivity. In attending to these priorities, policymakers will be forced by fiscal constraints to reduce other areas of expenditure. They must therefore be prepared to evaluate the efficiency of many other subsidies, both within and outside agriculture.

A Note on Infrastructure

As mentioned earlier, countries will be unable to reap the benefits of specialization and trade without reliable infrastructure, particularly rural roads. Such roads must be built and well maintained if rural transport costs are to be kept under control. Indeed, expenditure on infrastructure is important in reducing the cost of agricultural production and profoundly influences farm output and prices. That is why the GATT agreement does not preclude such expenditure. Good infrastructure is vital to the high-value, labor-intensive agricultural products in which developing countries have a comparative advantage. The problem is that developing countries as a whole not only have inadequate rural infrastructure but are not rectifying the situation rapidly enough. Because the budgetary requirements for these investments are so large, most countries will find it necessary to reduce other, less productive government expenditures. They must also recognize that investment in infrastructure is a never-ending process in which one improvement brings increased returns, leading to even more improvements. Egypt needs a greater effort to improve its rural infrastructure.

Income Transfers

Although the GATT agreement disallows production subsidies, it does allow direct income transfers to farmers. Such payments are in effect a subsidy to keep labor in agriculture, even though the GATT negotiators were careful to avoid describing them as such. These payments act as a reprieve to farmers who otherwise would be forced out of agriculture by low income. The purpose of such payments is to ensure equity by avoiding the income squeeze farmers experienced in developed countries when technology became an engine of growth and when demand growth slowed once food needs has been satiated through high incomes and once population growth had fallen to almost zero.

Income transfers to farmers will help slow the adjustment of resources out of agriculture. Combined with the slow phasing out of existing subsidies, the GATT-induced policy adjustments will decrease production, but this decrease will be more than offset by production increases caused by incremental technological change. Cereals will be greatly affected by these adjustments but in the end will remain relatively cheap on international markets, subject to a qualification described in the next section.

Food Aid

Producer price and supply-demand balance objectives can also be met through food aid, which is a form of export subsidy. Food aid generally targets low-income countries and people for whom demand is highly elastic with respect to price and income (Mellor 1992). The GATT allows such subsidies to continue, ostensibly on humanitarian grounds.

Whether industrialized countries will take advantage of the food aid allowance to any extent is not clear. They will if they behave rationally from the point of view of their producer-oriented policies. The combination of the inexorable growth in production, particularly of cereals, and inconsequential growth in domestic demand will continue to generate exportable surpluses of cereals for some time. In the United States, the gap between shifts in domestic supply and demand of agricultural commodities is probably about 0.5 percent of total production each year (Tweeten 1990). Current export subsidies are inefficient beggar-thy-neighbor policies that do not discriminate between price-elastic and inelastic markets and that will in any event gradually be phased out under the GATT agreement rules. Food aid offers an efficient alternative.

Budgetary efficiency would increase if more income assistance to farmers were to be diverted to expenditure on food aid. Whether that will happen depends not only on theoretical arguments but also on bureaucratic issues. The form of food aid in the U.S. budget, for example, provides strong incentives to balance the budget by reducing food aid, even though the real net effect on the budget balance may be inconsequential.

If developed countries do seize on food aid to deal with a problem of surpluses, then cereals prices to developing countries will average out lower than

other prices compared with prices under a system that rigidly adheres to the basic GATT philosophy.

Sanitary and Quality Regulations

Another significant factor to consider is that health regulations act to restrict agricultural trade. The commodities most affected are labor-intensive horticultural and livestock products, with respect to which developing countries have an immense long-term comparative advantage. Egypt is a case in point, with its potential fruit and vegetable exports to Europe and the Middle East.

Despite the restrictive effect of health regulations, the new trade regime will help prevent the misuse of those barriers. Developing countries such as Egypt can therefore still make strong economic gains by shifting their agricultural production pattern away from the more extensively grown commodities and toward the intensively grown ones. However, developing countries must work together to ensure that the World Trade Organization gives explicit attention to formulating and enforcing rules of behavior in this area of agricultural activity.

At the same time, it would be foolhardy to ignore the immense power of public opinion in developed countries concerning safe foodstuffs, although the public's fears of chemical pollutants may sometimes seem overblown. Developing countries must proceed cautiously in attempting to obtain a level playing field while endeavoring to meet the developed countries' standards of health and sanitation. That is easier said than done, however, in view of the weak support for technology in developing countries, not to mention the difficulty of enforcing rules and regulations pertaining to quality. Action in this area should be given immediate priority; the returns will be high.

Comparative Advantage

The new agricultural trade environment serves to reinforce the reforms already under way in Egypt. These reforms should enhance Egypt's comparative advantage, which stems in part from the low price of labor relative to land and capital and the potentially low cost of agricultural research and technology.

Low-Priced Labor Relative to Land and Capital

Adam Smith and David Ricardo, writing in the late 18th and early 19th centuries, first made it clear that comparative advantage depends on the relative abundance and prices of land, labor and capital. In developing countries, in contrast to industrial countries, labor is cheap but land and capital are expensive. Free trade can therefore be expected to shift land-intensive cereals production to the developed countries and to shift production of labor-intensive high-value agricultural commodities, including fruits, vegetables and livestock, to

developing countries. Cotton could go either way. The important point is that comparative advantage can be developed only under an open trading regime.

Low-Cost Agricultural Research and Technology

Economic growth in general and agricultural growth in particular depend in large measure on the pace and pattern of technological development. The effects of production incentives that emerge from an efficient system of generating and applying new technologies are far greater than the effects of price changes, even the greatly distorted prices common in many developing countries.

Although Egypt's research resources are low in cost, the country's agricultural research and technology remain fairly expensive in terms of input-output relationships, compared with the situation in industrial countries. Egypt's great problem is the uneconomic organization and allocation of its low-cost resources. Trained researchers and all types of support staff earn far lower wages than their counterparts in industrial countries; their productivity is correspondingly low.

The productivity of the research system could be raised by setting clear priorities for output and introducing an institutional and incentive structure designed to produce that output quickly and efficiently. As yet, few developing countries have identified either the priorities requiring close attention or the institutional and incentive structure that would lead to an effective agricultural research system.

Developing countries have received technical assistance for some time now, but with little effect. That is not to say that the economic rate of return has been low; on the contrary, numerous studies show this rate to be high (Evenson and Kislev 1975). But the returns have been well below their potential levels in light of the opportunities for cheap catch-up research in developing countries, the immense transfers of research results facilitated by international research centers and the low levels of expenditure. More important, the low expenditures ensure that even high rates of return have only slight impact.

The proportion of agricultural output value spent on research in developing countries is only about one-third of that spent in industrial countries (Pardey, Roseboom and Anderson 1992). Because research is cheaper there, developing countries should be spending a far higher proportion of agricultural output value than industrial countries. That is an important policy issue, the resolution of which will require reduced spending elsewhere. Sound decisions cannot be made in this regard without priority setting and major institutional reform.

New Trade Economics and Comparative Advantage

The new trade economics has come at a very propitious time for agriculture (Helpman and Krugman 1985, 1989). The emphasis now is largely on the scale economies and institutional economies that strongly influence

comparative advantage. At the same time, it is said that government should play a role in providing the public goods that will influence comparative advantage. Some would therefore argue that comparative advantage can no longer be achieved in the old-fashioned way, through an emphasis on relative factor costs. It seems more accurate to say that, under the new rules, comparative advantage will come about through careful selection of commodities for achieving it. Such selection will mean specializing disproportionately in those commodities with the strongest comparative advantage by the old standards. What, specifically, are the new rules?

First, as just mentioned, countries will have to specialize more than before, concentrating on only a few commodities. Second, governments must make some predictions as to which agricultural commodities are likely to be strong competitors and ensure the availability of the essential institutional public goods, which normally have long gestation periods. Developing countries should find it relatively easy to predict winners in agriculture by looking at what is happening in other countries. They must be flexible enough, however, to cut their losses on mistaken investments and to move quickly to support unexpected winners. Although setting research priorities is essential, the selections cannot always be the ideal ones and thus may have to be corrected from time to time. Because of the long gestation periods for vital public investments, making decisions of this nature, however imperfect those decisions may be, cannot be avoided.

The emphasis on specialization under the new rules applies both to strategy planning and sectoral concentration. Strategic priorities need to be set for investing in public goods, particularly those that will have an impact on agriculture. The government normally plays a larger role in the agricultural than in the industrial sector, because small farmers cannot do their own research or provide much of the other infrastructure essential to growth. Moreover, much of that infrastructure does not lend itself to private sector sale of services.

Even the burgeoning private agricultural research sector is limited to the fraction of agriculture in which technology can be protected by patents and farmers can be charged for innovations. Furthermore, the private sector in agriculture lobbies strongly for public-sector research that complements what it does. Of course, countries that are strong competitors in the world markets do nothing to constrain private-sector activities in areas previously associated with public goods, and where such activities succeed, the public sector normally gracefully withdraws and reallocates its resources to other areas.

Patterns of trade in horticultural commodities clearly show that although developing countries are important exporters of a large number of different fruits and vegetables, the bulk of horticultural exports of any one country is concentrated in just one or two commodities (Islam 1990). This pattern would seem to bear out the scale-economy argument. However, the great drawback to the increased specialization called for by the new trade economics, particularly for horticulture, is that such specialization can be rather risky because of constantly

evolving pests and diseases as well as market preferences. These problems, the new economics suggests, can be resolved not by diversifying, but rather by investing in the means to reduce and meet these risks. Most important is the greater investment in research, which is at the same time more necessary and more feasible because of increased specialization and concentration. Particular attention must be given to monitoring and dealing with disease and pest problems. There is some hope of abating such risks through high-technology solutions, particularly through recent breakthroughs in recombinant DNA techniques. Similarly, problems related to shifts in market demand can be met by specialized market analysis and trade support services.

Developing countries, with their limited institutional resources for specialized research, extension and marketing, will obviously be unable to meet all the different needs of a myriad of different commodities. It is therefore imperative for the governments of developing countries to concentrate their best efforts on a few high-value crops. Health regulations of importing countries make this strategy all the more desirable. Furthermore, the requirements of key importers must be thoroughly understood, and technologies must be developed to meet these requirements.

If the private sector is to succeed under the new trade regime, the public sector may have to help it meet the quality and grade standards essential to maintaining stable markets, particularly in countries whose private sector gradually develops from zero-sum competition with the public sector to positive-sum complementarity. Needless to say, in its pursuit of scale economies, the public sector should concentrate on promoting key commodities. At the same time, it should not take any steps to discourage the risk-taking private sector from experimenting and coming up with new and completely unanticipated winners. In this new environment of specialization, where the stakes are high and success is expected to arrive much faster than under a strictly *laissez faire* approach, the government will obviously have to play an exceedingly complex role.

Policy Implications for Developing Countries

Under the new rules, policymakers in developing countries will have to move with extreme caution. Above all, they must (1) avoid artificially distorting trade, (2) keep the foreign exchange rate modestly undervalued; (3) keep the public budget balanced to reduce tendencies toward inflation, overvaluation of the exchange rate and high interest rates; and (4) specialize to ensure adequate scale economies and institutional support.

Trade Distortions

Trade that is driven by comparative advantage holds out the promise of large increases in real income. When domestic prices are distorted, such trade declines. The greatest losers from distortions are the high-value,

nontraditional agricultural exports. Egypt has made a concerted effort to eliminate such distortions through major macroeconomic and agricultural policy reforms over the past eight years. These activities have been crucial in establishing the necessary conditions for the future growth and prosperity of its agricultural sector.

Undervalued Exchange Rates

As already mentioned, developing countries can expect to make their major gains in agricultural trade through high-value commodities, which tend to be nontraditional exports, notably horticultural products. Export subsidies instituted to balance an overvalued exchange rate rarely benefit such commodities. Bureaucratic systems that compile lists of commodities eligible for export subsidies are unlikely to uncover new export opportunities and rarely even try to do so. Given the natural export disadvantages of high transport and other transaction costs, an undervalued exchange rate can provide a general subsidy that does not artificially discriminate among commodities.

Countries that receive large amounts of foreign aid or that export natural resources tend to have overvalued exchange rates compared with those of other countries. This leads to unfavorable income distribution and low growth in the agricultural sector. Those natural tendencies toward overvaluation can be brought under control, however, by ensuring, first, a high level of imports of capital goods to foster growth and, second, availability of foreign exchange to import basic food staples for the poor, thus promoting social welfare. The latter policy has been pursued in Egypt through food aid as well as through general imports and food subsidies.

Budget Imbalance and Inflation

Governments faced with large budget imbalances are often prompted to reduce inflationary pressures by slowly overvaluing the exchange rate and by keeping interest rates high as part of monetary policy. Both of these responses to budget deficits are particularly harmful to agriculture. With overvaluation of the exchange rate, agriculture tends to increase credit use for purchasing imported inputs. In these circumstances, high interest rates are particularly deleterious to growth in agriculture. A recent review of a large number of empirical analyses shows that the demand for agricultural production credit in developing countries is generally much more elastic with respect to interest rates than is the supply of deposits (Desai and Mellor 1993).

Specialized Public Goods Support

With the emphasis on specialization in public and private institutional support for the growth of agricultural exports, public agricultural policy needs to make explicit judgments as to the specific commodities that are to receive that support. Such decisions must constantly be reexamined in the light

of the success of programs aimed at those commodities and any alternatives that may emerge from private sector activities.

A Vision of Egyptian Agriculture Driven by Comparative Advantage

As mentioned earlier, one way a developing country can judge its potential comparative advantage is to determine production from comparable resources in more advanced countries as well as in other developing countries. Such a comparison is presented in Table 3.2 for Egypt on the one hand and for California and Pakistan on the other. In each of these cases, agriculture is practiced with intensive irrigation in a hot, arid climate. Of the three examples, only California enjoys a high income, has access to the immense American market, and is highly advanced in the development of private agricultural marketing and in public- and private-sector research. In contrast, Pakistan lags in most of these respects. If physical resources drive comparative advantage, then the California example demonstrates that specialization in commodities that require labor-intensive techniques is a viable option for Egypt.

As Table 3.2 also shows, livestock production is a somewhat smaller proportion of total output for Egypt than for either California or Pakistan. The demand and supply forces that account for this size difference suggest that livestock has considerable potential for sustained accelerated growth in Egypt. Note, in particular, the lower contribution to output of Egypt's predominantly smallholder livestock subsector compared with that of Pakistan. Within the livestock subsector, the dairy component is the most important in both Egypt and Pakistan.

Horticulture is far more important in California than in either Pakistan or Egypt. Egypt's close proximity to Europe may explain why horticulture contributes 50 percent more to output there than in Pakistan, although the relative importance of horticulture is only one-third as great in Egypt as in California. On the other hand, California places much less emphasis on extensive field crops. If Egypt were to rapidly change its agricultural output composition to conform with that of California, its growth rate would enter a period of substantial acceleration.

When one examines the California counties in which conditions are similar to those of Egypt, some additional observations can be made. Note that the California counties comparable to the Nile and Indus basins devote far more area to vegetables and orchards (Table 3.3). The counties with cotton devote a much higher proportion of area to cotton and less to wheat, while the county with little cotton has far more area in fodder crops and a significant area in wheat. In the major cotton counties of California, the concentration of cotton is three times that of Egypt. Through research and market development, however, California has effectively reduced the risk of that concentration far more than Egypt and Pakistan have.

Table 3.2 Value of agricultural products sold: California, 1987; Pakistan, 1987-1988; and Egypt, 1990

Products sold	California		Pakistan		Egypt
	Total sales (millions of US\$)	Percentage of total in 1987	Gross value added (millions of US\$)*	Percentage of total value added	Percentage of total value added
Total	13,922	100	11,171	100	100
Total crops	9,269	67	7,020	63	75
Wheat, corn for grain, barley, oats, other grains and their by-products	339	3	2,047	18	23
Rice and its by-products	174	1	782	7	7
Cotton and its by-products	929	7	1,549	14	11
Hay, silage, and field seeds	470	3	276	3	9
Vegetables, fruits, nuts, nursery, greenhouse crops, etc.	7,033	51	1,300	12	17
Sugarcane and its by-products	-	-	683	6	2
Other crops	325	2	383	3	6
Total livestock, poultry and their products	4,652	33	4,151	37	25
Poultry and poultry products	1,084	8	509	4	-
Dairy products	1,914	14	2,205	20	-
Cattle and calves	1,450	10	320	3	-
Mutton, lamb, etc.	-	-	525	5	-
Other livestock products	204	-	592	5	-

Source: U.S. Department of Commerce, Bureau of the Census, 1987 Census of Agriculture, vol. 1, Geographic Area Studies (Pt. 5, California State and County data); Government of Pakistan, Agricultural Statistics of Pakistan, 1990-91, pp. 291-93; Egypt, 1995, personal communication, Ministry of Agriculture and Land Reclamation, Cairo.

-Not available.

*Based on World Bank World Tables exchange rates between Pakistani rupee and U.S.\$ for 1987.

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Table 3.3 Percentage of area under selected crops: Fresno, Imperial and Kern Counties, California, 1987; Punjab, Pakistan, 1987; and Egypt, 1990

Crop	California			Punjab, Pakistan	Egypt
	Fresno	Imperial	Kern		
Total cropland (millions of ha)	0.409	0.166	0.302	5.6	5.1
Wheat	4	15	4	39	17
Cotton	30	5	37	13	11
Hay/fodder ^a	9	49	13	14	18
Vegetables and orchards	48	22	35	3	17
Other	9	9	11	31	37
Total	100	100	100	100	100

Source: U.S. Department of Commerce, Bureau of the Census, 1987 Census of Agriculture, vol. 1, Geographic Area Studies (Pt. 5, California State and County data); Bureau of the Census and Government of Pakistan, pp. 158-60; Government of Pakistan, Agricultural Statistics of Pakistan, 1990-91, pp. 291-93; Egypt, 1995 personal communication, Ministry of Agriculture and Land Reclamation, Cairo.

^aHay includes alfalfa, other tame grasses, small grass silage, green chop and others.

Fruits and Vegetables

Three major policy issues arise with regard to expanding fruit and vegetable production: what priorities need to be set in the national agricultural research system so that world-class research is conducted in a few areas of concentration; how the physical infrastructure can be improved to reduce transaction costs; and how the public and private sectors can work together to improve the quality control of exports.

Livestock Products and Fodder Crops

In developing countries experiencing rapid growth in per capita income, the demand for livestock products usually grows by 8 to 10 percent a year and hence doubles every seven to nine years. Egypt should aspire to such growth rates, even though they are not yet present. Such growth requires rapid breed improvement and extremely rapid expansion of the supply of concentrate feeds and fodders. In both California and the Indus, high-quality fodders appear to have a comparative advantage and the potential for rapid growth. This growth would have a strong impact on income distribution in Egypt because livestock production there is highly labor-intensive (Von Braun and de Haen 1983). Imports of feedgrains normally increase greatly under such circumstances.

The emphasis on fodder crops and milk production in California probably derives in part from high, artificial supports for dairy product prices, although these only balance very high labor costs in this labor-intensive industry. In Pakistan, and even more so in the Punjab of India, small-scale dairy production

has been developed to a far higher level of efficiency and resource productivity than is currently being achieved in Egypt.

To accelerate growth in the livestock sector, Egypt needs to improve its physical infrastructure and set priorities in the research system, concentrating on improved high-quality fodder production and on animal nutrition. Breed improvement will become increasingly important over the long run.

Cotton

Cotton is already a major crop in Egypt. The significant factors to consider here are price policy and the exchange rate policy, because cotton competes for resources with other extensively grown crops and faces intense competition in international markets. First-class research is a must for this crop. Effective policy and institutional development could help increase the relative importance of cotton by as much as two- or threefold, as has occurred in California.

Cereal and Cereal Prices

California produces little in the way of cereals, particularly in the areas with a climate comparable to that of Egypt. The concentrated rice production in northern California illustrates the importance of soils to comparative advantage. In Egypt, areas with saline, heavy, impervious soils will also remain in rice. But soil conditions do not explain all of Egypt's rice production. Where the comparative advantage is based on low labor costs and high land prices, emphasis on cereals is likely to be less in Egypt than in California. In view of the substantial area devoted to cereals in Egypt, it is important to review the effect of the GATT agreement and other dynamic elements on relative cereal prices, especially since global cereal prices were expected to rise substantially as a result of the GATT agreement. Such a change in relative prices would, of course, call for greater emphasis on cereals than would otherwise be the case.

Table 3.4 presents a summary of 10 major studies of the impact of the GATT on prices of cereals, meat, dairy products and sugar.¹ It is important to note that these studies assumed complete liberalization under the GATT, complete adjustment and no technological advance. Even with these unrealistic assumptions, the results varied tremendously, depending on other assumptions generally thought reasonable by the analysts. With only the OECD countries adjusting, for example, the price of wheat would be expected to change from -5 percent to +27 percent, depending on the study. The most widely quoted studies projected significant price increases. In developing countries, the prices were expected to increase much less or even to decrease. The expected effect on coarse grains prices was just as varied, but in general prices were expected to decrease or at least show little increase. Meat and dairy prices would likely increase in almost all cases.

However, under more realistic assumptions (only partial adjustment over a substantial period of time, with technological change allowed to provide offsetting

Table 3.4 Price effects of trade liberalization in developed countries alone, and in developed and developing countries combined (percent)

Alternative Model	Wheat		Coarse grains		Meat		Dairy		Sugar	
	OECD (lib)	OECD & LDC(lib)	OECD (lib)	OECD & LDC(lib)	OECD (lib)	OECD & LDC(lib)	OECD (lib)	OECD & LDC(lib)	OECD (lib)	OECD & LDC(lib)
	Anderson/Tyers exogenous productive growth	25	1	3	-88	43	60	95	-12	22
Anderson/Tyers endogenous productive growth	19	1	2	-7	26	-2	90	56	27	-19
Zietz/Valdes	3	-12	-3	-24	10	13	-	-	15	-
Zietz/Valdes-1989 (10%)	0.4	-	-0.1	-	0.9	-	-	-	1.5	-
Zietz/Valdes-1989 (50%)	2	-	-0.3	-	4.0	-	-	-	7.6	-
OECD/MTM	-5	-7	-10	-12	5	-4	31	29	9	7
USDA/SWOPSIM	27	23	16-22	8-19	16	7	84	79	29	7
IIASA	18	23	11	13	17	11	31	34	-	-
RUNS	15	-	8	-	18	-	-	-	57	-
WALRAS	17	-	-	-	10	-	14	-	-	-

Source: Ian Goldin and Odin Knudsen 1990, pp. 484-85 (alternative models described in source).

-Not available.

Note: OECD refers to industrialized countries, LDC to developing countries.

Price changes due to gradual reforms in projection year from projections based on reference scenario, 15- to 20-year time horizon.

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effects), the effect of the GATT agreement on prices of wheat and other cereals largely disappears (see, for example, Tyers and Anderson 1992). It is notable that when the GATT negotiations concluded the United States had already made the bulk of the adjustment to the new rules. Meanwhile, recent studies continue to report lower expected price increases.

It seems that real cereal prices can be expected to move upward only if a large number of developing countries, or a few major ones (e.g., India and China), were to remain on a high growth path, with livestock consumption soaring and consequent large increases in feedgrain imports. This livestock feed issue may become extremely important in countries experiencing high income growth (Sarma and Gandhi 1990). Thus, this possibility is not as remote as it might appear at first glance.

When developing countries enter a period of fast growth, they normally experience large increases in feedgrain imports, thus becoming outlets for surplus cereals from developed countries. The increased demand for livestock feed could well drive up real cereal prices, with an assist from the GATT changes. That possibility must be viewed with caution, however, because it fails to take into account the export potential of the countries of the former Soviet Union and of Eastern Europe. Most observers (Tyers and Anderson 1992) believe that the reforms in those countries will eventually turn them once again into major exporters of cereals.

For planning purposes, it is best to assume that relative world cereal prices will not change radically in the near future. That conclusion is important with regard to Egyptian agricultural policy oriented toward comparative advantage.

Policy Lessons from Developed Countries

The agricultural policy experience of developed countries yields a great many lessons, some rather discouraging. However, where structural policies have been oriented toward technological change, toward reduction of transactions costs through physical infrastructure investment and toward measures to facilitate private sector efficiency, they have been highly successful. Those policies are the ones that matter most to growth. Indeed, they have been so effective that supply shifts outran demand shifts and transferred so much of the benefits of growth away from farmers that other policies were instituted to stem this flow. Most of those latter policies have proved exceedingly inefficient and ineffective.

Contrasts: Developed and Developing Countries

In developed countries, technological change is shifting the supply schedule up and to the right, while demand is shifting little or not at all and consumption is highly price inelastic with respect to both price and income. Thus there is a steady downward pressure on prices and a tendency for the real

incomes of farmers to decline. Governments respond with strong policy measures designed to protect farm incomes. These measures are by and large inefficient, as they shift incomes disproportionately to farmers who have been able to achieve scale and other economies and hence protect their incomes, while having only a modest impact on farmers with small- to medium-size holdings. The smallest farmers are, however, able to earn substantial nonfarm incomes. Thus the income problem now rests by and large with the medium-size commercial farmers.

In developing countries, demand is growing because their populations are increasing. Even more important, if they follow strong income growth policies, effective demand should increase greatly because of elastic responses to incomes and prices, particularly with respect to high-value commodities such as horticulture and livestock. Meanwhile, technological change in agriculture may be proceeding rapidly through catch-up growth if there is an effective national agricultural research system, or it may be lagging if such a system is absent. The net effect will be that imports increase or agricultural exports decrease, particularly for the cereals and the feedgrains needed by a burgeoning livestock industry.

The most important thing developing countries can do in these circumstances is to take advantage of relatively low cereal and feedgrain prices and emphasize commodities in which they have a comparative advantage. The pursuit of technological change is particularly advantageous for farmers in developing countries because of the buoyant domestic demand there, along with strong export markets for high-value commodities. Of course, the cereals crops will obviously continue to occupy a large area and command large resources as well as being a fertile field for technological change.

The other important distinction between developed and developing countries is the difference in size of agriculture. Income transfers toward agriculture in developed countries remove only a small percentage of income from nonagriculture and contribute greatly to increased incomes in agriculture. In developing countries, the opposite is the case. In fact, one idea behind income transfers away from agriculture is that they can benefit the poor through a substantial increase in real income while having only a modest percentage effect on the large agricultural sector.

Price Interventions, Land Prices and Trade

The agricultural price policies of industrialized countries, as pointed out previously, have succeeded because of technological advances. They have thus benefitted consumers more than producers because they decreased the relative prices of agricultural commodities. Developing countries more often have the opposite problem; that is, population- and income-driven demand increases more rapidly than supply from their technologically sluggish agricultures.

Price interventions in developed countries have had their most lasting effect

in supporting, and often raising, land prices, i.e., higher prices were capitalized into the price of land. This has had two related and unfortunate consequences. First, the benefits have been limited to the first generation; later entrants into farming, including children refinancing family farms, have been saddled with mortgage payments that absorbed their price support benefits. Second, the intensity of lobbying to retain price supports has increased because removal of the supports reduces values of land, land that has often (perhaps usually) been pledged against debt at the old, higher values. In other words, once price supports are instituted in agriculture, they are very difficult indeed to remove.

Price policies that reduce farm prices are much easier to remove than those that raise farm prices. In the former case, removal will provide a windfall increase in land prices. And consumer beneficiaries have no means to capitalize the benefits into land or asset values. The nearest equivalent is the risk of wage inflation consequent to reducing consumer subsidies on food.

The capitalization of price supports into land values and hence into higher costs of production reduces competitiveness on international markets. In developed countries, that has led to either export subsidies or a rapid buildup of stocks in storage. The latter is expensive and can be afforded only temporarily.

Generating Nonfarm Employment

The best way to prevent increased agricultural production from reducing farm incomes is to absorb surplus farm population into nonagricultural employment. In early stages of development, the stimulus for such growth comes from the demand push from agriculture itself. Studies in both the United States and Europe show little relation between the level of agricultural price supports and the flow of labor out of agriculture. Instead, flow is explained largely by the demand for labor in the nonagricultural sector.

In Taiwan as well as in the Punjab of India, parity between rural and urban incomes was largely achieved in the context of rapid technological change in agricultural production and very rapid growth in rural nonfarm job opportunities, the latter stimulated by the former (Mellor 1995). Once growth got under way in these countries, labor-intensive industrial exports played an increasingly large role in generating employment, with consequent favorable effects on rural incomes.

Farmer Lobbies

Farmer lobbies in the United States have recently shifted their focus of power from general farmer organizations to specialized commodities organizations, which frequently represent the interests of particular farmer groups rather than the broader interests of farmers in general. For example, several commodity-based lobbies have influenced both trade policy and foreign aid in directions that, although favorable for the particular commodity, have failed to seize the opportunities available for building the country's long-term agricultural export markets.

Policy Lessons from Developing Countries

The many striking success stories emerging from the developing world show that agricultural growth can arise from numerous sources, ranging from expanded land area and increased yields to trade-based changes in the composition of output toward more intensive commodities (Mellor, 1995). Whatever its source, growth seems to accelerate once economies are opened up to trade, once there is greater specialization in agricultural export commodities and once a large investment is directed toward public goods, particularly rural roads, electricity, and research.

Open Economies

Countries with open economies are able to sustain high agricultural growth rates. Closed economies, in contrast, are unable to do so because they tend to have overvalued exchange rates, they provide unfavorable price relationships for agricultural output and, more important, they endeavor to generate industrial growth over agricultural growth. As a result, they neglect rural infrastructure and the institutions important for technological change.

For example, Argentina's agricultural resources are among the best in the world, yet its agricultural sector has grown very slowly (Mellor 1995). Argentina has also experienced poor nonagricultural growth because it has focused on areas in which it lacked a comparative advantage and has failed to obtain strong nonagricultural growth multipliers from agricultural growth.

Specialization

The countries that have successfully exported nontraditional agricultural products have generally specialized in a few commodities (Islam 1990). Such specialization may have occurred naturally through private sector expansion in a few commodities, which in turn led to complementary public sector investment. However, there is a presumption that public investment should be directed toward a few areas of high priority so as to help lead the process.

Public Sector Support

In general, agricultural growth has been strong in countries that have dynamic research systems, active public sector support systems and ample investment in rural infrastructure. China, the latest entrant into a spectacular growth phase, is a case in point. Although the old economic system did stifle China's growth potential and the radical liberalization unleashed incentives, the long period of prior public investment must not be forgotten, because that investment was a necessary condition for the spectacular takeoff. Prior to liberalization, China experienced several decades of massive investment in education (particularly rural education), infrastructure (particularly rural roads, covering even difficult mountain terrain) and agricultural research. Also, China created a favorable basis for rural cooperation by reducing large inequalities in

rural landholdings and incomes. With those conditions met, liberalization could provide an extraordinary surge in productivity. This is not to say that liberalization should be delayed, but merely to point out the importance of those underlying investments.

Conclusions

The foregoing discussion points to several policy lessons concerning agricultural growth: (1) open economies and domestic prices generally act in consonance with international prices to facilitate specialization and the exercise of comparative advantage; (2) investment in rural physical infrastructure is necessary to reduce transaction costs and give a further boost to comparative advantage and specialization; (3) investment in agricultural research and technology systems is vital because these are the basic engines of all growth, particularly agricultural growth; and (4) on the export side, countries should specialize in a few commodities to obtain scale and institutional economies. Fast-growing developing economies usually move quickly to import cereals, because the growth in livestock demand quickly exceeds a country's capacity to expand cereal production on the available land areas. Countries that have succeeded with agricultural production have found that agricultural growth stimulates the rapid growth of rural nonagricultural employment, with a consequent closing of the rural-urban income gap. In the new global policy environment, Egypt will find it more and more costly to produce commodities in which it does not have a comparative advantage, and commodities in which it does have a comparative advantage will suffer as a result.

Policies in support of the livestock sector have had a positive effect on income distribution and favor a labor-intensive industry with a comparative advantage. Given the success of smallholder livestock production in countries with climates similar to Egypt's (e.g., northwest India) and the unusually low productivity of the livestock sector, efforts are needed to increase its efficiency and productivity. However, it would be less beneficial to rely excessively on imported feed than to rely on domestically produced fodder crops, including berseem.

Food subsidies for the poor are a drain on the budget and therefore contribute to budget deficits, which in turn bring about high interest rates and overvalued exchange rates. However, food subsidies enhance human capital and contribute to more equitable income distribution as well as helping to offset some of the forces leading to an overvalued exchange rate. In view of these conflicting effects, emphasis should be placed on drastically reducing the inefficiencies of food subsidies.

Subsidies that accelerate technological change need to be examined carefully for their favorable effects on growth and their unfavorable effects on more directly productive public expenditure. Obviously, price distortions that improve

efficiency and promote social welfare are preferable to those that do not. Furthermore, any price distortion that leads to rationing of production inputs represents the worst possible policy, because it does not foster growth and it brings about high costs in the form of forgone productive public investment or forgone private incentives.

The effort it takes to reduce distortions in the agricultural sector is without question worth the political costs. Those who have borne those costs in Egypt are to be commended for their courage and tenacity. Now the benefits need to be more fully realized by making complementary structural changes and by pushing on toward comprehensiveness of the reforms.

Note

1. For a full discussion of these various models and their implications see Mellor 1992.

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II

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4

Nature, Rationale and Accomplishments of the Agricultural Policy Reforms, 1987–1994

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Governments of all countries, developing and industrialized alike, undertake a myriad of activities that affect agricultural sectors. They build roads, irrigation systems and other infrastructure. They fund and operate research and extension organizations. They offer credit to farmers, often at below-market rates. They impose tariffs and non-tariff restrictions on imports, especially of manufactured goods. They maintain overvalued exchange rates and ration foreign exchange. They distribute fertilizer and seeds, often at prices below full cost. They directly control output marketing and prices. On balance, they tax their food consumers and subsidize their producers (mostly in developed countries) or tax their farmers and subsidize their consumers (mostly in developing countries). These policies and public expenditures have become the focus of concern over the performance of the agricultural sector and the overall economy in many developing and industrialized countries. Poorly planned and implemented, they too often have resulted in unsustainable fiscal burdens on governments, lower agricultural and overall economic growth rates, and reduced farming efficiency and rural incomes in countries where rural poverty is already too pervasive.

Egyptian agriculture, including production, marketing, and processing, accounts for over 40 percent of overall Gross Domestic Product and over 50 percent of total employment. From 1981 to 1992, average real growth in the sector was slow, around two percent per year. The agricultural growth rate has been well below the four percent per year believed to be needed to sustain overall economic growth at the government's minimum target rate of five percent. It also has been less than the rate of population growth, which contributed to increased food imports prior to the recent policy reforms.

Government policies, including direct price and marketing controls, public ownership of key agricultural industries, heavy net taxation of agriculture, and overvalued exchange rates, were the major causes of this slow rate of growth. Significant policy changes, however, have occurred since 1986: markets and prices for thirteen major crops, including cotton, rice, wheat and maize, have been liberalized; input subsidies and government marketing monopolies were eliminated for most farm inputs; and foreign currency is freely exchanged at market rates.

Cotton was completely controlled by the government until 1994. Virtually all textile spinning capacity remains under government ownership. Public factories manufacture most of the domestically produced fertilizer, and 50 percent of wheat and rice milling capacity is owned by the government. Overall, the policy climate is not yet friendly to private investment. The private agribusiness sector is still fragmented and economically ineffective.

By the early 1980s, the magnitude of the economic cost of the existing agricultural policies had become evident. Following a series of studies, the Government of Egypt (GOE), assisted by the United States Agency for International Development (USAID), embarked in 1986 on a program of reforms under the policy component of the USAID-funded Agricultural Production and Credit Project (APCP).

The reform program was developed in two phases. The first phase, 1987-89, covered price and marketing controls and delivery quotas for 10 major and minor crops, reduced subsidies on inputs and began the process of opening markets to private investment. The GOE made substantial progress: Markets for the ten crops were freed, farm-gate prices of fertilizer increased by 75 percent, and citrus exports were opened to the private sector. The public agricultural bank made progress in divesting itself of input marketing. Little progress was made in the cotton subsector, however, until liberalization was accomplished in 1994.

The second phase (1990-94), building on earlier experience, sharpened the policy focus and developed more quantifiable targets. Principal benchmarks established were to:

1. increase cotton procurement prices to 66 percent of the economic price (complete liberalization became the target in 1992 and was accomplished in 1994);
2. remove procurement quotas on rice;
3. eliminate subsidies on all inputs;
4. reduce PBDAC's role in input marketing;
5. restrict subsidized credit;
6. improve PBDAC's institutional structure and operations;
7. reform the structure of seed production and marketing.

Impressive progress toward meeting the benchmarks has been achieved.

Although cotton prices fell short of the original target of 66 percent of the five-year average export price, by 1992 they exceeded 84 percent of the "spot" export price, and in 1993 and 1994 they were higher than border prices. Furthermore, cotton marketing was liberalized in 1994. Rice delivery quotas were removed in 1991, private dealers distributed over 80 percent of fertilizer in 1992, and the GOE adopted a comprehensive plan to liberalize the seed subsector. In addition, exchange rates became freely market-determined in 1991. Details on agriculture in the pre-reform period and accomplishments of the reforms are provided in this chapter.

Much remains to be done, however, as is concluded at the end of this chapter. Policy reforms will continue to be urgent over the next several years, and reforms are still needed over a broad range of policy areas, including: (1) prices and marketing, (2) agribusiness private investment and privatization, (3) public investment, and (4) food security for the poor.

Egypt's Economic Growth and Agriculture in Long-Term Perspective

Egypt is currently classified as a low-income country (World Bank 1994). It has recently descended into the poorest stratum of countries from its previous lower middle-income status because of its relatively poor economic performance in the 1980s. Its GDP per capita was estimated at \$640 for 1992, slightly lower than that of Indonesia, a higher-growth country poised to gain middle-income status (World Bank 1994).

Egypt's real GDP grew at the impressive average annual rate of 6.7 percent during 1965-80, but growth during 1980-92 was at the lower rate of 4.4 percent annually (World Bank 1988, 1994). Population growth reduced the latter rate to 1.8 percent per head. At that per-capita growth rate, forty years would be required to double the country's level of output per person. In the 1965-80 high-growth period, the economy also underwent a significant change in its structure of production (Table 4.1). The decline in agriculture as a proportion of overall GDP was more rapid in Egypt than the average for all lower middle-income

Table 4.1 Sectoral composition of GDP (percent)

Sector	1965	1981	1987
Agriculture	29	21	21
Industry	26	38	25
Services	45	41	54
TOTAL	100	100	100

Source: World Bank 1983, 1989, 1994.

countries. Moreover, the country's increase in the share of industry was also more rapid than the average for all countries in Egypt's income group.

This pattern of structural change was heavily influenced by the policy regime that prevailed in the period. Slow growth in the 80s was accompanied by a stable share of agriculture, a major decline in industry's contribution and a strong surge in the share of services in the economy.

While total cultivated area increased only slowly during the 80s, significant changes occurred in areas planted with major crops (Table 4.2). The most important changes were the decline in cotton and maize areas and the upturn in areas of berseem and vegetables.

Yields for major crops during the early 1980s were generally declining or static (Table 4.3). As seen in the table, maize and cotton yields in particular showed a significant decline. Some increases appeared to be taking place in yields of wheat, vegetables, berseem and fruits.

The net result of the trend in crop areas and yields in the 1980s was a decline in the country's ability to feed itself and earn foreign exchange from cotton and other agricultural exports. Self-sufficiency ratios for important food items for 1987 are shown in Table 4.4. Imports accounted for more than three-fourths of

Table 4.2 Cultivated areas of major crops in the 1980s (fd. millions)

Crop	1980 (5.819)*	1986 (6.044)*
Wheat	1.326	1.206
Maize	1.924	1.483
Rice	0.972	1.055
Cotton	1.245	1.055
Sugarcane	0.252	0.262
Vegetables	0.695	1.018
Berseem	1.722	1.865
Major fruits	0.303	0.429

Source: Department of Agricultural Economics and Statistics, Ministry of Agriculture and Land Reclamation, Cairo.
*Total arable land.

Table 4.3 Yields of major crops in the 1980s (mt/fd)

Crop	1980	1986
Wheat	1.38	1.60
Maize	1.92	2.11
Rice	2.46	2.43
Cotton	1.13	1.03
Sugarcane	34.14	39.86
Tomato	NA	11.02
Orange	NA	6.30

Source: Department of Agricultural Economics and Statistics, Ministry of Agriculture and Land Reclamation, Cairo.

Table 4.4 Self-sufficiency ratios for key foods, 1987

Crop	Domestic production ('000 tons)	Imports ('000 tons)	Consumption ('000 tons)	Production as % of consumption
Wheat	1,929	6,857	8,786	22
Maize	3,900	2,028	5,928	66
Rice	1,330	-	1,330	100
Bean	282	-	282	100
Lentil	14	15	29	48
Sugar	905	850	1,755	52
Vegetable oil	161	474	635	25
Chicken	110	65	175	63
Beef	396	131	527	75

Source: Economist Intelligence Unit. 1988. *Egypt Country Profile, 1988-89*. London. pp. 21-22.

wheat, three-fourths of vegetable oil and almost one-half of sugar consumed. The one-third of maize that was imported was for animal feed, but meat imports (beef and chicken) were also significant. From being self-sufficient in food and a net exporter of agricultural commodities in the early 1970s, the country endured an annual net deficit in its agricultural trade balance in the 1980s. Cotton exports declined along with production. Rice production failed to keep pace with population growth, which left less to export. The increasing exports of onions, potatoes and citrus offset only a minor part of the country's growing food import bill.

Overall agricultural growth of 1.9 percent per year in 1980-85, down from 2.8 percent during 1965-80, was lower than the estimated population growth of 2.7 percent per year. Because government policies also favored increases in domestic consumption, food imports rose rapidly while agricultural exports fell. Egypt was importing about half of its food and incurring an annual net deficit of \$3 billion in agricultural trade by the mid-1980s. Projections of the production and consumption trends indicated unsustainable levels of future food imports, which alarmed key policy decision-makers and led to an assessment of the need to reform the agricultural policy regime.

Evolution Through 1986 of the Policy Regime Affecting Agriculture

At the beginning of Egypt's modern era, the industrial sector accounted for only 15 percent of GDP and employed around 8 percent of the labor force. Such industry as existed was concentrated in food processing and light manufacturing for the limited domestic market.

After 1952, government extended its role from major investor in infrastructure to active provider of basic social services. In addition, through nationalizations and new enterprises, the state extended its control over banking and finance

and industrial investment and production. High priority was given to industrial growth along standard import-substitution lines, with emphasis on state-owned enterprises.

In the agricultural sector, a system of implicit taxation was put into place through wedges between farm-gate and domestic retail or export equivalent prices, area controls, and mandatory delivery quotas. Thus, the basic market intervention framework directly affecting agricultural production during the past forty years took shape in the first decade of Egypt's modern history. Continuing high implicit rates of taxation of agriculture to transfer its surplus for industrial/urban investment was a cornerstone of that policy. Input subsidies subsequently lowered effective agricultural taxation somewhat but did not change its direction or overall order of magnitude.

The government extended its control apparatus to actual cropping patterns. Officials worked out a rotation cropping system designating areas to be used for growing major crops in each of the villages and major production regions. Control was exercised through a block system in which areas were specified each year for the controlled crops, most importantly cotton, rice and wheat. (Sugarcane was also controlled, but separately, through the sugar mills.) Blocks were rotated through an area in accordance with specified 2- or 3-year rotations. These controls constrained the overall pattern of cropping for the area, since agronomic factors limited the crops that could be grown before or after the controlled crops. When a given block was scheduled for cotton, every farmer with land in the block had to plant cotton on that land. Failure to do so resulted in fines or loss of access to subsidized inputs and credit. Village cooperative managers were responsible for policing compliance with crop controls, collaborating with village bank managers and government extension agents.

The block system, although not always effective, was designed to ensure a minimum production of the controlled commodities that would be delivered to government marketing bodies. It was also a technical production system that permitted mechanized and uniform application of practices such as cotton pest control. To the extent that these coordinated production practices were more productive or lower cost, they contributed to higher output and incomes for producers. Some, notably cotton pest control, were highly subsidized; these and other subsidies were provided in part to compensate producers for low prices paid for their products.

Open Door and Economic Liberalization: 1970s to Mid-1980s

The shift in economic strategy of the Open Door Policy followed a period of severe recession in the economy. GDP growth was below 2 percent for most of the years between 1967 and 1973, which meant the economy was contracting in per capita terms. Linked to large concessional capital inflows, the new policy liberalized some trade barriers, lowered taxation on agriculture, and encouraged foreign direct investment. It also pulled back from

a socialist, materials-balance planning approach and loosened a number of administrative controls on the economy. Nevertheless, the fact remained that government involvement in the economy continued high, in agriculture as much as in other sectors.

After 1973, GDP grew at 9-10 percent per year until 1982. Afterwards growth began to decelerate, falling to 6 percent and then, by the late 1980s, even lower. In the mid-1980s, Egypt was under increasing economic pressure from long-standing structural problems that persisted in ever more acute form.

The higher growth before 1982 was largely financed by concessional capital inflows, petroleum exports, remittances from migrant workers, Suez Canal revenues, and earnings from tourism. Industry and agriculture performed poorly; the former managed to grow at 6 percent and the latter at less than 3 percent in the period. Highest growth came in the broad services sector. Clearly, the inflow of foreign savings was fed through a policy framework that encouraged a shift of resources away from the production of tradables to growth in services (non-tradables).

An overvalued exchange rate was one important policy that distorted the domestic price structure in favor of nontradable production. Since trade tariffs and quantitative restrictions provided offsetting protection to much of industry, the negative incentive effects of currency overvaluation on agricultural producers were particularly strong. Food imports were cheapened and exports were discouraged. Lower profitability in agriculture discouraged investment and the spread of new technology, thus reducing growth in the sector.

In the mid-1980s, Egyptian agriculture was at the apex of a 30-year process of government regulation and control. An administratively dictated cropping pattern was enforced by mandatory area controls and crop delivery quotas. Producers' prices were controlled at low levels relative to international market values, with the implicit tax on outputs offset to a degree by free irrigation water and subsidized credit and inputs. Agricultural production incentives were also reduced indirectly through high industrial trade protection and overvalued exchange rates.

The confluence of discriminatory direct price policies and indirect macroeconomic policies resulted in large-scale transfers of resources from agriculture to government, industry, and consumers. Net transfers from the sector in 1985 have been estimated at LE 5.5 billion (in 1991 prices), representing some 4 percent of GDP and 20 percent of agricultural GDP in that year (Dethier 1989). Reflecting the disincentive effects of these transfers, during 1965-1985 real GDP in agriculture grew at only 2.2 percent per year, lower than population growth.

Estimates are also available of the average annual percentage deviations of agricultural output prices from those that would have prevailed without the direct and indirect policy distortions. These negative nominal protection rates for Egyptian agriculture for 1964-84 were found to have had the following origins by component sources (Krueger 1992):

Component	Average Price Effect 1964-84
Indirect Distortions	-19.6
currency overvaluation	-17.4
industrial protection	-27.5
Direct Price Distortions	-24.8
Total, Direct and Indirect	-44.4

Although indirect distortions are estimated to have had a somewhat smaller impact than direct distortions, they nevertheless accounted for 44 percent of the average negative nominal protection for Egyptian agriculture during the 1964-84 period.

Public sector expenditures allocated to food subsidies grew enormously after 1970. From a mere 0.1 percent of GDP in 1974, these subsidies rose to 8 percent of GDP and then to 13 percent of total government expenditures in the early 1980s. Subsidies on wheat flour and bread accounted for much of this increase. In addition, monthly quotas of highly subsidized rice, sugar, oil and tea were provided to holders of ration cards. Although food subsidies have made up a diminishing share of public expenditures in the 1990s, they have remained a fiscal burden that has crowded out funds for public investments and supporting services. Nevertheless, continuing reductions in real subsidies face strong opposition and require politically difficult decisions.

Discussion about food subsidies often links the policies aimed primarily at raising and stabilizing food consumption to the policies designed to control production and to tax or subsidize different agricultural products and subsectors. Where subsidized products are procured domestically at prices set below international equivalents, the implicit agricultural taxation does reduce explicit budget outlays for the consumption subsidies. Otherwise, there is no logical reason why these policies should be linked. Indeed, the total net tax burden on agriculture declined during the 1970s, while food subsidy outlays increased (Table 4.5). The total net burden on agriculture peaked in 1974 while the food subsidy bill was rising. This pattern was influenced by increasing subsidies on agricultural inputs as well as the rising cost of explicit food subsidies for consumers.

One interesting feature of Table 4.5 is the gains to meat and milk producers that occurred after 1975. In addition, berseem production benefitted from protection of meat and milk producers. Similarly, low taxation of vegetables and fruits raised their returns relative to grains and cotton and encouraged their production over the basic food and fiber crops. Even as implicit taxation of agriculture to finance cheap food fell along with self-sufficiency ratios of the

Table 4.5 Aggregate gains and losses by producers on agricultural commodity markets, 1965–80 (1975 LE mil)

Year	Cereals, pulses and sugar	Meat and milk	Feedstuffs ^a	Cotton	Total burden
1965	-432.20	-152.17	163.83	-528.79	-949.34
1966	-326.70	-131.55	145.83	-390.78	-703.94
1967	-278.16	-72.38	125.32	-311.79	-537.01
1968	-337.13	-131.66	112.32	-357.28	-713.70
1969	-414.40	-175.56	149.16	-608.81	-1041.62
1970	-346.71	-127.76	161.09	-550.49	-863.87
1971	-184.97	-142.66	122.55	-473.76	-678.84
1972	-205.70	-165.10	135.08	-448.49	-684.21
1973	-609.26	-217.37	186.10	-515.04	-1145.56
1974	-1407.61	-75.71	225.03	-805.50	-2063.78
1975	-1082.17	-13.03	172.95	-606.46	-1528.72
1976	-558.03	30.91	162.25	-473.44	-838.31
1977	-190.88	54.98	104.19	-605.01	-636.72
1978	-190.32	97.74	107.74	-369.25	-354.09
1979	-286.62	46.56	147.79	-266.15	-358.62
1980	-327.76	128.74	144.46	-319.18	-373.62

Source: von Braun and De Haen 1983.

^aThis excludes berseem. It should be noted that the producer losses computed for the maize market are compensated for by the implicit producer gains from depressed feed maize prices to the extent that domestically produced maize is fed to animals.

subsidized products, implicit taxation of cotton and distortions of incentives in favor of berseem and livestock remained high. These were the main distortions affecting the agricultural sector as the policy reforms began in the mid-1980s.

Summary Assessment: Agricultural Policies and Performance in the Pre-Reform Period

(1) The path of Egypt's food policies provides an instructive example of the impacts of keeping producer prices low to finance industrial investment and cheap food. With population and consumption growing at high rates, even countries with favorable agricultural resources—such as Egypt—may find themselves becoming net importers of food and losing foreign exchange through reduced exports. Although this loss of self-sufficiency will shift some of the subsidy burden from implicit taxes on producers to explicit government expenditures, implicit agricultural taxation and distorted relative prices that affect agricultural resource allocation may continue—as they did in Egypt.

(2) Egypt's resource and population parameters delimit its basic agricultural problem. Arable land and water are strictly limited, while population growth continues high. The population is clustered in the cultivated area of the Nile Valley and Delta. In spite of favorable climatic conditions, fertile soils, continuous water supply, and heavy government investment in land and irrigation

infrastructure, Egyptian agriculture cannot simultaneously achieve national food self-sufficiency through import substitution, transfer investible resources for industrial/urban development and earn foreign exchange by export-oriented production. Given these multiple and competing goals, it becomes increasingly important that the most efficient and economic use be made of the productive but limited agricultural resources.

(3) Egypt's predominantly smallholder agriculture has evolved complex and intensive cropping patterns. These patterns changed substantially after the 1950s, partially in response to government policies, which included administered prices, crop quotas and forced deliveries. Cotton and other area quotas and mandatory deliveries of rice, wheat, beans, lentils, groundnuts, sesame and winter onions were not uniformly enforced. Subsidized inputs allocated for controlled crops were often used on other crops or sold on the black market.

(4) Some of the impacts of these policies are displayed in Table 4.6. Prices offered by the government for major crops were low compared with export and import parity prices. The comparative net returns over variable production costs shown in Table 4.7 point to one important reason why producers shifted to uncontrolled crops.

(5) The implicit taxation and control of major crops were not extended to meat and milk products, which in fact benefitted from import restrictions and subsidies on feed imports. Furthermore, demand for meat rose in response to rising urban incomes and the real income effects of food subsidies on household purchasing power. Attractive prices and high demand encouraged domestic livestock production and raised net returns for berseem production (Table 4.7).

Table 4.6 Ratio of domestic farm-gate and procurement prices to international prices, 1970-1984

Year	Rice		Wheat		Cotton	Maize	Sugarcane
	A	B	A	B	B	A	B
1970	1.00	0.96	1.50	1.27	0.83	1.06	0.60
1971	1.09	1.07	1.21	1.14	0.07	1.03	0.51
1972	0.94	0.94	1.09	1.03	0.71	1.19	0.35
1973	0.41	0.39	0.59	0.52	0.40	0.62	0.46
1974	0.34	0.30	0.57	0.52	0.47	0.71	0.18
1975	0.55	0.55	0.77	0.76	0.62	0.76	0.30
1976	0.97	0.97	0.80	0.85	0.52	0.78	0.58
1977	0.96	0.85	1.06	0.98	0.56	1.31	0.78
1978	0.74	0.73	0.86	0.69	0.50	1.03	0.81
1979	0.63	0.63	0.55	0.57	0.48	0.73	0.71
1980	0.57	0.52	0.66	0.60	0.38	1.05	0.28
1981	0.59	0.51	0.72	0.63	0.40	0.73	0.46
1982	1.19	0.87	0.69	0.68	0.43	1.09	0.98
1983	1.14	0.95	0.84	0.75	0.34	1.10	1.02
1984	n/a	0.95	n/a	0.82	0.41	n/a	1.59

Source: World Bank 1986a.

A: Farm-gate to international price calculated at weighted average exchange rate.

B: Procurement to international price.

Table 4.7 Net return over variable costs, 1986 (LE/fd)

Crop	Net return
Tomato (winter)	1443.54
Tomato (summer)	682.87
Onion (winter)	616.85
Lentil	435.65
Sugarcane	417.97
Berseem	417.01
Wheat	296.83
Broadbean	286.37
Sesame	284.99
Groundnut	266.82
Rice	263.13
Potato (summer)	188.13
Maize (summer)	155.84
Cotton	136.81
Soybean	116.82

Source: Department of Agricultural Economics and Statistics, Ministry of Agriculture and Land Reclamation, Cairo.

As a result, private profitability of berseem production was increased relative to its social profitability, which is low because production of livestock fodder and feed grains is apparently not an economically efficient use of scarce, irrigated land. However, the policy-distorted prices faced by producers concealed the true social costs and returns of the alternative crops and provided poor guidance for production decisions.

(6) Distortions in relative prices and divergences between private and economic profitability clearly affected resource allocation in the sector, leading to more production of some crops and livestock products but less production of others. It is less obvious to what extent the policies depressed output for the sector as a whole. Fragmentary evidence suggests that the static inefficiency effects of suboptimal land use could have been as high as 25 percent of the value of agricultural production. Even less is known about the dynamic effects of the price distortions. To what extent were distortions due to government interventions responsible for the weak growth performance of the sector? Would yields of major crops, such as cotton, have remained static or declined under different policies?

(7) The implicit taxation of the sector through administered prices and forced deliveries was offset to some extent after the mid-1970s by subsidies on inputs and credit. These subsidies added to the government's fiscal problems and created their own distortions and inefficiencies. Farmers tended to use artificially cheapened inputs wastefully and indiscriminately. They competed for the limited supplies and economic rents conferred by the low prices. Small, poor farmers—and those in remote locations—often lost out to larger, richer farmers and those more centrally located.

(8) Pricing policies, crop controls and input subsidies were important constraints but still only partly explained Egypt's slow agricultural growth. The level and productivity of investments, and the extent and effectiveness of research, extension, and other support services, are other essential parts of the overall picture, and the government plays the major role in regard to these supply-shifting investments and services as well. The share of total government expenditure devoted to agriculture reached a low point in 1973 and 1974, which were years of high consumer food subsidies. The budget share spent on agriculture subsequently rose, but mainly in response to input subsidy increases. This historical pattern suggests that there was likely a trade-off between subsidy expenditures and funding for public agricultural investments and support services.

Agricultural Policy Reforms, 1987-94, and Their Impacts

This section provides a detailed account of the agricultural policy changes during 1987-94. Four crops (wheat, maize, rice and cotton) are examined in some depth. Although the emphasis in this chapter is on the pattern and sequencing of the reforms, some attention is also given to indicators of the impacts of the reforms on production and productivity, income and trade. However, much more detailed examinations of those impacts are made in the following three chapters. Policy changes affecting the four crops, as well as eight minor crops, are summarized in Table 4.8.

Impacts of the Reforms on Four Major Field Crops

Area restrictions, procurement quotas and fixed procurement prices had little impact on wheat and maize in either the 1981-1986 pre-reform period or the 1987-1993 reform period. Mandatory sales never exceeded 10 percent of production of either crop. However, trade policies and consumer subsidies had a depressing effect on domestic prices, which tended to shift land, water and labor resources out of these crops, especially during 1981-1984. Yields stagnated during the 1981-1986 period mainly because farmers reduced their use of purchased inputs and labor in response to artificially low prices relative to border prices and lacked incentives to apply new technology that was available.

The official exchange rates at which both maize and wheat were imported were highly overvalued through 1990. This reduced the domestic cost of imports and gave the government a margin for subsidizing bread prices and yellow corn prices to feed mills. By itself, this policy would have greatly depressed domestic wheat and maize prices at the farm-gate, thereby shifting resources away from those crops. However, a system of floor prices for farmers and subsidies for consumers was used to temper the effect on farm-gate prices. For both crops, the government trade policies drove wedges between domestic markets and international markets, effectively isolating the markets from one another.

Table 4.8 Agricultural policies, 1981-86, and policy reforms, 1987-94

Crop/Policy	1981-1986	1987-1994
A. Minor crops	<ul style="list-style-type: none"> • Eight minor crops were affected by various degrees of quotas, price controls, marketing controls, input subsidies, exchange rate overvaluation and trade controls during 1981-86. These crops were broad beans, lentils, sesame, groundnuts, onions, garlic, soybeans and potatoes. • Neither acreage restrictions nor delivery quotas were applied to these eight crops during 1981-86. Government procurement prices were in effect but delivery was not obligatory. Intergovernmental transport was restricted and would have had some impact on geographical price patterns and efficiency of distribution by areas. 	<ul style="list-style-type: none"> • All crop area, quota, and price restrictions were eliminated by 1987, except that floor prices were introduced. Marketing restrictions were eliminated in 1987, except for rice, cotton and sugarcane.
B. Wheat and maize	<ul style="list-style-type: none"> • Area restrictions were imposed on wheat but not maize. Quota and fixed procurement price applied but only nominally to maize and to less than 10% of wheat procured. Real farm-gate prices increased 52% for wheat and 45% for maize from 1981 to 1986. Farm-gate prices averaged 85% of world price for maize and 80% for wheat, from 1984 to 1986. • Marketing, processing and imports were controlled by the government. 	<ul style="list-style-type: none"> • Area restrictions, quotas and fixed procurement prices were removed for wheat and maize, in March 1987. Marketing and processing were controlled for approximately 50% of production by public sector firms. Consumer subsidies on bread depressed farm prices, as did subsidies on maize to feed manufacturers. Private sector was allowed to import maize in 1991. Private wheat flour imports were allowed in 1992. Wheat prices increased between 1987 and 1992.
C. Rice	<ul style="list-style-type: none"> • The full range of controls (procurement quotas) and fixed procurement control of marketing, processing and exports applied throughout the period. Over 50% of milling capacity was owned by the government. There was no transport or export by private sector. • Official prices increased 94% over this period; average farm price increased 150%. • Government procured 48% of production. • Weighted average market price was 45% of world price between 1981 and 1984. 	<ul style="list-style-type: none"> • Area was still controlled for antipollution and water allocation purposes. • Procurement quota was eliminated for the 1991 crop. Prices from 1987-1990 were between 75 and 90% of world price. During 1991 market prices remained at 82-89% of world prices. • All controls on price procurement, marketing and exports were removed in 1991. • Rice milling capacity was still over 50% publicly owned. • Strong political pressure was exerted to reduce rice area by 30% in 1987, and 13.3% more in 1988. Acreage was stable at about 1.1 mil. feddans 1989-93. • Consumer subsidy was high and was removed in April 1993. • Domestic market restrictions on private trade were removed in 1991 and 1992.
D. Cotton	<ul style="list-style-type: none"> • Strict acreage controls were enforced by fines; 100% quota delivery of fixed prices at less than 50% of the border price equivalent; prohibition of transport, ginning, domestic trade and foreign trade by private sector; and strict cropping pattern controls by region and by variety of cotton. • Procurement prices averaged 52% of border prices during the period and fell to 40% during 1987-1990. 	<ul style="list-style-type: none"> • 1981-1986 policies continued as constraints through 1991, except procurement price was gradually increased to approximately 75% of the 1991 border price. • Procurement price was 114% of border price in 1992 and 132% in 1993, priced at market exchange rates. • Acreage controls were removed for the 1992 and 1993 crop. • All marketing restrictions and quota requirements remained the same. The marketing of cotton was liberalized in 1994.

- E. Input prices, distribution and subsidies
- Fertilizer subsidy averaged about 50% in 1981-86 and 24% in 1987-88.
 - Fertilizer subsidies were over 50% and pest control subsidies were 100% for cotton.
 - All fertilizer was distributed by the PBDAC. Credit was tied to subsidized fertilizer purchases.
 - No explicit water charges. Implicit water subsidy was approximately double for rice compared with other crops.
 - Imported yellow maize was subsidized to feed mills.
 - Prior to 1985, most newly reclaimed land was allocated to public enterprises.
 - Input subsidies of 50-60% applied to minor crops, although the link between fertilizer distribution subsidies and credit allocation may have distorted the pattern of subsidy actually received by farmers, as the PBDAC distributed fertilizer by providing credit in kind, which credit was allocated according to priorities set on a crop basis.
 - General fertilizer subsidy was increased 13% in 1986-1988 and declined to zero in 1992.
 - In 1985-1988, land reclamation programs were allocated almost 100% to private individuals.
 - Ex-factory prices of fertilizer reached 105-112% of border prices.
 - Cotton fertilizer subsidy was removed by 1991.
 - Cotton pest control subsidy was reduced by 25% in 1992, further reduced for 1993, and removed for the 1994 crops.
- F. Exchange rate and trade policies
- Wheat and maize were imported by the GOE only. There were import subsidies and consumer subsidies.
 - Exchange rate was highly overvalued, depressing farm-gate prices relative to import prices and favoring imports over exports.
 - Exchange rate overvaluation caused LE 555 mil. transfer out of agriculture during this time.
 - No private rice exports were allowed.
 - Cotton, both for export and for domestic mills, was traded at administered prices by the public sector only.
 - Cotton was exported only at the official rate. Mill prices, for example, during 1981/2-1986/7 for Giza 75 were virtually identical to the farm-gate price. Thus, mills were subsidized by the amount of domestic ginning and marketing, and procured raw materials at the depressed farm-gate price of about 50% of the export prices.
 - The market exchange rate increased from LE 0.90/\$ in 1981 to 2.30/\$ in 1991, while the official exchange rate remained constant at LE 0.70/\$.
 - The policy of taxing farmers through low procurement prices was enforced by fixed prices and monopoly marketing through the public trading companies.
 - The GOE adjusted the official exchange rate from LE 0.70 in 1988 to 3.35 in 1991, while the market rate increased from LE 2.30/\$ to LE 3.35/\$ in 1991. The rate was freed in 1991.
 - The subsidy on maize was decreased by 81% in 1986-88. The private sector was allowed to process domestic and imported wheat.
 - Real wheat prices increased less than 2% in 1987-92. Real corn prices declined 25%.
 - The fertilizer subsidy was 24% until 1988 and was eliminated in 1992.
 - Field level costs were paid by farmers only on new lands.
 - Implicit subsidies on maize and wheat imports were caused by overvaluation of the exchange rate, eliminated in 1991. Bias was extreme and in favor of imports of wheat and corn during 1987-89 and against major export crops, including cotton, fruits, vegetables and rice.
 - 1990 domestic prices were close to border prices for both wheat and maize.
 - An import subsidy (U.S., E.U.) of about 20% affected both grains during the entire period.
 - The consumer subsidy for wheat and bread was continued.
 - The subsidy on wheat bran was reduced by 50% in 1991 and to zero in 1992.
 - Minimum export prices were set in 1991 but eliminated in 1992. Rice exports were opened to the private sector in 1991.
 - Cotton exports were made at the official rate, the official asking price was much higher than the true border price, and the procurement price therefore did not fully reflect the overvalued exchange rate. Procurement prices would have been less than 20-30% of the true border price if the full impact of exchange rate overvaluation had been passed to farmers.

For wheat, artificially low domestic costs created by both an overvalued exchange rate and exporter-country subsidies were passed through large, modern flour mills owned by the government. The cheap flour was sold as highly subsidized bread, largely to urban consumers. Domestic wheat, of which less than 10 percent was procured by the Ministry of Supply, was milled in small, traditional mills, largely in the rural areas, and consumed at the same low, subsidized prices by rural consumers.

The maize economy is somewhat more complicated, as local white maize is consumed largely as human food, usually mixed with wheat flour to make balady bread. Imported maize (yellow corn), on the other hand, was sold mainly at highly subsidized prices to mills producing poultry feed. Red meat and frozen poultry imports were banned to further protect the local livestock industry, including the commercial poultry industry.

Devaluation of exchange rates and a concurrent reduction in the subsidy on imported yellow corn in 1987-1989 shocked the local commercial poultry industry, causing major financial restructuring, and many private units were forced out of business. The poultry industry's slow restructuring and recovery from this major shock are discussed in more detail in Chapter 6.

Wheat and maize prices reached equivalence (at market rates of exchange) with their respective border prices in 1988/89. Real farm-gate prices peaked during these years. Wheat and maize area and yields climbed steeply during 1988-1990, most probably as a result of these favorable price developments (Tables 4.9, 4.10, and 4.11). Moreover, relative prices of rice and cotton, which are the major crops competing for land area during the summer season, remained extremely low, both relative to their respective border prices and relative to historical average levels. The relative profitability of wheat, maize, rice and

Table 4.9 Ratio of market prices to border prices^a for wheat, maize, rice and cotton, 1981-1994

Year	Wheat	Maize	Rice ^b	Cotton
1981/82	0.48	0.74	0.51	0.61
1982/83	0.69	0.80	0.87	0.47
1983/84	0.70	0.92	0.95	0.47
1984/85	0.88	1.02	0.55	0.48
1985/86	1.04	1.10	0.93	0.61
1986/87	0.84	1.18	0.97	0.46
1987/88	0.71	0.96	0.71	0.31
1988/89	1.00	0.97	0.64	0.32
1989/90	1.02	1.16	0.80	0.42
1990/91	1.10	1.11	0.77	0.53
1991/92	0.98	0.99	0.86	0.75
1992/93	1.00	1.03	0.89	1.14
1993/94	1.00	1.00	0.84	1.32

Source: Ministry of Agriculture and Land Reclamation, Cairo.

^aUsing free market exchange rates.

^b1981/82-1983/84 figures are the ratios of procurement prices to border prices. 1984/85-1993/94 figures are the ratios of weighted average market prices and procurement prices to border prices.

Table 4.10 Real farm-gate prices of wheat, maize, rice and cotton, 1981-1994

Year	Wheat	Maize	Rice	Cotton
1981/82	92	94	99	348
1982/83	75	114	119	348
1983/84	93	141	110	349
1984/85	95	131	99	358
1985/86	120	136	148	431
1986/87	140	136	154	383
1987/88	121	137	111	392
1988/89	110	151	119	433
1989/90	175	162	145	513
1990/91	161	145	125	566
1991/92	139	123	121	559
1992/93	123	101	105	560
1993/94	112	96	136	495

Source: Ministry of Agriculture and Land Reclamation and CAPMAS, Cairo.

Note: Deflated by the implicit GDP deflator.

cotton rotations, shown in Table 4.12, supports this thesis. As a result of this complex set of trade and farm price policies, wheat production increased 116 percent and maize production increased 82 percent in 1991 compared with 1986 (Table 4.11).

The real farm-gate price of cotton was increased by 45 percent between 1986 and 1991 and remained at this higher real level through 1993. As a result, profitability of the cotton/short-berseem rotation exceeded that of wheat, rice, and maize rotations by LE 600-700 per feddan in 1992, whereas it was lower by LE 300-400 per feddan in 1986. Significant shifts of acreage from wheat, maize and rice to cotton could have been expected in 1991, 1992 and 1993. Such shifts did not happen; in fact, cotton acreage continued its downward trend even through 1993 and 1994. Yields of cotton, however, rose steeply, from 5 ktrs/feddan in 1988 to over 7 ktrs/ feddan in 1991, 1992 and 1993 (Table 4.12).

Table 4.11 Wheat, maize, rice and cotton production, 1981-1994 (000/mt)

Year	Wheat	Maize	Rice	Cotton
1981/82	1,928	3,328	2,236	421
1982/83	2,007	3,367	2,440	384
1983/84	1,986	3,530	2,442	339
1984/85	1,806	3,720	2,236	333
1985/86	1,863	3,708	2,311	367
1986/87	1,919	2,824	2,444	345
1987/88	2,708	3,641	2,406	301
1988/89	2,825	4,112	2,132	271
1989/90	3,150	4,556	2,671	253
1990/91	4,080	4,825	3,164	258
1991/92	4,143	5,152	3,439	251
1992/93	4,232	5,088	3,899	300
1993/94	4,452	5,360	4,149	344

Source: Department of Agricultural Economics and Statistics, Ministry of Agriculture and Land Reclamation, Cairo.

Table 4.12 Indicators of policy impacts on wheat, maize, rice and cotton

Crop	Year			Change		
	1986	1991	1993	1986/91	1991/93	1986/93
Wheat						
Area	1.21	1.94	1.83	0.73	-0.11	0.62
Yield	10.66	14.30	16.23	3.64	1.93	5.57
Production	12.86	27.76	29.68	14.90	1.92	16.82
Maize						
Area	1.48	2.07	1.90	0.59	-0.17	0.42
Yield	13.52	17.70	18.47	4.18	0.77	4.95
Production	20.05	36.58	35.16	16.53	-1.42	15.11
Rice						
Area	1.01	1.10	1.28	0.09	0.18	0.27
Yield	2.42	3.14	3.25	0.72	0.11	0.83
Production	2.44	3.44	4.15	1.00	0.71	1.71
Cotton						
Area	1.05	0.85	0.88	-0.20	0.03	-0.17
Yield	6.54	5.90	7.78	-0.64	1.88	1.24
Production	6.90	5.02	6.88	-1.88	1.86	-0.02
Rotation Net Income (LE/fd)						
Wheat/maize	453	1385	995	932	-390	542
Wheat/rice	559	1501	1225	942	-276	666
Berseem/cotton	270	1196	1824	926	628	1554

Source: Based on data obtained from the Department of Agricultural Economics and Statistics, Ministry of Agriculture and Land Reclamation, Cairo.

Note: Area fd millions
Yield ardab/fd
Production ardab millions

Farmers' reluctance to expand the area devoted to cotton probably can be explained by the uncertainty created by the world cotton price decline in 1991, 1992 and 1993. In 1991, the official export price was reduced by 30 percent. This adjustment process culminated in a 1993 export price that was less than 50 percent of the 1991 level. In 1992 and 1993 farm procurement prices were fully 14-30 percent *above* border prices. The government, squeezed by these events, found itself without sufficient funds to make an initial payment to farmers in 1993. After several months of delay, it made good its commitment to pay farmers a price that exceeded "world" prices by about 30 percent. Many farmers chose not to grow cotton because of this uncertainty, and area declined from 850,000 fd in 1991, to 840,000 fd in 1992, and to 800,000 fd in 1993, and then declined further to 720,000 fd in 1994. Some farmers (probably the more efficient ones, who had lower costs) continued to plant cotton and, indeed, used more labor and purchased inputs to boost yields and profits during 1991-1993.

Except for rice, whose price continues to be somewhat depressed below border prices, the 1990 adjustment in exchange rates toward market rates, removal of acreage controls, removal of the rice procurement quota in 1991, the increase in the farm-gate price of cotton, and continued liberal markets for wheat and maize have finally created a liberal market situation for all the major crops

in Egyptian agriculture. What net adjustments did farmers make in face of full liberalization in 1991-1993? Table 4.12 provides indicators for 1986, 1991 and 1993 of changes in crop areas, yields, production and rotation net incomes for the four major field crops.

A massive shift in area to wheat and maize occurred between 1986 and 1991, partly in response to relatively high and increasing profitability of those crops throughout the period. Area in wheat and maize increased by 50 percent between 1986-1991. The increase in area planted to wheat and maize came at the expense of "other" crops, as rice and cotton area together remained about constant between 1986 and 1991. By 1992, falling world prices for wheat and maize induced a 5-8 percent decline in area for these crops. Farmers apparently shifted to crops other than rice and cotton, although both cotton and rice became relatively more profitable. Uncertainty about cotton prices, discussed earlier, and restrictions on expansion of rice area imposed by its high water requirements probably accounted for farmers' failure to shift more cultivated area to those crops.

The impact of policy changes after 1986 was probably not fully realized even by 1993. Although allocation of land, water, purchased inputs and labor seem to have responded to the new situation induced by the more liberal policy regime, government ownership of much of the marketing and processing industry and continued direct interventions in cotton and rice production were apparently still distorting resource allocation.

Rice area, yields and production were stagnant during 1981-1986, increasing by only five, four and nine percent, respectively. During 1987-1993, production increased by 62 percent, area expanded by 20 percent and yields rose by 42 percent. These increases, including a jump in exports from near zero in 1987 to 200,000 MT in 1992 and 1993, were associated in part with elimination of delivery quotas in 1991 but to a greater extent with the elimination of the overvalued exchange rate in 1991. Farm-gate prices rose to border-price levels in 1990 and 1991 and then receded to 85 to 89 percent of border prices in 1992 and 1993. Of course no rice could be exported during the 1984-1989 period because the official export price, converted at the overvalued official exchange rate, exceeded world prices.

During 1981-1986, procurement prices for rice were set at less than 60 percent of the open market price and about 50 percent of production was procured by the government, the remainder being sold at market prices. In 1987-1991, the procurement price rose to 75 percent of the open market price and 42 percent of production was procured. The procurement price became a low "floor" once, in 1991, when the market price exceeded the procurement price by over 40 percent.

Thus, during 1987-1991 the overvalued exchange rate caused export prices of rice to be artificially high at the official exchange rate, but farm procurement prices were set artificially low, discouraging both exports and production. In 1991-1993 the market exchange rate, combined with private sector export

capability, stimulated a sharp increase in both production and exports; government procurement declined to less than 25 percent of the crop in 1991 and 1992 and fell to less than 10 percent in 1993.

Rice, a heavy user of water and nitrogen, benefitted from subsidies for both inputs during the 1981-1990 period. Thus, as real, free-market prices of rice increased, farmers were stimulated to expand, as rice became very profitable in the 1991-1993 period. Rice area increased by 41 percent from 1988-1993, yields increased by 41 percent, and output increased by 82 percent. Returns to the wheat/rice rotation increased from LE 654/fd in 1986 to LE 1,501/fd in 1991, and then dropped slightly to LE 1,225/fd in 1993 (Table 4.12).

More favorable farm prices for rice evolved during the 1991-1993 period in conjunction with reductions in consumer subsidies for most grades of white rice in 1991 and total elimination of consumer subsidies in 1993. Consumer subsidies of course are often associated with low procurement prices as the government tries to reduce the fiscal burden of the subsidies.

Notwithstanding improvements in farm-gate prices relative to border prices, the real farm-gate prices of rice declined in the reform period. While fluctuating from year to year, the average price for 1984-86 was LE 134, declining to LE 125 for 1987-90 and LE 113 for 1991-93. However, comparisons of net profitability among major competing rotations indicate that rice rotations increased in net profitability over the time period, which in part explains rice acreage expansion and to some extent explains the increase in yields. Nevertheless, negative protection of 10-12 percent still persists, despite improvements in recent years, probably owing to non-competitive conditions in the rice marketing and processing industry.

Throughout the 1981-1988 period, a combination of overvalued exchanged rates, high official export prices, and subsidies to domestic mills was associated with low farm-gate prices for cotton, leading to reduced production and lower shares of the export market for LS and ELS cotton and expanded domestic consumption of these high-valued LS and ELS cottons. These policies were inimical to growth in cotton production and trade. First, low farm-gate prices relative to the border equivalent price and relative to farm prices for alternative crops caused farmers to reduce yields drastically. There was less downward flexibility for area grown, as strict area quotas were enforced by the government. Official area quotas were reduced only from 1 million to 0.95 million fd. Second, apparently assuming that foreign demand for LS and ELS was *inelastic*, the GOE attempted to extract monopoly profits by raising export prices against lower exportable supplies. However, the demand is in fact elastic, so Egypt lost most of its market share by 1990. Also, only a fraction of this "monopoly" price was passed back to farmers, whose procurement price was set at less than 50 percent of the official export price, adjusted for internal marketing costs. Third, domestic mills received almost the full benefit of depressed procurement prices and in addition were generally subsidized by the additional amount of the domestic

marketing costs. Fourth, yarn and cloth for domestic consumption were sold at subsidized prices, thus increasing demand and competing with exports of lint cotton.

As a result of interactions among farm price policies, exchange rate policies, mill subsidies, export strategy and underestimation of the elasticity of demand for exports, cotton yields declined 25 percent from 1981 to 1988, official area allocations declined 10 percent, production fell 36 percent, and exports plunged from 465 thousand bales in 1984 to 183 thousand bales in 1988.

The policies biased against cotton production began to be reversed in 1989. The exchange rate was devalued to a market rate by 1991. Farmers' procurement price, which was 53 percent of the adjusted border price in 1990, rose to 75 percent in 1991, 114 percent in 1992 and 130 percent in 1993. Cotton/berseem was the most profitable crop rotation in 1991, 1992 and 1993. Domestic mills were required to pay full procurement costs at border price equivalents, without subsidy on marketing costs. While cotton area continued a downward trend, partly as a result of uncertainty in 1992 and 1993 regarding procurement prices, yields recovered to their pre-1981 level of 7 kentars per feddan.

The cotton market was fully liberalized beginning with the 1994 crop. At that point, exchange rates reflected the market value of the Egyptian pound, farmers received the border price equivalent or more, domestic mills no longer received subsidies, and private traders were allowed by law to export at whatever price they could sell in international markets. Adjustments expected in the cotton industry during the next few years, assuming complete liberalization and privatization, could include: (1) an increase in acreage to around one million FED, with yields rising to over 8 ktrs/fed; (2) shifts to shorter-season, shorter staple cotton; (3) reduction of capacity of domestic mills, which may be forced to operate more efficiently; (4) recovery of ELS and LS export levels to about 20 percent of the world market (150,000 mt); and (5) large increases in yarn and fabric exports because of growth in world demand.

This optimistic outlook for the Egyptian cotton industry depends, of course, on world trends in supply and demand as well as on liberal domestic policies. Overall demand for raw cotton is expected to increase by over two percent per year through the year 2000, while world production trends are expected to lag behind this rate, thus creating favorable market conditions for increased Egyptian exports.

Sector-Wide Impacts of the Policy Reforms

Policy reforms included removal of the system of official prices and procurement quotas that applied to many crops during the 1980-1986 period. Crop prices at the farm-gate were artificially depressed relative to international (border) prices, amounting to an indirect tax that in turn was used to finance either consumer subsidies or subsidies to government-owned processing industries. Based on Table 4.9, the following tabulation illustrates the rather

dramatic changes that occurred with the reforms and that generally allowed farmers to receive much closer to world prices for the major commodities:

Ratio of Farm-Gate to Border Prices

	<u>1981-86</u>	<u>1987-92</u>	<u>1993</u>
Wheat	0.77	0.97	1.00
Rice	0.56	0.83	0.84
Maize	0.96	1.04	1.00
Cotton	0.52	0.58	1.32

Farm-gate prices relative to border prices reached equivalence for wheat and maize in 1987-92 and in 1993. Cotton prices reached and then rose above border prices in 1991-1993. Only rice prices remained significantly below parity in the reform period. Thus, much of the price distortion, which served as a disincentive to farmers during 1981-1986 and prior years, was removed by the policy reforms. Rice seems to be a case to the contrary. Although quotas and fixed procurement prices were terminated in 1991 and 1992, farm-gate prices have remained below the economic or border price. The pricing situation apparently remains distorted. One possible explanation is that pricing policies by government-owned rice mills serve to depress farm-gate prices.

Border prices for wheat, maize, rice and cotton declined in 1991 and 1992, depressing net farm income relative to the immediately preceding three years. Removal of controls on procurement prices thus carries with it a downside risk from the volatility of world prices of tradable commodities. Price stabilization programs may be warranted as a means of stabilizing incomes, and could be particularly important in this country of very small farmers, many of whose incomes fall below the poverty line. However, the operation of the government's floor price system needs evaluation in relation to stabilization goals, economic impacts, and budgetary costs. This issue is discussed in more depth in Chapter 9.

The real gross value of output for eleven major crops averaged LE 2.65 billion for 1980-86 and LE 3.36 billion for 1987-92, a 27 percent increase. Rather dramatic changes were evident in yields of certain key crops. Yields of wheat, rice, maize and tomatoes in 1987-1992 were 17 to 44 percent above average yields for 1980-1986. By far the largest contributor to increased net income attributable to policy reform was thus an increase in crop yields. Two factors account for this increase. Crop prices relative to input prices increased dramatically in 1987-1990, stimulating farmers to adopt new varieties and to apply better management techniques. Research had produced new, high-yielding varieties that were adopted rapidly following the improvement in price relationships. The most dramatic increase occurred for wheat, which showed an astounding increase in yields between the two periods. Area, yield and production changes are analyzed in the following chapter.

Farmers also shifted resources from crops with low returns to crops offering higher returns. Among the five crops mentioned previously, wheat expanded by 0.3 million feddans (23 percent) and cotton declined by 0.2 million feddans (-18 percent). Reflecting overall economic gains from policy reforms, wheat production increased 85 percent in the reform period over the pre-reform period. Only cotton, which remained under strict government controls through 1993, showed an overall decline in production (-28 percent) in the reform period.

Change in combined producer and consumer surplus would measure the overall static welfare effects of efficiency gains from improved allocation of resources among alternative crops, adoption of new technology, and more efficient input use for each crop as a result of the reforms. A partial measure—gross output value less costs of purchased inputs—can be used to capture changes in income accruing to agricultural resources associated with policy changes. Changes in farm prices and adjustments in cropping patterns and input use will be reflected in this aggregate measure of agricultural resource income.

The average annual value of this measure for 11 major crops (old land only), deflated by the implicit GDP deflator, was LE 4.7 billion for the pre-reform period (1980-1986) and LE 5.8 billion for the reform period (1987-92), an increase of 23 percent. However, the measure of real resource income dropped significantly in 1991 and 1992, despite further policy reforms, including freeing of the exchange rate and increased producer prices for cotton. Two factors may account for much of this decline. First, international prices for wheat, rice, maize and cotton, crops that account for 50 percent of the total value of production, declined by about 15 percent between 1990 and 1993. If world prices had remained at 1987-1990 levels, average net real resource income for the reform period would have exceeded the average for the pre-reform period by over 30 percent. This is an indication of gains in overall efficiency of production, because the larger output value would have been produced with the same endowment of land, labor and water resources in the sector.

Second, real variable costs increased somewhat during 1991-93 compared to previous years, as subsidies on fertilizer and other inputs were removed. The effect of reductions in input subsidies on real resource income for the 11 crops was significant when combined with declining border prices. The combined effect reduced real resource income by about 30 percent from 1990 to 1993. The ratio of product prices to NPK fertilizer prices averaged 1.76 in 1987-1990 but dropped to 1.11 in 1991-92, as product prices declined and fertilizer prices increased with elimination of subsidies. A review of changes in product-fertilizer price ratios for major crops is given in Table 4.13.

Macroeconomic Policies and Agriculture

Since 1987 the GOE has been implementing macro-economic stabilization and structural adjustment policies. Its initial efforts resulted in some liberalization of trade and domestic prices but did

Table 4.13 Ratios of farm-gate product price to NPK price (in LE)

Year	Wheat	Maize	Rice	Cotton	Berseem	Tomato
1980	2.2	1.5	2.3	0.6	19.2	2.7
1981	2.7	2.6	2.5	0.7	20.5	3.0
1982	3.0	1.9	1.9	0.6	17.0	2.4
1983	2.4	1.5	2.0	0.6	15.4	2.5
1984	2.1	1.5	2.0	0.6	14.8	2.2
1985	1.5	1.3	1.2	0.4	13.2	1.8
1986	1.2	1.2	1.1	0.4	12.4	1.6
Average (80-86)	2.1	1.7	1.8	0.6	16.1	2.3
1987	1.9	1.6	1.7	0.5	15.5	2.2
1988	1.2	1.0	1.3	0.4	8.1	1.3
1989	1.3	0.9	1.2	0.3	10.5	1.2
1990	1.1	1.2	1.4	0.4	17.2	1.6
1991	1.1	1.2	1.4	0.3	14.0	1.8
1992	1.5	1.6	1.7	0.4	17.1	2.2
1993	1.9	2.3	2.2	0.4	18.8	3.1
Average (87-93)	1.4	1.4	1.5	0.4	14.4	1.9

Source: International Fertilizer Development Center 1993.

little to resolve the economy's underlying macro-economic imbalances and structural distortions. GDP growth rates declined in the early 1990s and, as a result of the Gulf war, the economy was hit by a fall in overseas remittances and a need to find jobs for returning workers when unemployment was already high.

In 1991 the GOE adopted the comprehensive Economic Reform and Structural Adjustment Program (ERSAP), which was intended to lessen reliance on the public sector, develop a stronger market economy and open more opportunities for the private sector. This program was designed to:

- Deregulate interest rates.
- Unify exchange rates and devalue the currency.
- Reduce consumer and industrial subsidies.
- Lower money supply growth and fiscal deficits.
- Liberalize prices and foreign trade.
- Restructure public enterprises and initiate their privatization.

The impacts of macroeconomic policies on Egyptian agriculture is the subject of Chapter 12. Industrial protection remains high, which continues to bias the domestic terms of trade against the agricultural sector. Moreover, the ultimate goal of trade liberalization is export promotion, and export growth is still lagging in Egypt. Efficient export-oriented industrial growth would benefit Egyptian agriculture in several ways. It would provide lower-priced and better quality inputs and consumer goods to rural households. It would strengthen the market for agricultural raw materials, thus encouraging output growth. It would create

jobs for workers, thereby absorbing some of the excess workers in agriculture and encouraging growth in output and income per worker in the sector.

The discussion in Chapter 2 suggests that the real exchange rate appears to be becoming overvalued. Some observers see current overvaluation of as much as 30 percent. If this is so, producers of food import substitutes and exporters of agricultural commodities are again facing an implicit tax. Also, there is mounting evidence that protection of certain key agriculturally-related industries (e.g., fertilizer, cotton spinning and rice milling) through administered pricing schemes is beginning to indirectly tax farmers through higher inputs costs and lower farm-gate prices.

Macroeconomic and industrial policies, while much improved compared to pre-1990 conditions, are still distorting resources allocation in agriculture and agro-industry. The situation should be closely monitored and corrective policy measures should be introduced expeditiously. Egyptian policy makers would be well advised to avoid reverting back to a situation like that of 1964-1984, when agriculture suffered a severely negative protection rate of over 44 percent, which drastically distorted resource allocation and depressed both agricultural growth and the overall rate of economic growth.

Impacts of Policy Reforms on the Poor and on Food Security

The rise in consumer prices associated with the policy reforms, including reductions in direct consumer subsidies, along with falling real wage rates, is having a strong negative impact on the poor. Nominal prices of grains and high-carbohydrate foods, which make up a very large proportion of the diets of the poor, rose threefold between 1987 and 1992. Real prices increased by 70 percent in the same period, and real government wages actually declined.

Upper Egypt is the most vulnerable. Measuring the poverty line as the expenditure necessary to obtain an adequate caloric intake (an expenditure usually set at two-thirds of the average income level), 37 percent of the urban population and 25 percent of the rural population naturally fall below the poverty line. But in Upper Egypt, 45 percent of the urban population and 36 percent of the rural population fall below the poverty line. The "poverty gap" index for rural areas is 5.05 percent. The poverty gap index is the sum of individual deficits expressed as a percentage of the poverty line. It indicates the minimum cost of perfect targeting of income transfers to "fill" the poverty gap, by bringing incomes of all the poor up to the level of the poverty line. The index, multiplied by the poverty line value and then by the rural population, gives a figure of LE 750 million, the minimum cost of targeting aid to bring all rural inhabitants up to the poverty line. This is in contrast to the 1992 budget cost of LE 2.4 billion (1992) for untargeted food subsidies.

It is quite evident that poverty is deep and widespread, and it would not seem feasible to target assistance to everyone falling below the poverty line, given the magnitude of the gap in both rural and urban areas. The minimum expenditure required to bring all of the urban poor to the level of the poverty line is estimated at LE 1.7 billion. The sum of minimum urban and rural expenditures required thus equals LE 2.5 billion annually, exceeding current expenditures for non-targeted food subsidies.

Thus, the recommended strategy would seem to be a targeting of aid to a fraction of the poor, say the ultrapoor 20 percent of the population, bringing them up to some point below the poverty line. The food subsidy budget could be eliminated and some fraction of the savings spent on eliminating poverty. The advantages are clear. Waste is avoided by reducing excess consumption arising from broad-based food subsidies. Reform-induced worsening (deepening) of poverty is avoided during the transitional years of structural reform. Some budget savings may be possible if targeting is precise, and those savings could be applied to, say, rural work programs that would generate jobs and rural infrastructure. This issue is discussed in much more depth in Chapter 13.

Strategic Directions for Future Policy Reforms

Privatization and Liberalization of Agricultural Marketing, Processing and Input Supply Industries

Economic studies completed within the past two years for the cotton textile industry, rice marketing and milling, and fertilizer production and marketing have revealed gross inefficiencies in public sector enterprises. Most measures of technical efficiency and pricing and marketing efficiency were much lower than for private sector firms in similar operations in other countries of the world. Privatization, private management and private investment in agro-industries are expected to generate huge savings in marketing and processing costs.

Rice marketing and processing. In 1993, 4.2 million mt of rice were produced in Egypt, of which 56 percent was sold to private sector merchants, 29 percent was consumed on the farm, 8 percent was sold to the public holding companies and 7 percent was traded for production inputs. Of the 56 percent sold to private merchants (2.4 million mt), about 0.3 million mt was custom milled by public mills.

The fifty-two public mills have an annual capacity of 2.2 million mt of paddy, 37 commercial mills have an annual capacity of 98,507 mt of paddy and 1,882 village mills have an annual capacity of 286,567 mt of paddy. In 1993, public mills procured a total of 550,000 mt of paddy (335,000 purchased directly

and 215,000 custom milled for the private sector). This amounts to 25 percent of the rated capacity. At 25 percent capacity, the total milling cost was LE 253/mt as compared to LE 110/mt at 87.5 percent of capacity, a savings of LE 143/mt.

Applying this cost savings of LE 143/mt to the 71 percent white rice equivalent of the 1993 rice crop, the cost savings attributable to improved organization and efficient management through privatization or liberalization of the publicly owned mills equal LE 285.7 million per year. Theoretically, additional savings could arise through increased export earnings. If the elasticity of demand facing international mills is assumed to be unity, then a 14.3 percent reduction in offering price associated with lower milling costs could generate additional exports of 28,600 MT valued at LE 857/MT, or LE 24 million. Thus, improving efficiency or privatization of rice mills could generate over LE 300 million/year.

Apparently, underutilized capacity of public rice mills is only one form of inefficiency in rice milling. A 1994 sample of private commercial rice mills showed that average cost of milling of white rice in these private mills was LE 26.6/MT, or less than 20 percent of the full-capacity costs for public mills. There appears to be scope for further reductions in costs of over LE 100/MT, or LE 200 million per year after full efficiency is reached.

Cotton ginning, spinning and weaving. Cotton spinning and weaving represent over 25 percent of total industrial output in Egypt (excluding petroleum) and accounts for nearly 50 percent of total export earnings. About half of total public sector industrial employment is in the cotton textile industry. Twenty-five public sector companies and two private companies comprise the spinning subsector. Sixty percent of the weaving capacity is held by the public sector. Knitting and production of ready-made garments are largely in the private sector. The public sector firms produced 273,000 MT of yarn and 550 million meters of fabric in 1992.

There is excess capacity in cotton spinning owing to the GOE policy of expanding and modernizing textile spinning since the late 1980's, while cotton production declined and imports were limited by phytosanitary restrictions. Meanwhile, much lower rates of growth (or actual declines) in the capacity of upstream operations (spinning, cloth production) resulted in an imbalance in capacity along this vertical production chain.

In 1990, cotton yarn and fabrics exports started a rapid decline that continued through 1994. Yarn exports declined almost 15 percent per year between 1989 and 1992, while exports of finished textiles increased by over 20 percent per year during the same period. Textile production was largely in private hands, while yarn production was largely controlled by public firms.

Almost all efficiency indices for the public sector companies are low and declining, the direct result of management problems and policies. Policies include export pricing, investment decisions for new plant and equipment, and the quota

system for procurement of raw materials; problems related to these policies are being addressed in the new liberalization legislation.

Egypt's mills spin about 6 million kentars of raw cotton each year at an average cost per kantar of LE 589, which exceeds the cost for all competing countries except Japan for 1991/92. Efficiency measures indicate that the public mills operate at less than 65 percent of rated efficiency, as compared to the global average of 85 to 90 percent.

If operating efficiency increased 20 percent, there would be a reduction of LE 118 per kantar in cost of raw cotton milled, or a savings of LE 708 million per year. Further important savings could accrue in weaving, which currently operates at an average efficiency of 72 percent, as compared to a global average of 85 percent. Achieving global efficiency would translate into a reduction in cost of LE 0.55 per meter or LE 302 million per year.

Privatization or liberalization of cotton ginning companies could generate significant benefits to the economy. Ginning charges under public holding companies were fixed at LE 15 per kantar in 1993. Gins have operated at about 20 percent of capacity in recent years, and even less for the 1994 season where cotton production had fallen over 20 percent below historical levels. Costs of ginning are estimated at LE 3.96 per kantar at 97 percent of capacity, LE 6.29 per kantar at 40 percent of capacity and LE 14.69 per kantar at 20 percent of capacity. Thus, a savings in costs of LE 10 per kantar could be realized with improved management, reduction in excess capacity and introduction of competitive conditions in ginning. This translates into a benefit to the economy of LE 60 million per year for the crop of 6.0 million kentars.

Fertilizer manufacturing and marketing. A detailed study of the economics of fertilizer production in Egypt is planned. However, rough estimates of the benefits of completion of fertilizer production plants are available through examination of certain indicators.

One of these indicators is the level of tariffs on fertilizer. In January 1993, the GOE introduced a 30 percent tariff on all fertilizer inputs, a tariff that protects the least efficient public factories from import competition. A 30 percent increase in fertilizer prices to farmers translates into increased total crop production costs of LE 223.6 million per year, an increase of 22 percent.

In 1992/93, production costs for urea ranged from LE 273/mt to LE 351.75/mt. Costs for AN were LE 246/mt to LE 488.25. Costs per ton of SSP were about LE 190. Selling prices were LE 450/mt for urea, LE 395/mt for AN and LE 182/mt for SSP. Competition would surely narrow the 30-40 percent differential in production costs if tariffs were removed. If the gap were reduced by LE 150/mt of production, over LE 750 million per year would be saved in production costs.

Marketing margins declined significantly following entry of the private sector into fertilizer distribution. Distributors reported a factory/wholesale margin of 9.4

percent. Merchants reported average operating margins of 3 percent, including transport costs. Thus, as a gross order of magnitude, savings in costs of distribution were probably around 8 percent, which translates into about LE 60 million per year.

Increased Efficiency of Land and Water Use

Land reclamation. The government's agricultural strategy for 1992-1997 called for direct reclamation of 872,000 feddans (fd) for small-holder and university graduates settlement schemes and for investment in infrastructure with subsequent sales of land to private investors, for an additional 359,000 fd. Annually, new land reclamation will amount to 110,000 fd, and extensions of old projects will add another 40,000 fd per year.

The wholly public schemes planned (graduates, small-holders), which include infrastructure (canals and roads), housing and schools, and on-farm improvements, amount to 513,000 fd at an estimated investment cost of LE 1.8 Billion, or LE 3,509.2 per fd. As a recently completed study (New Lands Development Study, 1994) indicated that investment in infrastructure and sale of land to private investors was economically efficient (ERR's in excess of 12 percent), it is assumed in the present analysis that gains from a reform in land reclamation policy will come only from improvements in the "public" programs, which include small-holder and graduates settlement schemes.

Economic returns to these publicly managed, small-holder settlements were extremely low, or even negative, ranging from an ERR of -3.3 percent for graduates in Bustan to +13.8 percent for Khatatba (small investors with wells). The most important factors accounting for this poor economic performance were: (1) inefficient irrigation; (2) lack of market access; (3) lack of site specific production technology; and (4) lack of access to credit. The study recommended investing in removing these sources of inefficiency by investing in "intensification" schemes on existing settlements, perhaps providing capital to finance the intensification program by diverting public investment resources from planned new land reclamation schemes.

Three basic economic scenarios were examined in order to develop recommendations for improving the economic performance of new land reclamation schemes:

1. Investment in new projects under current government practices;
2. Application of recommended improvements for future new projects;
3. Improvement of only existing projects ("old" new lands).

An extensive survey of seven existing development schemes, representative of all types of land and social organizations, was carried out in 1993 to generate up-dated costs and returns data. Investment and operating cost data were obtained

from the GOE development agency, GARPAD. Results are shown in the following tabulation of economic rates of return (ERRs):

	Small Farmers and Graduates	Small Investors	Large Investors	Small Farmers Ismailia
Current practices	-3.3	+0.7	+13.8	+12.2
New projects with an improved system	+7.3	+14.1	+18.7	+17.0
Intensified old projects	+18.5	+41.5	+35.3	+32.0

Based on these results, the study team recommended curbing new land reclamation and concentrating on intensifying investments in reclaimed lands. If this advice were to be carried out for planned, publicly managed graduate and small-holder schemes, applying improved techniques to the 513,000 fd planned in the 1992-97 development plan, addition of 10 percentage points to the ERR would increase net social returns by LE 180 million per year on the planned investment of LE 1.8 billion. Foregoing further land reclamation and investing only in improved production and marketing on existing reclaimed lands could generate net social benefits of over LE 360 million per year, given that estimated ERRs for such investment exceed 30 percent. Benefits would also accrue in the form of improved efficiency for the remaining private schemes planned for 1992-97 (359,000 fd).

Improved water use efficiency. Recent estimates generated by agricultural sector models measuring the impact of policy change on production and resource allocation reveal potentially large savings resulting from improved water use efficiency in Egypt. Water is becoming a serious constraint to growth in Egyptian agriculture, and has a shadow value around LE 0.056/cu. meter. At present, water is delivered free to farmers' canals. Farmers pay costs of canal improvements and on-farm costs of water. (LE 0.056/cu. meter would amount to LE 213/fd for cotton, for example).

Theoretically, allocating water to agriculture through a rationing mechanism that involved differential cost allocation could generate savings in the amount of water used in agriculture, which could in turn be used for other production purposes or be diverted to non-agricultural uses. Models also suggest that the demand for water in agriculture may be somewhat inelastic (a one percent increase in water cost would be associated with a less-than-one-percent decrease in water use).

One measure of potential gains to society from improved water use efficiency is gross value of water saved through improved irrigation management. Irrigation studies have estimated that about 20 percent of the water could be saved through

investment in canal-level improvements. Improvements may of course be adopted more readily if water had a cost to the farmer. Further, there must be incentives to make farmers use water more rationally, ultimately leading to further reduction in water use per unit of crop production.

Currently the amount of water used annually for irrigation is approximately 40 billion cubic meters, which, valued at its theoretical shadow value, has a total value of LE 2.2 billion. Saving (or diverting) 20 percent of this water amounts to generating an increase in social returns of LE 440 million per year. The shadow value of water is expected to double by the year 2000, so improved water use efficiency could generate a savings of almost LE 1 billion per year by the year 2000. Further savings would result from improved on-farm water allocation arising from attempts by farmers to maximize returns to water, if water were priced and farmers thus had incentives to use it economically.

Increased Government Services

Compared with dismantling the public enterprises structure, with its attendant labor redundancy and debt burden, liberalizing markets should be relatively costless. However, restructuring (reforming) public institutions to create a new role for them under the newly liberalized, free-market regime could indeed be quite costly. Three functions of government require either that new institutions be created or that existing institutions be significantly modified: (1) market news and information; (2) regulation of standards (consumer protection); and (3) regulation of noncompetitive behavior in the private sector.

Regarding public market news, virtually no regular publication of statistics on production, prices, stocks and consumption takes place for agricultural commodities. However, basic farm-level data are collected. A comprehensive system of market price reporting and crop outlook information is the major service requiring significant levels of investment in collection, processing and disseminating of information. Such a system might cost LE 20 million to establish and LE 2.0 million per year thereafter. Some cost recovery is a strong possibility, however, as private traders may be charged fees for information, thus reducing the net cost to the public in the long run.

Regulation of standards is of course already practiced. However, streamlining and expansion may be required as more trade and processing activity shifts into the private sector.

Neither the legal framework nor the enforcement apparatus is yet in place for regulation of competition. No estimate of the cost of such regulation is currently available. This problem should be the subject of a new comprehensive study.

Labor Retraining and Reduced Labor Redundancy

Studies carried out thus far indicate a labor "redundancy" factor of about 30 percent in public-sector agro-industries. Applying this factor to the total labor force employed in the cotton, rice, wheat, feed, and fertilizer

industries gives a gross redundancy level of approximately 150,000 workers. The unit cost of early retirement is approximately LE 12,500, based on experience with restructuring of the public agricultural credit bank. Retraining costs might amount to LE 1,000 per worker. Assuming that about 50 percent of the 150,000 workers identified as redundant could be retrained and that the remaining 75,000 were to be "bought out" (early retirement), the total costs over the four-year reform period would be approximately LE 1 billion, or LE 250 million per year.

Summary Recommendations for Further Reforms

1. Complete the liberalization of the agricultural pricing and marketing system.
2. Complete the liberalization of cotton prices and markets at all levels of the production, marketing, processing and trade channel.
3. Explore the feasibility of introducing price stabilization programs for major agricultural commodities.
4. Explore the feasibility of promoting increased employment in farm-related business and rural activity.
5. Target food subsidies to the population that falls well below the poverty line, perhaps to the poorest 20 percent of the population.
6. Restructure and privatize as quickly as possible the major agro-industries, including cotton spinning, ginning and weaving, rice milling, wheat milling, feed milling, and fertilizer manufacturing.
7. Develop a plan and pilot project to test the possibility of using government resources for simultaneously reclaiming new lands and intensifying investment in "old" new lands.
8. Develop for farmers a plan for new irrigation systems, the cost of which can be repaid as a long-term loan, basing these costs on sound social, political and economic criteria.
9. Continue to examine overall exchange rate policy, industrial protection policies, and other macroeconomic policies to ensure that the nominal protection rate for agriculture remains close to zero and that domestic terms of trade are not unduly biased against the agricultural sector.

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Appendix

This appendix contains a list of analytical studies of agricultural policies carried out by the Ministry of Agriculture and Land Reclamation, with funding and technical assistance from the United States Agency for International Development, during 1992-1994. These studies are available from the Office of Agricultural Credit and Economics, Directorate of Agriculture, U.S. Agency for International Development, Cairo, Egypt.

Policy Impact Studies

1. An Assessment of the Potential for Liberalization of the Cotton Production, Trade and Ginning Sector
2. Impacts of Agricultural Policy Reforms on Rice Production, Milling, Marketing, and Trade in Egypt
3. Fertilizer Policy Impact Study
4. Animal Protein Foods System: Increasing Efficiency of Production, Processing and Marketing
5. Potential for Short Season Cotton Production in Egypt

Assessments of Policy Issues

1. Analysis of Horticultural Trade in the European Market: Implications for the Near East
2. Policy and Regulatory Environment of Agricultural Input and Output Markets: Their Evolution and Responses of Private Traders to Policy Changes
3. Policies Affecting Agribusiness in Egypt: A Comprehensive Assessment using the Agribusiness Policy Inventory Method

Subsector Studies

1. Assessment of Potential for Liberalization and Privatization of the Egypt Cotton Textile Subsector
2. New Lands Development Study
3. Irrigation Water Cost Recovery in Egypt: Determination of Irrigation Water Costs
4. Assessment of Fertilizer Supply and Potential for Liberalization and Privatization of Fertilizer Production

5

Crop Production Responses to the Agricultural Policy Reforms

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Egypt is favored by a mild winter climate, a continuous supply of irrigation water from the Nile River and an intensive agricultural production system. Unfortunately, the country also has a very limited land and water resource base. Crop yields of many commodities are high compared with those of other countries, but production must be sustained on only 3.15 million hectares (7.5 million feddans) of arable land to support a population approaching 60 million persons. Egypt thus has only 0.05 hectares of arable land per person. Despite recent moderation of the population growth rate, arable land is now, and will be more so in the future, under growing pressure. Because agriculture is totally dependent on irrigation, agricultural development is also closely tied to the water resources of the Nile River.

Total agricultural land is distributed among the "Old Land," comprised of the Nile River Valley and the Delta (72 percent of the total), "New Land" or reclaimed lands (25 percent of the total), and the small proportion consisting of rainfed areas and oases. With a cropping intensity of approximately 180 percent, cropped area totals around 5.7 million hectares (13.57 million feddans). The estimated 3.5 million farmers cultivate an average of 2 feddans (approximately .84 hectares) each; almost half of them cultivate only 1 feddan or less.

This chapter examines the short- and long-term responses of crop production to the reforms described in Chapter 4, based on data from the Ministry of Agriculture and Land Reclamation. The study is confined to an analysis of the Nile Valley and Delta, i.e., the Old Land, which is the productive base of the 23 major crops. The reclaimed new lands and border governorates are excluded. Although the reforms did not all occur at the same time, we consider 1980-1986 as the pre-reform period and 1987-1993 as the reform period. An effort is made

to determine the impacts of reforms on aggregate agricultural production and productivity and on the four most important crops in Egypt—wheat, rice, maize, and cotton.

In terms of area planted and crop output value, the 11 most important crops in Egypt are wheat, rice, maize, cotton, berseem, tomatoes, broadbeans, onions, potatoes, soybeans and sugarcane. Figure 5.1 illustrates that these crops account for 97 percent of total crop output value. Six crops alone—wheat, rice, maize, cotton, berseem and vegetables—accounted for 85 percent of the cropped area and 75 percent of total crop value during 1990-1993. The dominant cash crops in Egypt are wheat, rice, maize and cotton, which account for almost two-thirds of total cropped area and 57 percent of total crop value. These, along with an aggregate of 23 crops, are examined in depth in this chapter.

As shown in Figure 5.2, significant changes in production did not occur at the same time for all crops. Also, many policy initiatives that were crop-specific occurred at different times. In some cases (e.g., tomatoes), changes in production were mainly due to non-policy factors.

A major shift upward of tomato production after 1984 and a decline in cotton

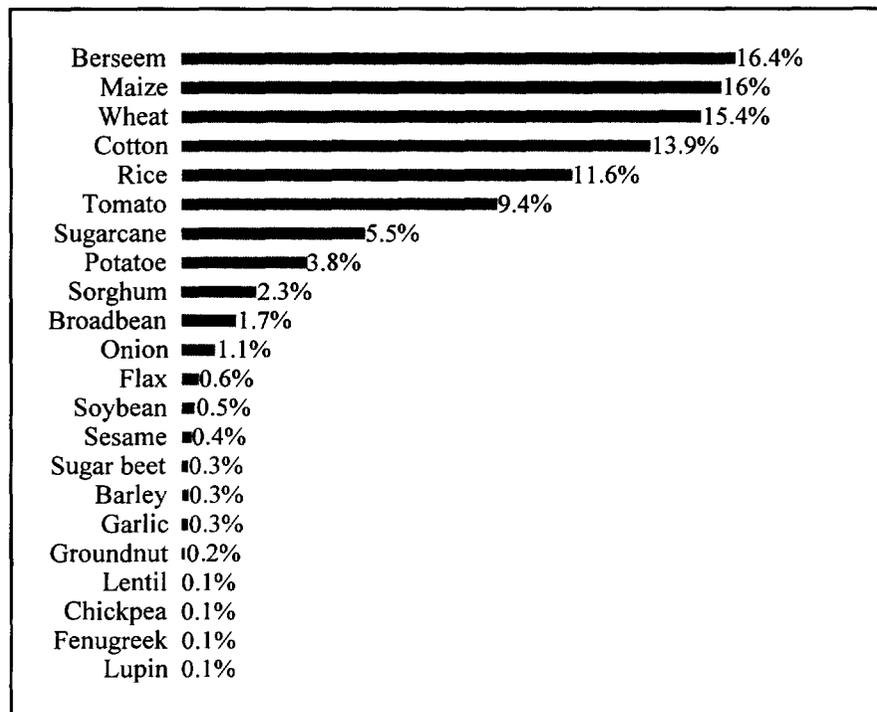


Figure 5.1 Value as a percent of total crop value, 1990s

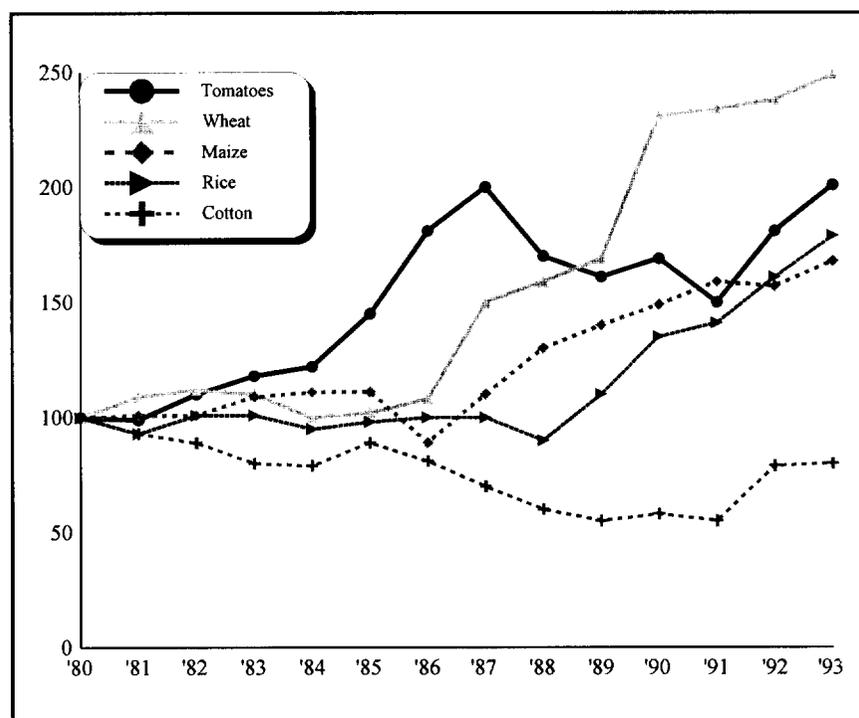


Figure 5.2 Crop production indices for major crops (1980=100)

production were the first significant changes in Egyptian crop production during the 1980s. Tomato production reversed course and began to decline after 1987 but this change was not directly related to policy reforms. Significant increases took place in wheat and maize production after 1986, in rice production after 1988 and in cotton after 1991. Production changes for these four crops did occur in response to changes in policies, particularly price policies.

Two price-weighted quantity indices are shown for the 23-crop aggregate in Figure 5.3. The patterns for the base-year price-weighted index (Laspeyres) and the current-year price-weighted index (Paasche) are similar. The divergence beginning in 1990 reflects production growth of grains, whose prices fell in the 1990s, and modest output growth of cotton but sharply higher cotton prices in 1993.

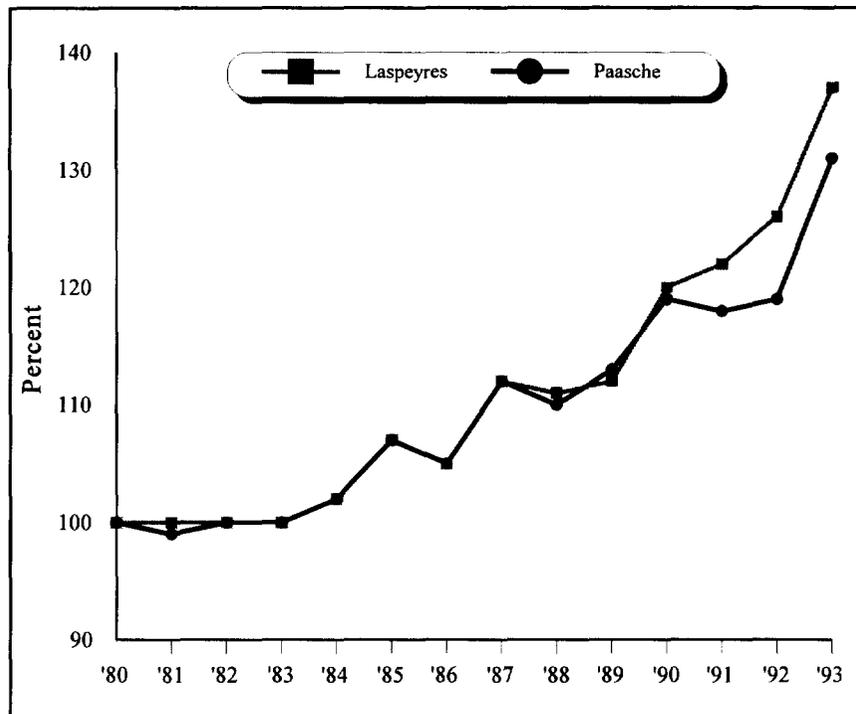


Figure 5.3 Laspeyres and Paasche production indices for 23 major crops (1980=100)

Cropping Patterns in the Pre-Reform and Reform Periods

As already mentioned, Nile Valley crop production is entirely based on an irrigated system. Close supervision of the agricultural cropping pattern by the government became part of agricultural policy beginning in the early 1960s. The state intervened in the production areas of many major crops, including cotton, wheat, rice, sugar cane and onions. Along with specifying the area to be cultivated, the policy also required farmers to participate in what was termed "co-operative marketing," which consisted of obligatory delivery of all or part of their production to the state at a price fixed much lower than the free market price.

Arguments for control of crop areas were based on the concept that the agricultural sector was interrelated with other sectors of the economy and that errors in the agricultural sector, such as a shortage in supply of cotton, would cause losses to the industrial sector. Also, the industrial sector was responsible for providing the inputs needed in agriculture and could not make production

plans without knowledge of agriculture's needs. The basic philosophy was that state planners could make better decisions than could individual farmers—standard socialistic dogma.

The system was carried out by development of a basic cropping plan for each agricultural year (November 1 to October 30) by the cooperative in each village, based on production targets set by the Ministry of Agriculture. Cropland belonging to each village was allocated to crops to be grown during each cropping season for each tract of land and each agricultural year.

The system also included the specifications of seed varieties and the quantities and types of fertilizer and pesticides each farmer was entitled to obtain at subsidized prices from the state-owned Principal Bank for Development and Agricultural Credit (PBDAC), which provided inputs as in-kind credit. Farmers were denied the necessary inputs for production unless they followed the designated cropping plan. Farmers were also subject to monetary penalties for violations of the cropping plan, but the penalties were sometimes canceled after the production season.

A planned cropping pattern was defended on the basis of the need to program the distribution of irrigation water. Because all crops are irrigated, and because crops differ somewhat in their water requirements, the irrigation authorities had to know the area and location of crops to be able to provide the needed water; in turn, areas devoted to irrigation-intensive crops such as sugar cane and rice had to be consistent with the water supplies available. Most of this system of controls has now been discarded, but some remnants survive, e.g., the government continues to designate areas where rice can be grown and imposes monetary penalties for violations.

The current water distribution system provides access to irrigation water in the Nile Valley and Delta at no cost, except that farmers must lift the water about one to two meters from the supply canal to the level of their fields. This small pumping cost is the only rationing mechanism. The use of small diesel-powered irrigation pumps has decreased the cost of pumping relative to the cost of pumping by animal power. Without a water measurement and pricing procedure in place, some type of water rationing is needed. A higher land tax is being assessed as a partial substitute for pricing of water.

The GOE maintains tight control on the production of cotton by variety. Each year the variety to be produced in each governorate and district is specified by ministerial decree. The specification of the varietal areas also requires that no-cotton-production buffer areas be designated between adjoining production areas. Along with the production area designation is the designation of the variety that can be ginned at each gin.

The technical justification for these controls is that they reduce mixing of cotton varieties and thereby maintain varietal purity. Protection of cotton varieties is a valid technical reason for some controls, but there may be too many varieties in existence and too much shifting of varieties between areas from year to year.

The large number of cotton varieties currently being grown in Egypt increases the difficulties of maintaining seed purity during ginning.

The village cooperative system of cropping patterns still exists, but it is officially voluntary. In 1994, some Egyptian farmers were still reporting that they were subject to cotton area quotas. However, as farmers acknowledge, no monetary penalties are being assessed for noncompliance with cotton quotas.

The technical justification for retaining such cotton area quotas is that they help in the control of cotton pests. Externalities of cotton pest control are such that production of cotton in blocks is much more sensible than production in scattered fields. And because the government still manages cotton pest control activities, it also still requires farmers to maintain cotton production in blocks. The problem of cotton pest control is only one externality issue. Similar externalities exist with respect to the use of pesticides on crops other than cotton. These problems are inherent in an intensive irrigated system composed of many small farms.

Another problem is related to the different water needs of different crops, such as cotton versus rice. Rice production requires a large amount of water, which can result in waterlogging of the soil and reduced yields for cotton when it is grown alongside rice. Thus, farmers cannot independently determine their cropping patterns. Even without government control of the cropping pattern, each farmer cannot have complete freedom in making decisions. Each must get along with neighboring farmers, which may require giving up some independence in decision making.

The government's longstanding policy of controlling the cropping patterns and forcing cotton production into blocks has encouraged farmers to scatter their land holdings so as to avoid having all of their land in cotton in any given year. This may have led to farm fragmentation. Fragmentation can result in each farmer having more interaction with neighbors, which may increase the difficulty of choosing crop areas and rotations.

In summary, Egyptian farmers have gained considerable, but not complete, freedom for making decisions on their cropping patterns. Technical reasons justify some continued control, but the government must carefully weigh the losses resulting from such constraints on farmers' decisions against the gains from continuing controls.

Production Response and Sources of Growth

Some policy-related questions about production are: (1)

How fast has production been growing, especially since the major policy reforms began in the mid-1980s? (2) Is production growing fast enough to meet increases in food demand? (3) Which products account for most of the production growth, and which are lagging? (4) To what extent has the production growth depended upon yield increases, and to what extent on changes

in the mix of crops grown? (5) In the 1990s, is the allocation of scarce resources for crop production more consistent than in the past with Egypt's comparative advantage?

Based on the Laspeyres index shown in Figure 5.3, an aggregate production increase of 6 percent occurred in 1985. By 1987, production was 10 percent greater than it had been in 1984. A positive trend continued thereafter, and by 1993 production was 23 percent greater than in 1986.

Overall production grew at 2.7 percent a year from 1987 to 1993, compared with 1.1 percent before major reforms began. Thus, there is sufficient evidence of an increase in aggregate production growth in the reform period for us to conclude that the overall level of production significantly improved in the reform period.

Area, Yield and Production Growth Rates

One of the most restrictive policies in the pre-reform period was control over areas planted for 14 major crops. Farmers were obligated to follow the dictates of the Ministry of Agriculture; they were fined if they did not. In 1980, the two major crops grown in the Nile Valley were maize (21 percent of the total area cultivated) and long-berseem (19 percent). These were followed by wheat (14.5 percent), cotton (13.6 percent), short berseem (10.8 percent), rice (10.6 percent), vegetables (6.2 percent) and legumes (4.6 percent). With the release of all planting controls by 1993, except for controls on sugarcane and some technical constraints on cotton, this distribution changed considerably. For example, wheat area increased to 18 percent of the total for the Nile Valley while cotton dropped to only 8.8 percent (Figure 5.4).

A detailed picture of production responses to the reforms is given in Table 5.1. Annual average production growth rates for the 23 major crops were calculated separately for the pre-reform and reform periods. Production growth rates in each period were divided into area and yield components. Because little change occurred in the total amount of arable land, area changes mainly reflect reallocations of land from one crop to another. Areas of both wheat and rice grew rapidly in the reform period, while the maize area changed very little and the cotton area declined. Thus, land was taken from the berseem-cotton rotation and used for wheat and rice rotations.

Yield growth rates for the four major cash crops were all strongly positive in the reform period, and all were above the yield growth rates of the pre-reform period. Cotton yields actually declined in the pre-reform period, and most of their increase in the reform period came after 1990, when producer prices were increased. Both wheat and rice experienced high growth rates in both areas and yields in the reform period to reach impressive levels of production growth.

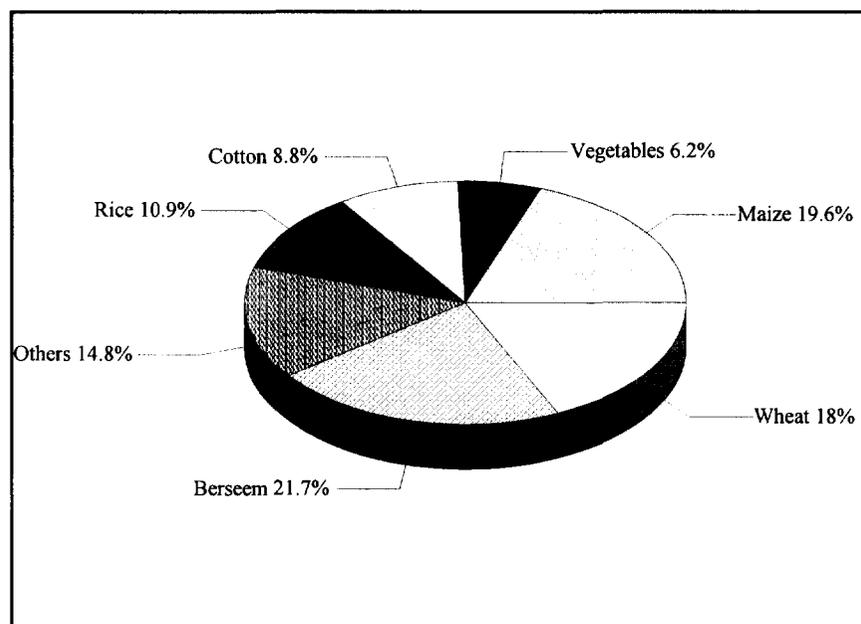


Figure 5.4 Crop areas, 1990-93 (percent of total)

Output per Hectare

Agricultural growth can be decomposed into three main sources: expansion of land cultivated, increases in yields per unit of land and changes in the crop composition. The first analysis we made uses the construction of a time series of economic yields for all crops included in the production index.

An appropriate way to measure the output value per hectare is to multiply quantities by constant prices and divide by total cropped area to generate economic yields per hectare (or feddan) of cropland. This measure is of direct concern to policy makers, as it should increase if the sector's performance is improving over time. The economic yield subsumes changes in the sector's crop composition. Sometimes, in fact, it can decline over time because an emphasis on food self-sufficiency leads to replacement of higher-value crops by lower-value crops. Because Egypt has been attempting to move away from a development strategy of self-sufficiency towards one of reliance on comparative advantage to drive production growth, this economic yield variable should show increases over time.

The analytical evidence does support this expectation, with some improvement seen as early as 1982. In the pre-reform period, economic yields in Egypt were growing at 1.9 percent per year, rising 11 percent from 1980 to the year

Table 5.1 Crop area, yield and production growth rates (percent per year)

Crop	Pre-reform Period, 1980-86			Reform Period, 1987-93		
	Area	Yield	Production	Area	Yield	Production
Wheat	-2.8	2.9	0.1	5.6	3.5	9.1
Maize	-2.7	2.3	-0.4	0.7	5.5	6.2
Rice	0.0	0.2	0.2	5.8	5.2	11.0
Cotton	-2.7	-1.6	-4.3	-3.0	5.2	2.2
Barley	6.1	0.9	6.9	-8.2	3.2	-5.0
Berseem (long)	1.9	0.6	2.5	0.1	-0.4	-0.3
Berseem (short)	-2.5	1.1	-1.3	-2.1	2.9	0.8
Broadbean	2.3	3.5	5.9	-2.9	-5.4	-8.2
Chickpea	2.6	1.0	3.6	-1.0	1.2	0.2
Flax	-7.4	0.6	-6.8	-4.1	0.2	-3.9
Garlic	-12.6	0.0	-12.6	-0.8	4.0	3.1
Groundnut	-3.2	-2.0	-5.2	2.3	3.8	6.1
Lentil	8.6	8.9	17.5	-5.6	-0.7	-6.2
Lupin	5.6	0.5	6.0	-3.0	0.9	-2.1
Fenugreek	4.9	0.9	5.8	-9.3	0.6	-8.7
Onion	6.2	2.7	8.9	-0.4	3.8	3.3
Potato	0.9	2.4	3.3	-7.0	3.8	-3.2
Sesame	-12.6	0.8	-11.8	14.3	2.4	16.7
Sorghum	-2.6	0.5	-2.1	2.0	4.0	6.1
Soybean	3.1	0.8	3.9	-15.8	0.6	-15.2
Sugarbeet	22.7	4.2	26.9	-2.0	3.7	1.7
Sugarcane	0.2	3.1	3.3	0.2	1.8	2.0
Tomato	2.3	7.2	9.5	-3.6	4.0	0.4

Source: Calculations by authors from data provided by the Department of Agricultural Economics and Statistics, Ministry of Agriculture and Land Reclamation, Cairo.

before major reforms. However, starting in 1987, the pivotal year after major reforms, economic yield grew at 2.6 percent annually, rising 21 percent between 1986 and 1993. This improvement in the gross revenue per unit of cropped land bolsters the argument that the agricultural sector responded favorably during the reform period. Figure 5.5 gives clear support for this conclusion.

Sources of Growth

The sources of growth behind aggregate production change, and they can be assessed by decomposing the production index to calculate the percentages of the sector's output growth over each period that can be attributed to specific crops. S_i , crop i 's contribution to growth, will be negative for products whose output is declining. The sum of the positive values of S_i will be more than one if overall growth is positive. Thus, with all crops taken into account (including crops with positive and those with negative S_i):

$$\sum_{i=1}^n S_i = 100$$

In the pre-reform period, it was actually tomato production that contributed most

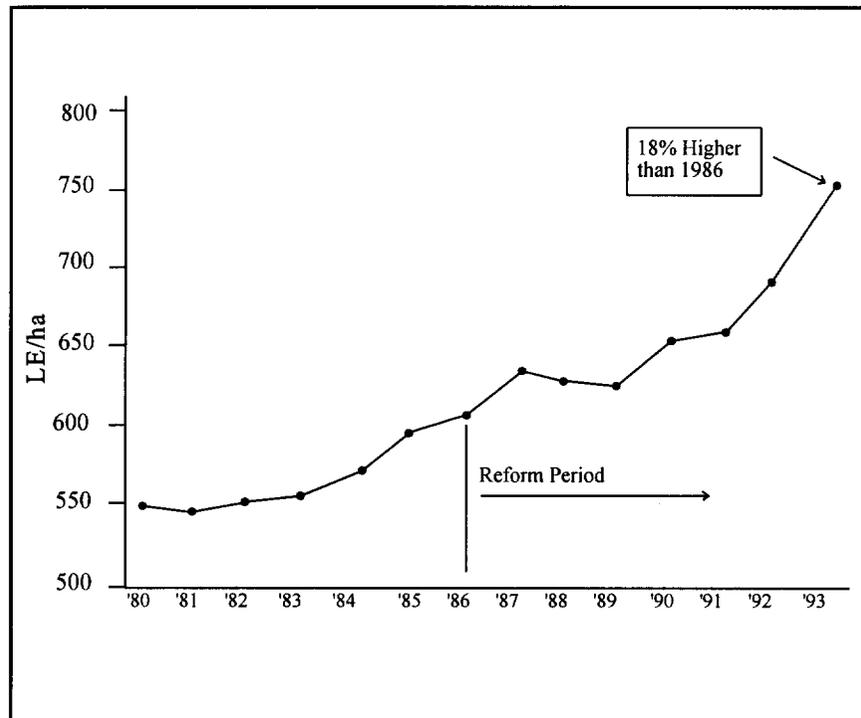


Figure 5.5 Economic yields (at constant 1980 prices)

to sectoral growth. Production of this vegetable crop contributed 130 percent to total growth, whereas crops such as maize and cotton were constraints on growth, accounting for -49 percent and -90 percent, respectively. It must be kept in mind that the sum of all crop contributions equals 100 percent. The most interesting aspect of the results is that tomato production accounted for only a 9 percent share of total value, compared with an 18 percent share for maize and a 15 percent share for cotton. Long berseem was the other crop that contributed more to growth than its share of output value during this period (Table 5.2).

On further examination of the importance of tomatoes, it can be seen that sharp increases in tomato production (80 percent) and prices (139 percent) were behind the rapid rise of this crop's contributions to growth. In both 1981 and 1984, tomato yields shot up, increasing over 60 percent by 1987. This sudden change was the result of improved varieties. In addition, production was not controlled for this crop as it was for 14 other major crops. There is good reason to believe that farmers became aware of the considerable response of these improved varieties to inputs such as fertilizers. Therefore, in a rational economic

Table 5.2 Changes in production, share of output value and contribution to growth of selected crops (percent)

	Wheat	Maize	Rice	Cotton	Long Beseem	Tomatoes
Change in production						
1980-86	7	-13	3	-23	12	81
1987-93	56	40	62	0	-10	-9
Share of total constant-price output value						
1980-86	7	18	8	15	19	9
1987-93	12	21	9	10	15	11
Contribution to total growth						
1980-86	1	-49	5	-90	46	130
1987-93	26	37	25	7	0	1

Source: Calculations by authors using data provided by the Department of Agricultural Economics and Statistics, Ministry of Agriculture and Land Reclamation, Cairo.

move, they began to divert subsidized fertilizer intended for the controlled crops to tomato production, which was highly profitable.

In the reform period, wheat, maize and rice were all major contributors to output growth. As a result, all increased their share of total output value. Production growth in wheat, maize and rice of 56, 40 and 62 percent, respectively, contributed most to growth in the reform period. Maize made the most dramatic change, from a negative contributor to growth (-49 percent) in the pre-reform period to the greatest positive contributor to overall growth (37 percent) after 1986. The bottom fell out of tomato production in 1988, when the crop was hit by a devastating whitefly infestation. In two years, production dropped 23 percent. Production recovered in 1992, but its contribution to growth shrank drastically, to only 1 percent in the reform period in contrast to 130 percent in the pre-reform period.

Resource Allocation and Long-Term Production Patterns

A major objective of the reforms was to allow Egypt's agricultural production system to align itself with the country's international comparative advantage in crops and livestock. That is, with a more liberalized, open market economy, Egypt would be expected to grow those crops that most efficiently use the country's scarcest domestic resources, especially water and land. This concept is embodied in a crop's Domestic Resource Cost (DRC) coefficient. A crop with a low DRC, compared to 1.0 as the reference point, is an efficient user of domestic resources and is internationally competitive. On the basis of 1992 data, Egypt is seen to be most competitive in crops such as tomatoes, wheat and cotton, which have low DRCs, and least competitive in sugarcane and the berseems, which have high DRCs (Figure 5.6).

An interesting question, then, is how Egypt has fared in improving resource use since the 1980s, when allocation of the economy's resources was greatly

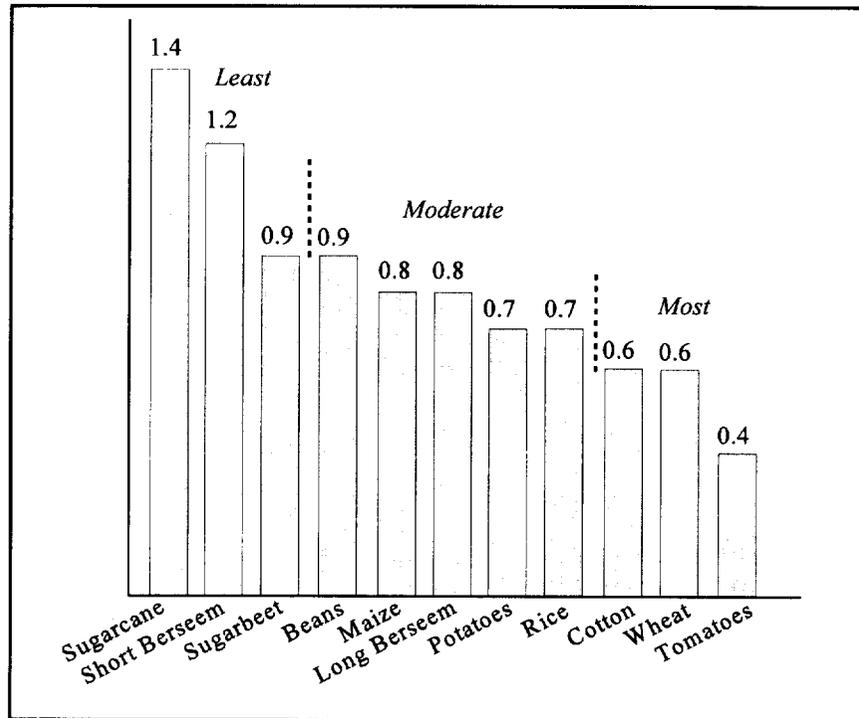


Figure 5.6 Competitiveness of major crops based on DRC coefficients for 1992. (Source: World Bank 1993 and Wailes 1994)

distorted by poor policies. Stated otherwise, have the reforms had the intended effect of getting Egypt to devote more of its scarce resources to those crops with the highest return per unit of land and water?

To begin making this determination and to understand the relative efficiency of each crop in using land and water, a group of 13 crops (representing most major crops in Egypt) was selected. Each crop was evaluated in terms of the percent of total value-added for the entire group it generated per unit of both water and land. Figure 5.7 illustrates the results, showing how efficient these crops are in the use of these resources. Those crops higher up and to the right in the figure are more efficient, relative to the other crops, at using water and land (i.e., they are more competitive). For example, tomatoes, vegetables, potatoes and cotton, which are higher and to the right, generate the highest value-added per unit of these two resources. Short berseem and sugarcane, on the bottom left side, generate relatively lower value-added per unit of water and land.

How did land allocation change after the reforms in relationship to each

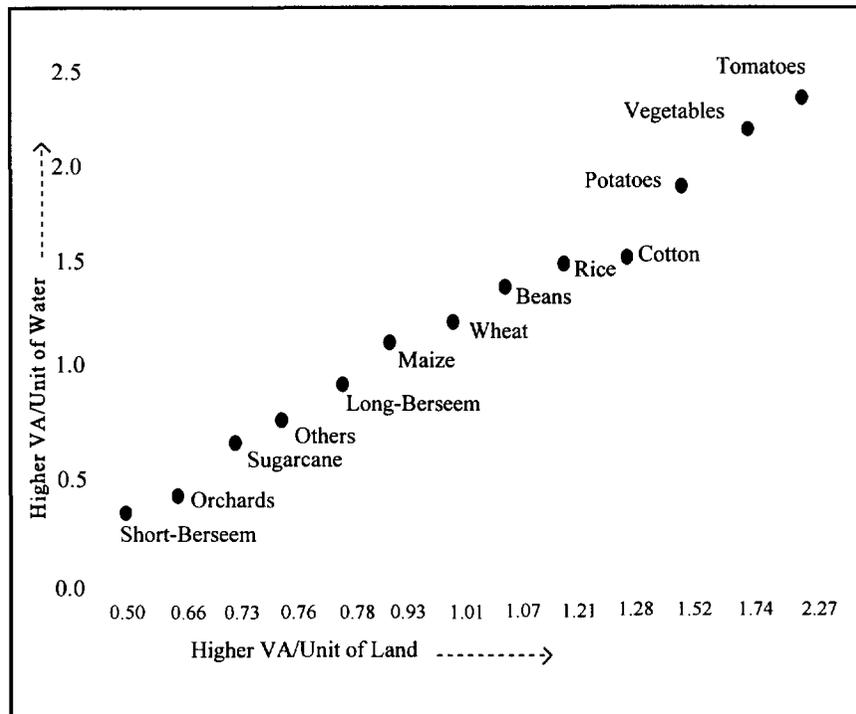


Figure 5.7 Relative effectiveness of water and land use based on crop value-added (1992)

crop's comparative advantage? Presumably, if resource allocation improved, more land would be devoted to those crops that are most competitive (i.e., with the greatest comparative advantage). With few exceptions (notably broadbeans and cotton), since the reforms of the mid-1980s, there has been an increase in the areas allocated to the crops with the most competitiveness, such as wheat and sugar beets, and a decrease in the area allocated to those crops with the least competitiveness, such as soybeans and short berseem. Thus, this test provides some evidence that the reforms on balance have had the intended effect of improving land allocation.

What is the prognosis for the future of Egyptian agricultural production? This chapter has presented evidence of a sharp increase since the mid-1980s in agricultural production from Egypt's main 23 crops. As a result of this increase, coupled with a moderation in the rate of increase in food utilization (due mainly to a reduced population growth rate and significant reductions in food subsidies),

projections to the year 2000 now indicate a potential food gap that is down to 4.5 million tons—only 17 percent of the gap projected in the early 1980s (Figure 5.8). The dashed lines in the figure are extrapolations of trend lines to the year 2000. Policy reforms have clearly helped put production on a higher growth path. The crucial question now is whether or not production can continue to grow at the rate achieved in the reform period. Examination of the past 35 years shows that there have been noticeable surges in individual crop yields, followed by periods of stable yields. But what are the possibilities now for sustaining yield increases to fulfill the projections in Figure 5.8?

In general, on-farm demonstration yield trials reveal what gains are possible in average farmer yields in the near future using present knowledge and technology. Encouraging information comes from comparing demonstration yields to average farmer yields for selected crops in Egypt to see if the gap is narrowing. The ratio of demonstration yields to average farmer yields for wheat decreased from 1.35 in 1991 to 1.23 three years later. The ratios also decreased for rice, from 1.27 to 1.22; for maize, from 1.33 to 1.16; and for tomatoes, from

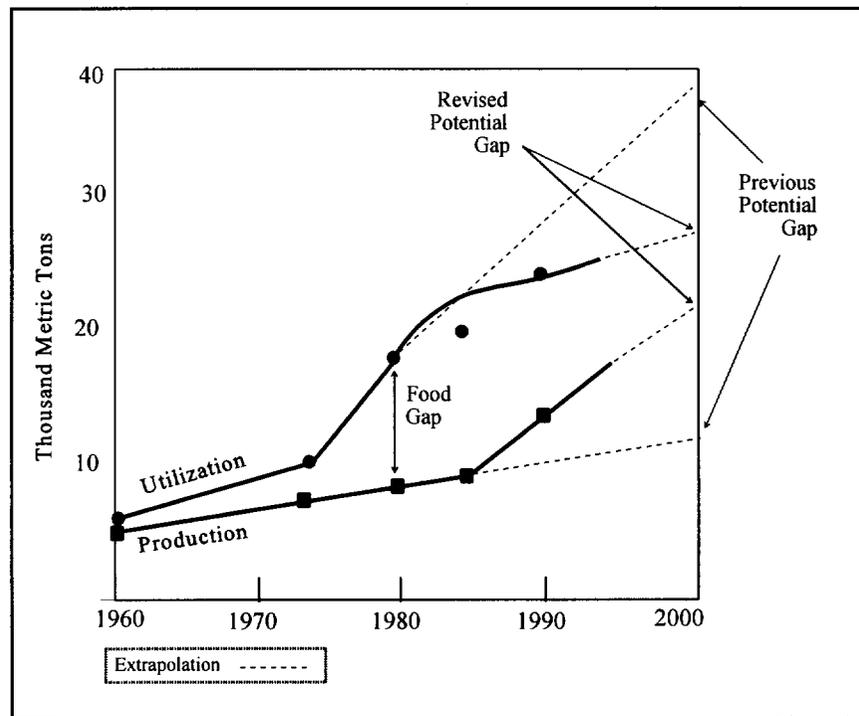


Figure 5.8 Domestic food production and utilization, 1960-1990, with extrapolations to 2000. (Source: York et al. 1994)

1.39 to 1.22 over the same three-year period.

There is evidence that the impact of the policy reforms on the profitability of modern farm technology was positive for wheat in Upper Egypt (Aw-Hassan et al. 1994). But even with an enabling policy environment that maintains incentives for farmers to adopt new and improved technology, how high can yields go in the long term in Egypt? A 1994 report, "The National Agricultural Research Project's Contributions to Significant Advances in Egyptian Agriculture" (York et al. 1994) examined this question. The report mentions that world record yields (under similar farm conditions) are indicative of the current potential yield of a crop. Egypt's best farmer yields are actually close to world record yields in some crops, particularly cotton. But using best farmer yields as a benchmark, it appears there may still be considerable potential for increased yields in maize, wheat, soybeans, sorghum, barley, potatoes, sugarcane and sugar beets. In addition, according to the cited report, the prospects for increasing world record yields are relatively high for (in descending order) potatoes, sorghum, maize, barley, soybeans, wheat and rice.

Production Response of the Major Crops

This section analyzes the impacts of the reforms on the four major field crops: wheat, rice, maize and cotton. It disaggregates the production responses of these crops into area and yield components.

Wheat Area, Yields and Production

Wheat research has been conducted in Egypt for over eight decades. In the first three and a half decades, from 1914 to 1950, the breeding program was confined to introduction of foreign seed and varietal material, mass selection, and individual plant selection. In the 1960s, the wheat research program increased its international cooperation with agencies such as the Food and Agricultural Organization of the United Nations, the United States Department of Agriculture, and the International Maize and Wheat Improvement Center. In the early 1960s, dwarf lines were introduced and used in the crossing program. The first high-yielding dwarf varieties were subsequently developed in the 1970s and 1980s. During the 1980s, the capacity of the wheat improvement program had increased considerably and greater emphasis was given to the development of high-yielding varieties that are tolerant to environmental stresses such as heat, salinity and drought. In 1987 new bread wheat varieties were released, such as Sakha 92, Giza 162 and Giza 163 for the Delta Region; the heat-tolerant variety Giza 164 for Middle and Upper Egypt; and the Sohag 2 durum wheat variety for Upper Egypt. More recently, since 1990, the new bread wheat varieties Giza 165 (for Upper Egypt), and Gemmeiza 1 (southern Delta) and durum variety Beni Suef 1 and Sohag 3 (for Middle Egypt), were released.

The spread of the first generation of high-yielding varieties such as Sakha 8

and Giza 157 started in the early 1980s, mainly in the more favorable environments of the Delta and Middle Egypt. This was followed by the rapid spread of Sakha 69 in those areas during the mid 1980s. The diffusion of modern varieties such as Giza 160 was less in the less favorable environment of Upper Egypt, and yields there remained lower than their attainable levels.

Despite the fact that wheat production was stagnant from 1980 to 84, production of wheat showed the most dramatic changes of all crops after the mid-1980s. Wheat was grown on 557,000 hectares (1.3 million feddans) in 1980 but on almost 40 percent more cropland (768,000 hectares, or 1.8 million feddans) in 1993. However, this change in area does not fully explain the situation regarding wheat. From 1980 to 1986, although area planted declined at an average annual rate of 2.7 percent, yields did not decline, but increased at an annual rate of 2.9 percent. Thus, total wheat production increased by a only 7 percent, leading to greater imports of wheat to meet rising demand for wheat products.

The year 1987 was a turning point in wheat production. Production increased 41 percent in that one year alone. Over the following three years, production doubled, from roughly 2 million tons in 1986 to 4.2 million tons in 1991, as a direct result of farmers responding to the continued profitability of the wheat rotations. The self-sufficiency ratio improved from 22 to 43 percent. Wheat area, however, as depicted in Figure 5.8, declined after 1991, which was likely a response to the decline in real wheat prices after they peaked in 1989 as well as to changes in relative prices. But in 1993, Egypt achieved its highest production level, 4.45 million tons. This reflects a 9.6 percent annual growth rate in production from 1987 to 1993, with a plateau level of about 4.2 million tons reached in the 1990s (Figure 5.9).

The diffusion of modern farm technologies, including high-yielding wheat varieties and improved cultural practices, has clearly increased wheat productivity in Egypt. Policy change has helped create an environment conducive to adaptation and change on the part of farmers. The average yield of wheat in Egypt has increased by over 60 percent, from 3.6 tons/ha in 1980-86 to 5.7 tons/ha in 1992-93. The annual growth rate of wheat yield in Egypt during 1980-93 was estimated at over 5 percent, contributing more than 60 percent to the growth in production.

Figure 5.10 clearly illustrates the relationship between price and adoption of higher-yielding wheat varieties. There is a 98 percent correlation between the area and price of wheat lagged two years. Thus it appears that if the price of wheat increases, farmers respond in two years by planting more wheat of improved varieties (the two-year lag represents the time it takes a farmer to change his rotation).

As mentioned earlier, wheat prices were liberalized in 1987; prices then increased dramatically. Domestic wheat price levels are now comparable to border prices. The combination of higher yield levels and higher prices resulted in higher profitability of the wheat enterprise. Until recently, the net returns from wheat-based rotations exceeded those from other major rotations. The high profitability

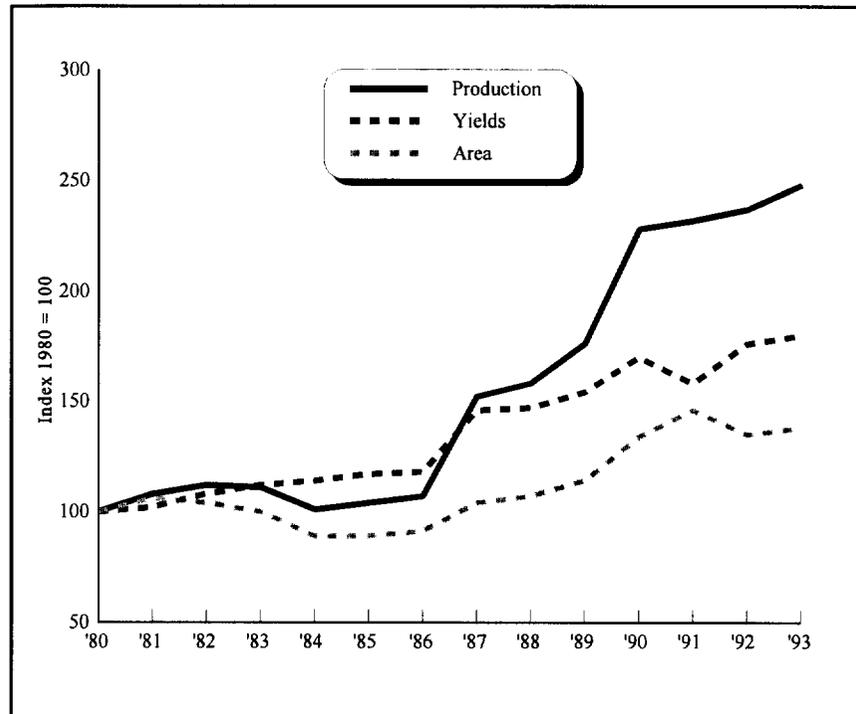


Figure 5.9 Wheat area, yields and production

of wheat after market liberalization resulted in the rapid spread of high-yielding varieties, which considerably increased wheat yields.

Until the mid-1980s, prices were distorted by heavy government intervention. In two subsequent periods, 1987-89 and 1990-93, different policy measures were successively taken that had differing impacts on the relative prices of wheat and inputs. The policy measures taken during the 1987-89 period, which will be called reform period I for wheat, had a relatively greater impact on wheat prices than on input prices, but the converse was true in the 1990-93 period, which will be referred to as reform period II.

Prior to 1987, the price of wheat was affected by government-determined area allotments, quota delivery requirements at fixed prices, and wheat and flour imports (which in turn, were affected by an overvalued exchange rate). However, just before the 1987 season, three policy reform measures were adopted that had a significant effect on the area planted in wheat. The reforms lifted the control on wheat area planting and abolished the mandatory delivery quota, while the government's fixed procurement price was replaced with a floor price. Farmers

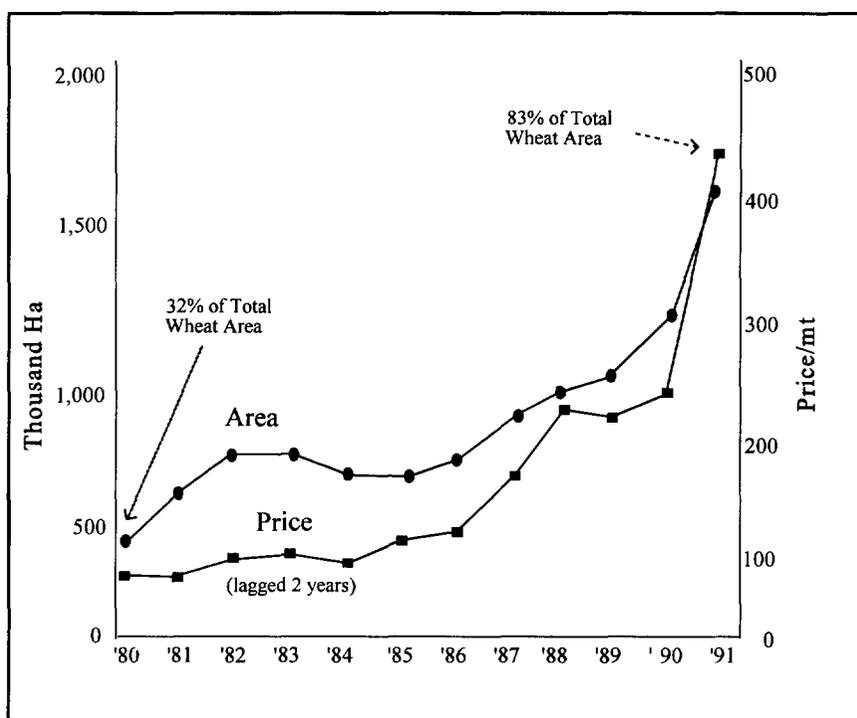


Figure 5.10 Area in new wheat varieties and prices

reacted immediately by planting 14 percent more wheat in 1987, and yields jumped approximately 24 percent, leading to a remarkable 41 percent surge in production.

As a result of those policy reforms, actual wheat prices increased dramatically. The average producer price of wheat increased by over 300 percent, from 122 LE/ton in the pre-reform period to 500 LE/ton in 1990-93. However, the average real wheat price (deflated by the implicit GDP deflator with the 1980 value set at 100) increased by only 44 percent, from 95.6 LE/ton in the pre-reform period to 137.5 LE/ton in the reform period II. The statistical correlation between area expansion and wheat profitability during this period was estimated at 87 percent. But the real price of wheat has been decreasing since 1990, and wheat area expansion stopped in 1991.

The pricing policy reforms also affected input prices. Since 1988, retail fertilizer prices have successively increased, and in 1991 the subsidy was removed (Gregory et al. 1993). Thus the prices of inputs increased significantly. For example, the average actual price of urea more than tripled, from 125 LE/ton in

the pre-reform period to 390 LE/ton in reform period II. However, the change in the average price of urea exceeded the rate of inflation by only 3 percent.

The relative profitability of three technology packages has recently been evaluated (Aw-Hassan et al. 1994). The packages consisted of the technology used in traditional practices, intermediate technology and a full new technology package. Profits of wheat under the three technology options for the 1980-93 period were higher for the full package and the intermediate technologies than the traditional technology. The average net returns for the traditional, intermediate and full-package technologies were 280, 525, and 713 LE/ha, respectively, in the pre-reform period (1982-85 as defined in this study). In reform period I, the average net returns increased largely (as a result of the higher wheat prices) to 746, 1216, and 1576 LE/ha, respectively, for the three technology levels in the same order. The higher the technology option assumed, the higher the increase in net returns per hectare, which increased the incentives for technology adoption.

However, in reform period II the average real net returns from wheat declined. The estimated average real profits for this period were 350, 549 and 698 LE/ha, respectively, for the traditional, intermediate and full-package technologies. The decline occurred because of the relatively higher increases in input prices following removal of subsidies and because of a decline in the real wheat prices due to accelerated growth in aggregate price levels. However, the decline in real profits that occurred in reform period II was overestimated because of the constant technology assumed. Technology is not constant over time, because farmers continuously respond to price signals by adjusting their input use and production practices. If a farmer producing wheat under the intermediate technology in reform period I shifts to the full package in reform period II, his average real profit per hectare increases by 18 percent, whereas it declines by 8 percent if he continues using the same technology.

In spite of the recent decline in real net returns from wheat, the policy reform had a positive impact on the profitability of modern farm technology. Thus, the financial profitability of wheat production improved after the policy reforms.

The marginal rate of return (MRR) on improved technologies was estimated for the three periods. Private returns on investment in modern farm technologies were greater after reform than before. For example, farmers who shifted from traditional technology to intermediate technology would realize an MRR of 288 percent in the pre-reform period and MRRs of 417 and 467 percent in reform periods I and II. Similarly, a farmer who shifted from intermediate to full package technology would realize an MRR of 239 percent in the pre-reform period and MRRs of 327 and 325 percent in reform periods I and II. The higher the level of technology adopted, the greater the increase in net return per hectare. Thus policy reforms have increased the incentives for adoption of modern farm technologies. It is safe to say that if there had been no changes in the agricultural pricing policies of the early 1980s, returns to investments in wheat research would have been reduced.

Rice Area, Yields and Production

Rice production in Egypt dates back to the seventh century. As a heavy user of water, rice was mainly cultivated as a reclamation crop in the Northern Delta Region. Since then, the area planted in rice has expanded slowly throughout most of the delta and into some limited areas in middle and upper Egypt. The area planted in rice grew rapidly from the 1920s to the 1960s. During the period 1919 to 1934 and 1935 to 1950, the total rice area increased 125 percent. From 1935 to 1950 and from 1951 to 1966, area expansion slowed but increased by another 16 percent, to 678,040 feddans, as a result of improved water supply capacity. Since 1967, the rice area stabilized at 850,000 to 1.28 million feddans. The main reasons for the government to maintain rice production are to increase food self-sufficiency, contain salinization of soils and earn foreign exchange (Wailes et al. 1994).

The growth in rice yield was relatively slow for 30 years until it surged by 0.25 mt per feddan in one year, 1990. This surge coincided with the beginning of rice policy reforms. First, mandatory deliveries by farmers to the government were reduced to 0.5 mt per feddan. Then, in February of 1991, the government actually canceled the requirement for any delivery of rice at a fixed price. The faster growth in production established in 1990 was sustained through 1993, when yields reached 3.25 mt per feddan, the highest in the world. The longer-term growth rate of rice yields has been relatively slow, however, compared to growth of other major crop yields from as far back as 1960, which must be due, in part, to the high level of yields achieved in rice (Figure 5.11).

As a result of both area expansion and yield growth, total rice production increased from 1988 up to 1993 at the rate of 11.7 percent per annum, the highest growth rate in production of all crops in Egypt. About 54 percent of this increase in rice production is from area expansion (which grew at roughly 6 percent a year) and the rest is due to the annual yield increase of 5.6 percent.

Currently, the short-grain Giza 171, 172, 173, 175 and 176 varieties comprise 90 percent of the crop and are strongly preferred by consumers compared to the higher-yielding, long-grain "Filipino" variety. Farmers also prefer to plant japonica, as it has a higher current market price and tastes better than Filipino. Millers also prefer it since it has a higher milling out-turn and more ready domestic and export markets.

A recent study attempted through a total factor productivity analysis to estimate the statistical significance of the difference between the reform and the pre-reform period. That growth accounting analysis revealed that the major sources of growth from 1965 to 1985 were increased use of machinery, area expansion, and technical change. The increased use of land is the main source of growth after 1986 during the reform period. Land accounted for almost 35 percent of total production growth from 1985 to 1989 and 46 percent from 1989 to 1992. This is likely due to the policy reforms, which increased the relative profitability of rice production and thus made it profitable for farmers to shift land

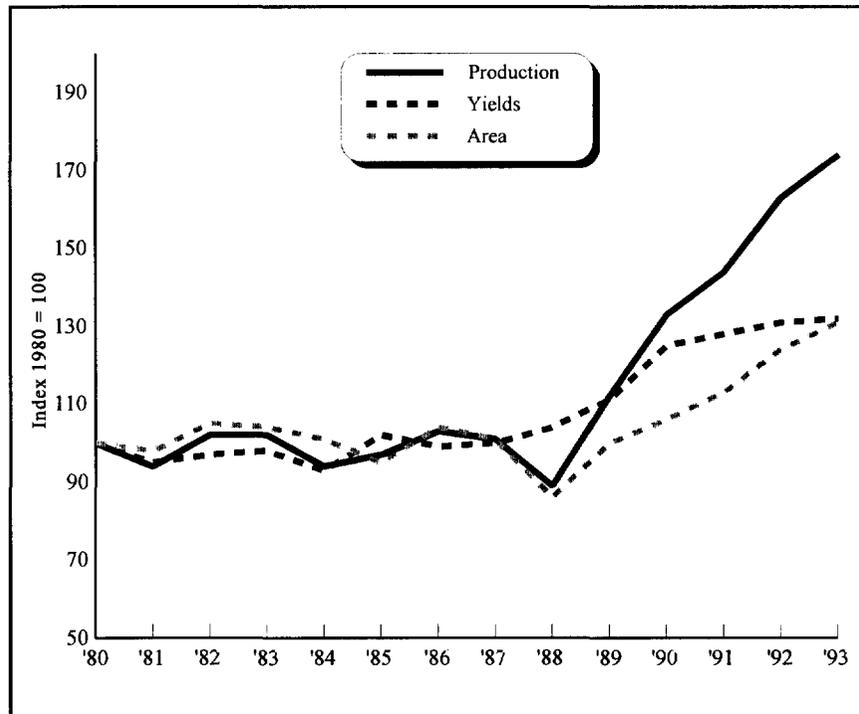


Figure 5.11 Rice area, yields and production

from cotton and corn production to rice production. Machinery accounted for 33 percent of total production growth from 1985 to 1989 but for only 3.7 percent of growth from 1989 to 1992. Fertilizer made negligible contributions to production growth during both reform periods (Wailes et al. 1994).

Maize Area, Yields and Production

Government controls on area planted, prices, procurement and domestic marketing were removed for maize and nine other crops in March 1987. Before this, the government had increased procurement prices and relaxed the enforcement of procurement quotas. However, the highly overvalued exchange rate greatly subsidized imports of maize until 1991.

The cropped area in maize has not changed much from 1980 to now, averaging around 785,000 hectares from 1980 to 1986 and increasing only slightly, to an average of around 820,000 hectares, in the 1987-1993 period. However, yields have shown a steady increase. In fact, there was a considerable improvement between the two periods, with an annual growth rate of 2.3 percent

in the 1980-1986 period rising to 5.7 percent in the reform period. As a result, production of maize increased 48 percent from 1987 to 1993, in contrast to a decline in the earlier period that was affected greatly by a sharp drop in production in 1986 (Figure 5.12).

The sudden drop in production in 1986 was caused in part by a blight that adversely affected yields. However, the area planted in maize also fell, dropping some 22 percent below the 1985 figure. One explanation for this change may have been farmers' reactions to the announcement of a policy shift to a floor price for maize. Farmers may have reacted negatively to the possibility of this change in pricing policy. But the government did not implement the policy, and the area planted in maize made an equally sharp move upward in 1987.

Cotton Area, Yields and Production

Nationalization of the cotton sector was formally initiated in 1961 and virtually completed by 1965 (American University, Cairo 1992). Deterioration of the cotton sector since that time actually accelerated with the initiation of the policy reforms in 1987. This program freed up production of most crops but retained controls on cotton. Nominal cotton farmgate prices were increased, but until recently those increases were less than the increase in prices of most other farm products and inflation. For many years, net returns to cotton worsened relative to competing crops. Growers responded by reducing the area planted in cotton and following practices (such as later planting and fewer pickings) that reduced yields (Figure 5.13).

Major progress toward liberalizing cotton production has begun, but some forms of state intervention due to technical concerns remain in effect. Regulation of pest control programs and varietal purity, which are thought to be justified by general welfare considerations, have been retained to some degree.

Prior to recent reforms in the sector, producers were required to sell their crop as seed cotton and were restricted to disposing of it to the single trading company representative operating in each collection center and at a price fixed by the government. Prices for lint sold to mills or exported were also fixed, and quantity and quality allocations to domestic mills and export outlets were set by public companies and government agencies.

Before nationalization of the cotton sector, the Government decided that cotton area should not exceed one-third of the agricultural land holdings. However, with the relative decrease in cotton profitability compared to other crops, producers have become less willing to grow cotton. The government therefore had to issue decrees requiring the producers to plant at least one-third of their land to cotton. The area to be planted in cotton is divided among governorates and among districts and duly endorsed by the directors of agricultural affairs in each governorate. These regulations have faced resistance from producers because of competition between cotton and other field crops competing for the limited land resources.

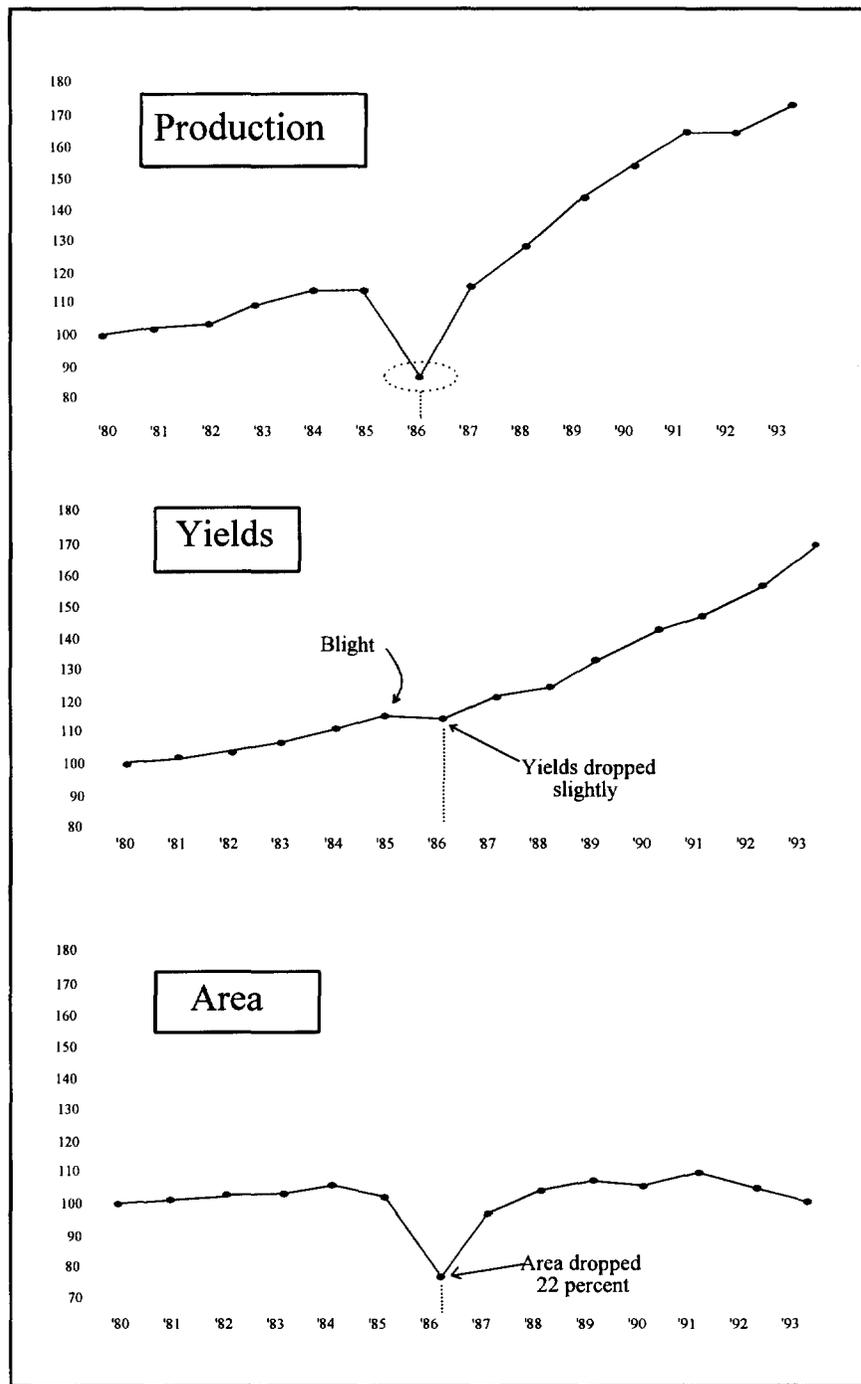


Figure 5.12 Maize area, yields and production

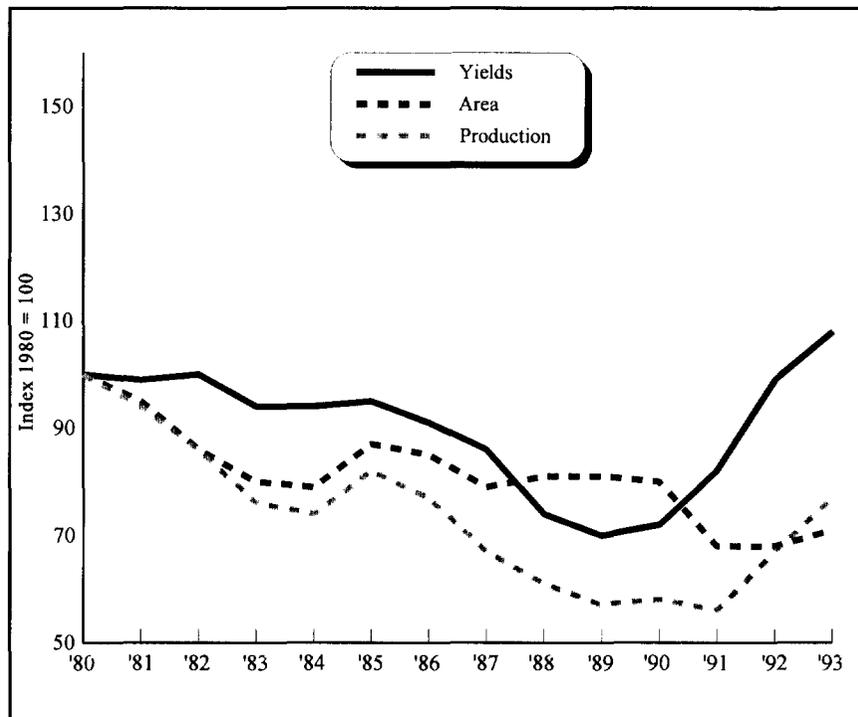


Figure 5.13 Cotton area, yields and production

Since 1958, the Ministry of Agriculture has followed three major practices to preserve the quality of cotton varieties:

- Designating specific regions for the cultivation of specified cotton varieties.
- Limiting each ginnery to one variety.
- Adopting a breeding program to preserve and improve the qualities of the Egyptian cotton varieties by producing an annual breeding nucleus for each variety.

The region and area to be planted in each variety was determined by the following five considerations: (a) export orders, (b) requirements of the national spinning factories, (c) suitability of a region to a specific cultivar, (d) availability of pure varietal seeds and (e) the actual yields of each variety.

In line with these five factors, almost 25 percent of the total cotton area is cultivated with extra-long-staple (over 1 3/8") varieties that account for almost 30 percent of the national cotton production. The area cultivated with the Giza 75, a long-staple (ls) variety, in 1990-91 constituted 50 percent of the total cotton area

and accounted for almost 48 percent of total cotton production. The ls cottons are allocated to the domestic textile industry.

A new promising ls variety for Upper Egypt, Giza 83, is characterized by early maturity and high yield. However, this new variety is still at the early stage of seed production. The feasibility of using shorter-season cotton varieties has also been investigated, and such varieties may prove promising (El Saadany et al. 1994).

Cotton has long been a premier crop in Egypt, starting in the 1950s and 1960s. After 1980, cotton production steadily declined, falling by 4.2 percent a year up to 1986. The factors underlying this trend were the constant drop in cotton area of 2.6 percent a year, coupled with a 1.6 percent annual decline in yields. The cotton rotations were simply not profitable to farmers.

However, the 30 percent decline in yields from 1980 to 1989 reversed itself in 1990. Within 3 years, yields had moved up an impressive 42 percent. Undoubtedly, the return of profitability in cotton production, brought about by the implementation of the policy reform, was a major reason for this remarkable change in one of Egypt's most important crops.

Cotton had been the most controlled crop, with strict acreage quotas until 1991, procurement prices set at less than 50 percent of border prices and 100 percent of the crop procured by the government. Procurement prices were increased from 40 percent of the border price in 1990 to 75 percent in 1991, and acreage controls were relaxed. Further, price increases in procurement prices in 1992 and 1993 caused the farmgate price to rise above border prices in those years. Pest control costs were subsidized by over 90 percent until 1992. The subsidy was then reduced by 25 percent in 1993. The fertilizer subsidy that affected other crops through 1990 also applied to cotton.

In 1991, the government lowered administered export prices and raised procurement prices. Some estimates show that procurement prices were 75 percent of border prices in 1991, 114 percent in 1992 and 132 percent in 1993. Pricing policy thus shifted dramatically from taxing farmers and practicing monopolistic strategies in the export markets to subsidizing farmers and taking aggressive steps to recapture a larger share of the export market.

Legislation removing all controls on farmers, merchants and exporters was introduced for the 1994 crop. Cotton imports, however, remained severely constrained by phytosanitary controls, and no private exports had occurred as of December 1994. In addition, the cotton textile industry is almost 100 percent government owned.

Conclusions and Recommendations

Crop production responses to policy reforms, which for the most part have had a favorable impact on agricultural production, were examined in this chapter. Some of the responses have been

immediate, putting production on a different growth path. Most reforms, except for those involving inputs (e.g., fertilizer) and foreign exchange, were crop-specific and were phased in over time. In general, the comparison between the pre-reform period, 1980-1986, and the reform period, 1987-93, shows that gross output is significantly greater as a result of reforms; returns to a scarce resource, land, have improved; farmers have more freedom of choice in production decision making; resource allocation is more in line with Egypt's comparative advantage; and farmers now have more incentives to adopt improved technology.

Egypt faces the future with an arable land base that is very small relative to its population and that is confined largely to the Nile Valley (Old Lands). However, studies have shown that the potential increase in productivity in the Old Lands exceeds or matches that from reclamation of New Lands in desert areas outside the Nile Valley. Therefore, continued investment in the Nile Valley is still a prudent decision, although some land reclamation is also appropriate. An emphasis on higher value, export-oriented crop production is undoubtedly the appropriate orientation for future agricultural development.

The strongly positive responses of wheat production to the release of some policy constraints contrast dramatically with the responses of the cotton sector, which remained highly depressed for a long period of time because of controls that stifled its development. Wheat flourished under a more liberalized policy environment while considerable economic returns continued to be lost in cotton despite the fact that Egypt has a strong comparative advantage in producing cotton.

Many but not all disincentives to increased agricultural crop production have now been removed. In response to reforms already made, yield growth for many crops since 1986 can only be described as phenomenal. These gains demonstrate the symbiotic relationship between policy change and technology. For the foreseeable future, increased yields will remain the critical link to productive gains, much as they are in other developing countries. As pointed out in this chapter, there is still room for advances in yields. But with Egypt's severely limited land and water resources, it is imperative that other reforms be continued or undertaken to create an environment with incentives for farmers to intensify production through the adoption of new technology—the key to raising yields. To generate and adapt new technology, it is also imperative that investment be sustained for research that in turn must become more responsive to farmer needs and conditions as well as to the market place. If policy distortions remain, the path of technological development will be skewed and resources will not be utilized most productively.

Greater risk and uncertainty come with the reforms for both producers and government. Farmers are now entering an era in which timely and accurate market signals are essential for sound decision making. Decisions in the pre-reform period were made with little uncertainty regarding prices. Cropping patterns are subject to substantial change if farmers now begin to experience

prices that are more variable. As prices in Egypt move closer to border prices and liberalization allows international price signals to be transmitted to domestic prices, increased variability is likely.

One of the best ways to maintain productive incentives and to reduce or temper increased risk and uncertainty is to ensure that farmers receive reliable, timely and accurate information for sound decision making. In addition, they must be able to trust the market and be confident that policies will not change abruptly. Shifts in policies and the availability of improved technology together have "pushed" production and will continue to do so. But now more emphasis must be placed on the market system to "pull" production along by expanding production outlets, especially export markets. Farmers need to be more connected to markets through greater vertical coordination in order to produce what consumers want and to be rewarded for improved quality, through receiving higher and dependable prices. Contract farming is one example of improved vertical coordination.

Reforms are required in other sectors of the economy to relieve the cost-price squeeze farmers find themselves in as they are forced to adapt to higher input prices, falling international prices, and exposure to international market conditions such as greater price variability and external competition (in the case of cotton). Adequate political/economic voice in the new open market system will become more important in obtaining sufficient influence to protect farmers' interests—not at the expense of other groups, but in concert with them to maintain a balance.

These are necessary but perhaps not sufficient conditions for the sector to prosper now that agricultural policy decision makers have courageously moved agriculture up to a new and much more promising path of economic growth and development.

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6

Impacts of the Policy Reforms on Livestock and Feed Production, Consumption and Trade

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This chapter summarizes impacts on the livestock and animal-origin foods system of agricultural policy reforms carried out in Egypt since 1986 and identifies additional reforms required to accelerate development of this subsector. It draws on a study completed in late 1993 (Winrock International 1995). That study gives a detailed picture of Egypt's animal-origin foods system, including historical trends as well as the current status of animal populations, productivity, production, processing, distribution, pricing, trade, controls and policies. Although the 1993 study did not consider implications of the Uruguay Round of GATT negotiations for the trade regimes facing Egypt's feed and livestock producers, this chapter specifically examines the impact of the recent GATT agreement on the international market outlook and on changes in supplies of subsidized grains, live animals and animal-origin foods to Egyptian markets.

Description of the Livestock and Animal-Origin Foods System

Production Systems

Changes in animal inventories between the agricultural censuses of 1981 and 1991 are summarized below. The human population increased by 21 percent during this decade, so both the "buffalo" and the "sheep and goats" categories kept pace with human population growth.

	<u>Cattle</u>	<u>Buffalo</u>	<u>Sheep and Goats</u>
1981	2,906,207	2,378,561	6,118,410
1991	2,683,067	2,940,529	7,528,657

Current poultry populations are 240 m, 27 m, 3.6 m and 1.0 m birds for broilers, layers, broiler parent stock and layer parent stock, respectively. Total annual value of animal production was estimated at LE 7.0 billion in 1991, which was equal to about 25 percent of the total value of agricultural production in the early 1990s.

Most livestock and poultry production is relatively intensive and concentrated on smaller, subsistence-oriented farms in the irrigated cropping region. These intensive village-based systems predominate for cattle, buffalo and small ruminants and produce 80 percent of all beef, 90 percent of all milk and dairy products, and 70 percent of all mutton. Other parts of the country are desert and thus cannot support natural forage for intensive grazing. The extensive Bedouin system provides 30 percent of all mutton, which is destined primarily for export. The intensive commercial dairy system operates large and medium-scale farms that, with 30,000 to 40,000 Holstein cattle in production, contribute 10 percent of all milk and dairy products. A summary of the production systems is shown in Table 6.1.

As shown, poultry are represented by two distinct production systems: traditional farmyards and commercial farms. The commercial, industrialized system has varying degrees of vertical integration, is a high technology industry geared towards domestic and export markets, represents a LE 7.0 billion capital investment, employs 500,000 people, and produces 70 percent of both broiler output and table eggs. A wide variety of poultry are kept on small farms. Chickens are kept mainly for eggs while pigeons, ducks, turkeys and geese, along with rabbits, provide meat for the household. Farmyard poultry flocks consist of small, hardy breeds that command a premium price for their meat and eggs. Growth of these farm flocks is limited by the availability of crop residues, their

Table 6.1 Livestock production and processing subsystems in Egypt

Production Units	Livestock		Poultry	
	Red Meat	Milk and Dairy Products	Broilers	Table Eggs
Small farm village	• Cattle and buffalo male calves and animals culled for age (80% of all beef)	• Buffalo milk, ghee and soft cheese (90%)	• Farmyard flocks, medium scale farms (27%)	• Farmyard flocks, medium scale farms (30-40%)
Extensive Bedouin	• Offtake of lambs and kids, and animals culled for age (30% of all mutton and lamb)	• Household consumption only	• N.A.	• N.A.
Intensive commercial	• Dairy/beef calves and animals culled for age, feedlots (20% of all beef)	• Pasteurized UHT and processed milk for urban markets (10%)	• Vertically integrated commercial producers (73%)	• Commercial farms (65-70%)

Source: Authors' estimates.

major feed source. Commercial chicken production depends more on imported feeds and other inputs, a dependency that has spread to a lesser extent to production of ducks, geese, rabbits and turkeys for the urban market.

Livestock are no longer used extensively for animal power as they once were. During the past ten years, most oxen have been sold for slaughter, and irrigation water is now pumped primarily by electric and diesel engines. Heavy plowing is often accomplished with rented tractors, a trend accelerated by subsidies for energy and imported machinery.

Livestock and poultry compete with crop production for direct food use because they consume corn, barley, wheat and pulses. Livestock also compete directly for land because during the winter a large portion of land is devoted to production of berseem clover. This land could otherwise be used for wheat, beans and winter vegetable crops. During the summer, forage is not produced as extensively and there is often a seasonal shortage of animal roughage.

Consumption and Demand Patterns

Several conflicting estimates are available for consumption levels of animal-origin foods in Egypt. The most recent figures are from the 1990/91 household budget surveys. Table 6.2 provides figures from the three most recent of these surveys. These figures lump all poultry together, so per capita consumption figures for poultry are much higher than figures given in the Winrock (1995) report, which estimates only chicken meat. Figures for eggs and milk are also somewhat lower than the estimates given in the main Winrock report. Table 6.2 is consistent with changes noted in many developing countries, where consumption of red meat and milk has stagnated or declined as a result of production constraints while consumption of poultry products has increased rapidly. Following the reforms, however, consumption of all products declined (see "Impacts" section). The 1991 food balance sheets for Egypt showed per capita figures of 11.8 kgs of red meat, 4.4 kgs of chicken, 52.6 eggs and 46.3 kgs of milk. A simulation model that estimated animal inventories, carryovers, offtakes and per capita consumption, developed by the

Table 6.2 Per capita consumption of animal-origin foods estimated from household budget surveys (1964/65, 1974/75 and 1990/91)

Commodity	1964/65	1974/75	1990/91
Red meat (kg)	8.17	7.88	7.93
Poultry (kg)	3.80	2.67	8.80
Eggs (units)	39.17	37.75	59.00
Milk equivalent (kg)	47.57	42.50	33.77
Total per capita expenditure, LE (constant price)	53.00	80.50	68.20

Source: Winrock International 1995.

Winrock International team in 1993, gave 1991 per capita estimates of 10.4 kgs of red meat, 7.8 kgs of chicken, 62 eggs and 49 kgs of milk. The Winrock model, which was based on internal consistencies between animal inventories estimated by census surveys, disappearances, animal production parameters and ending inventories, covers the pre- and post-reform periods; therefore, these figures are used in the analysis that follows. These data suggest a total average intake of about 16 grams of protein/day/person from animal sources.

Cereals and legumes are the most common foods in the average Egyptian diet. By weight, animal-origin foods make up about 10 percent of the diet, an estimate that does not, however, include fish. Red meat is commonly used to improve the palatability of other foods. Low-income families consume less than 8 kg of meat/person/year; for the poor, the meat consumed is often animal fat and edible offal used for flavoring and an occasional inexpensive imported liver or frozen meat. About half the milk is consumed fresh and the other half converted to cottage cheese and butter. Buffalo milk, with its high butterfat content, is the preferred milk for drinking and for making ghee. Poultry is usually sold as whole birds. Chickens are usually purchased live and slaughtered at the retail point or at the family dwelling, although chilled or frozen chickens and processed parts are being successfully introduced. Eggs are usually consumed as part of other foods, although one-third are eaten boiled or fried.

From a nutritional standpoint, animal protein can supplement proteins from cereals and legumes. Animal protein accounts for about 18 percent of all protein consumed and is not a significant energy source, providing less than 8 percent of total calories. However, the high quality of animal protein is very important. Cereal-based diets are often deficient in one or more essential amino acids, although adequate amino acid intakes can be achieved by combining different cereals and legumes that compensate for each other's shortcomings. Cereal/legume combinations that furnish adequate protein are often high in bulk and not suitable for vulnerable groups. Nevertheless, cereal/animal protein mixtures are more expensive than cereal/legume combinations and thus are often too costly for those in the lowest income group.

Over half (59 percent rural, 50 percent urban) of total household expenditures in Egypt are for food. In the 1990/91 Household Expenditure Survey, total per capita household expenditures were LE 859.5, and the total expended for food was LE 466.3 per capita. Within the food bill of the average household, about 31 percent of expenditures are for foods of animal origin. Poultry products top this bill, absorbing about 9.5 percent of the total. Dairy products and red meat follow, with 9.1 and 8.6 percent, respectively. Although red meat is preferred, less expensive cheeses, eggs and poultry account for most of the animal protein intake.

In 1993, national self-sufficiency ratios were 78 percent, 82 percent, 100 percent, 67 percent and 100 percent, respectively, for milk, red meat, poultry meat, fish and eggs (Winrock International 1995). The high self-sufficiency level for poultry products reflected restrictions on imports.

As the economy shifts to one that is more market oriented, it is likely that higher levels of economically superior goods will be emphasized and promoted in the market. "Superior goods" are those that are purchased in increased amounts proportional to personal and household income increases. Animal-origin foods, vegetables and fruits are the more important superior goods in the diet. However, some animal-origin foods are economically "inferior" goods, consumed primarily by the poorer segments of the population and purchased in lower quantities as incomes rise. For example, nearly one-half of all frozen meat imports are consumed by individuals with total expenditures of less than LE 1600 per annum. These foods are often imported at prices subsidized by the exporting countries.

Animal production has been affected by several changes associated with the move to a market economy. Changes in policies and in the economic system since 1986 have been very rapid, causing the animal-origin foods sector to adjust. Both supply and demand have been affected, supply by the reductions in feed subsidies and demand by changes in consumers' incomes, in prices, and in tastes and preferences. Urbanization has also affected preferences and hence demand.

Consumption Responses to Income Changes

Red meats consumed in Egypt consist of locally produced fresh meat and imported frozen meat. Demand analysis shows that the poorest segments of the population purchase imported frozen red meat and consider it a superior good. The nonpoor segments of the population consider imported frozen red meat an inferior good and purchase less as their incomes rise. This relationship is such that a 10 percent increase in per capita household expenditures leads to an approximately 8 percent increase in locally produced fresh red meat consumption. Thus fresh meat is very responsive to income but on average not necessarily a superior good. The nine percent of the population with annual expenditures under LE 1600/family/year consider imported frozen meat as a superior good, and a 10 percent increase in the purchasing power of this group leads to a 25 percent increase in the consumption of frozen meat. This poorest stratum of the population consumes between 2.5 kg and 4 kg/person/ year of red meat. This group must buy the cheapest meats and is very dependent on less expensive frozen meat imports.

About 68 percent of the population consider frozen meat a necessary substitute for higher priced fresh meat. These are the income classes of LE 2400-5600/household/ year. Within this class, 13 percent consider frozen meat a full substitute for fresh meat, while 15 percent consider it a partial substitute. The top 20 percent of the population, with annual expenditures >LE 6800/ household/year, consider frozen meat to be an inferior good. This group appears to prefer fresh locally produced red meat.

Availability of milk products in the market, through either imports or local production, has decreased. All available estimates show a general decline in milk

consumption. Although the estimated income elasticity for milk is 1.29, the increases in real per capita income have been too low to support the demand increases needed to stimulate production. Price controls have also reduced production incentives.

Because of the low price of poultry relative to red meat, consumption of poultry can increase if it is available. The estimated income elasticity of demand for poultry meat is 1.13, so a 10 percent increase in per capita household income leads to a more-than-proportional increase in poultry meat consumption. Thus the poultry industry will benefit from any positive economic growth in terms of market expansion. Because of its high association with income and potentially low cost of production, poultry meat is an important component of the animal-origin foods system. Per capita consumption of poultry now exceeds that of red meat. However, until the poultry meat industry completes a restructuring process and imports are made available to the consumer, the industry will not achieve its full potential. The poor segments of the population would likely benefit from poultry imports as they have benefitted from imports of frozen beef.

Only 1 percent of the population (those with <LE 1000 income/household/year) consider eggs a superior good. About 20 percent of the population (with expenditures below LE 2400/household/year) increase their consumption of eggs 6 to 7 percent with a 10 percent income increase. Two-thirds of the population (with expenditures of LE 2400 to LE 6800/ household/year) increase their consumption by 4 percent for each 10 percent additional income. The remainder increase egg consumption by only 3 percent with a 10 percent income increase. Eggs have been more available than poultry meat, and the industry appears to be expanding its market more successfully than the poultry meat industry has.

On average, price increases for foods of animal origin have not matched the rate of inflation, even when supply shortages developed. For example, between 1976 and 1993, the per annum rates of growth in retail prices for animal-origin foods were somewhat lower than inflation rates. Milk prices increased by an average of 14 percent per year, meat prices by 12.75 percent, and poultry (broilers and eggs) prices by 11 percent. These increases contrast with the 16.3 percent average annual increase in the Consumer Price Index (CPI) over the same period. Government price controls restrained price increases for animal-origin foods even when supplies were short.

Processing and Marketing of Animal-Origin Foods

The processing and distribution components of the animal-origin foods system assemble and convert live animals, raw milk and eggs into food ingredients and foods that are finally retailed to the consumer. These marketing activities, through processing, storage and transport, change the form, time of availability and place of access for livestock and poultry

products for both domestic and foreign consumers. The efficiency and effectiveness of marketing and processing activities play a major role in determining the farm profitability of livestock and poultry production.

Egypt is becoming increasingly urbanized and moving towards a market economy, and those transformations are paving the way for commercial production and processing of animal-origin foods, creating a need to develop important new markets in urban areas, especially for frozen poultry, cooled milk, packaged eggs and pre-portioned cuts of beef. As improvements in income and technology continue to influence consumers, more food is processed and packaged. A commercial animal-origin foods supply industry is emerging, keyed to consumer preference for new products. At the same time, a national marketing system appears to be emerging for a number of animal-origin food products such as cheese, ice cream, processed meats and packaged eggs.

Marketing Costs and Margins

Although the marketing chain is somewhat long in Egypt, no particular category of middlemen appears to be performing functions that are redundant. The long marketing chain basically stems from the small farm size characteristic of animal production; small farm size results in a need for large numbers of middlemen to collect the small surpluses produced by the many small farmers scattered over the Nile Valley and Delta. There is little evidence of excessively high trading margins for foods of animal origin. It is estimated that the farmers' share of consumer expenditures for these perishable commodities runs between 50 and 65 percent. These margins are not high compared with those of other countries, although the level of services provided is relatively low.

Marketing of Animal-Origin Foods

The animal-origin foods marketing industries are probably more efficient and more equitable than they are often portrayed. At the same time, they are characterized by a number of inefficiencies that are reflected in high product losses in the feed industry, hatching chicks, milk and egg transportation, and the marketing of live birds. These losses reduce volumes and lead to a reduction in quality and in the prices the product can command in the marketplace. The absence of bulk handling equipment and procedures increases losses and costs in the feed industry. Poor quality hatching eggs and lack of speedy transportation result in high losses and low vigor of day-old chicks. Marketing of live birds that are slaughtered at retail or at the family dwelling results in the loss of the viscera, feathers and skin, and in large urban centers, the accumulation of waste from slaughtering chickens may constitute a health hazard.

The absence of refrigerated transportation and of storage facilities limits the amount of milk that can be transported from rural areas where surpluses exist to urban centers where deficits exist. Consequently, dairy producers are forced to convert a large part of their milk production to low-value-added products such as

yogurt and cheese. At the same time, imports of dry milk powder are required to meet the demand for milk products in urban areas. The lack of refrigerated transport and storage facilities also affects the quality of the milk that eventually reaches urban areas, because middlemen must add ice and chemicals to preserve the milk during the hot summer months.

Milk Production and Marketing

The demand for milk and milk products in Egypt is mainly met by local production, which represents 86 percent of the total market supply. Imports of dairy products, on a whole-milk equivalent basis, provide only 14 percent of the total market supply. This system faces a number of problems concerning milk production, collection, and distribution. Higher marketing incentives, if applied, could be an important factor in increasing output by encouraging farmers to increase overall production. The small-scale household producers could be the basis of a modern commercial production system if such a system were further developed. However, many problems need to be considered, particularly the lack of any control or procurement system to encourage market-oriented improvements at the farm level.

Poultry Meat Marketing Structure and Performance

Local poultry production in Egypt currently provides 100 percent of the total market supply. The share of commercial private-sector farms is 65 percent, while public-sector farms contribute about 10 percent of meat and 14 percent of eggs. The latter companies still market most of their production through state-dominated "cooperative" stores or government institutions. The traditional household-type system contributes 25 percent of total supplies.

The private broiler farms market 56 percent of their birds live through wholesalers, while only 4 percent goes for slaughter in private-sector slaughterhouses. The public-sector broiler farms have their own slaughterhouses.

The wholesale market is controlled by a few traders, whose main interest appears to be to increase their profit margin without playing a significant role in the industry. The traders work toward squeezing the margins of both retailers and producers to minimum levels to ensure higher profit margins for themselves. Thus, oligopoly has been extended to reach the retail level where there are, in many cases, agents working for the wholesaler. Only about 6 percent of poultry meat is marketed through supermarkets.

There are 19 processing plants, 7 owned publicly and the rest privately. The total capacity of slaughterhouses, about 110 million birds/year, has remained the same over the past 10 years. The slaughterhouses are not fully utilized, for several reasons: a preference by consumers to buy live birds rather than dressed poultry, partly because of bad previous experiences with unhygienic chilled or frozen products; the high cost of transportation to the slaughterhouses, along with increased probability of death and losses during transport; and noncompliance of

some birds to slaughterhouse specifications. All these reasons work against vertical integration and against increasing the market share of chilled or frozen poultry.

Table Egg Marketing Structure and Performance

Local table egg production in Egypt is supplying market demand; imports of table eggs ceased several years ago. Commercial producers provide 70 percent of the total supply, while farmyard production supplies the other 30 percent. Output of the commercial sector has varied during different phases of its development. In 1986, the capacity of this sector reached 5,000 million table eggs/year; it is currently 6,303 million eggs/year. With the phasing out of feed subsidies, production of table eggs dropped, and this has reduced per capita consumption from about 80 to 58 eggs in recent years. Many table egg producers in Egypt have established large integrated production units. These integrated enterprises usually include a feed mill and hatcheries with a total capacity of up to one million eggs per year. In many cases egg producers have their own distribution system, without relying on wholesalers.

Studies of the farm-consumer price spread have shown that cost shares are as follows: retail, 4.8 percent; wholesale, 5.0 percent; feed ingredient costs, 30.8 percent; feed processing costs, 7.2 percent; and other production costs, 39.9 percent. This breakdown reflects marketing inefficiencies. Under this system the feedmills get nearly a 7 percent profit margin, while the producers who bear the risk on the production side have margins of only 5.5 percent. A cartel appears to exist among the largest producers, who actually control both the prices and the supplies in the market in the absence of vertical integration among other participants.

The Animal Feed Industry

In the pre-reform period, the government subsidized feed and feed ingredients and enforced low prices for feedmill products. In addition, the government controlled importation of ingredients and quotas to feed mills, which resulted in a black market for feed and an inefficient industry in terms of feed production and profitability. Since removal of subsidies and quantitative controls, the feed and feed ingredient markets are moving towards free and competitive markets. Both the poultry feed mills and livestock feed mills have considerable excess capacity, a result of the government's historical pattern of state ownership and subsidization. State ownership of feed mills, particularly of those producing ruminant feed, led to excess capacity and inefficiencies, which became evident when market-based policies were put in force. New entrants in commercial animal production, such as dairy and beef cattle feedlots and poultry units, chose to construct their own feed mills to ensure adequate and reliable supplies of mixed feed meeting nutrition standards. Thus,

additional capacity was added to the industry. Earlier subsidies, particularly for poultry and veal production, encouraged this trend.

Analysis of feed balances for livestock and poultry indicated that in 1992 the aggregate supply of total digestible nutrients (TDN) exceeded requirements by 2.6 million tons and the supply of crude protein (CP) exceeded requirements by 350,000 tons. These surpluses represent 15 percent of total TDN supply and 11.5 percent of total CP supply. However, when nutrients from imported maize and soybean meal are deducted, TDN surplus is cut in half (to 7 percent of total supply) and CP surplus is cut to 3 percent of total supply. After waste and normal losses are accounted for, these figures indicate that domestic feed supply is now only marginally adequate and that high-energy and high-protein feeds are not produced in adequate quantity to meet domestic demand without imports. The need for imports of feed is likely to increase as demand for animal products increases. Land use competition from horticultural and industrial crops with forages/grain/oilseed crops will continue to increase the demand for feedstuff imports as less land becomes available to produce livestock feed and as less domestically produced grains/concentrates become available for feeding livestock. Although there may be marginal surpluses of these feeds, shortages will continue to be a problem in the summer (De Boer and Amir 1987).

Green forages represent about 64 percent of TDN produced for ruminants. Berseem clover, the only major forage recognized as an important crop in the three agricultural rotations commonly followed in Egypt, contributes about 75 percent of the digestible crude protein (DCP) used in ruminant nutrition. All other green fodders (alfalfa, sorghum, maize and others) play minor roles in animal feeding. Total production of dry roughage, which includes hay and several kinds of straw from crop residues (in particular corn stalks) is estimated at 14 million tons, although probably only 30 percent of this amount is available for ruminant feeding. Dry roughages contribute only 18 percent of the TDN produced for ruminants. Because of the low DCP of dry roughages, their contribution in this regard is marginal. Animal feed resources classified as concentrates account for 18 percent of the TDN and 24 percent of the DCP used in animal feeds. If poultry are included, concentrates would account for 15 percent and 18 percent of the total TDN and DCP available in Egypt. Annual concentrate availability is 4.7 million tons and consists mainly of grains and seeds. The use of cereals for livestock feed in Egypt is not extensive. Grains and seeds contribute about 50 percent and 25 percent of the TDN and DCP of all concentrates, respectively. Most of the manufactured feed used in Egypt for livestock and poultry feeding is produced as by-products of the vegetable oil and the cereal and rice milling industries; sugarcane molasses is also included in this group. The major by-product is cottonseed cake. Small amounts of plant protein supplements, such as linseed meal and soybean meal, are also utilized in feeding.

Most poultry feed ingredients are imported. The bulk of it—yellow corn—is imported from the U.S., and some other ingredients, such as soybean meal, fish

meal and premixes, are also imported. However, all wheat bran is produced locally from local and imported wheat. About half of the soybean meal is produced locally and the other half is imported. Limestone, molasses, rice bran and limited amounts of other concentrates are also produced locally.

The poultry feed industry illustrates the growth that has occurred in private sector feed production during the past twenty years. Poultry feed mills are relatively modern, with premixing systems for micro-ingredients and facilities to produce pellets and mash; most of the plants have computerized mixing systems. Increased local poultry production required increased feed manufacturing. However, large amounts of the ingredients are still imported. All feed mills produce broiler (starter, grower and finisher) and layer (starter, grower and layer) feeds, most of which are produced in mash form. Although poultry feed mills have the equipment to produce pelleted feed, most decline to do so because of the high cost involved.

Of the 60 feed mills, 39 are for production of poultry feed. Of these 39, 11 are joint public/private, 4 are publicly owned, and 24 are under private ownership. In 1989, capacity of poultry feed mills was 2,528,100 tons, production was 950,459 tons and capacity utilization was 37.6 percent. Since then, capacity utilization has increased as the industry has started to recover following removal of subsidies on feeds. Almost all livestock feed mills (90 percent) are in the public sector. Their total capacity is about 4.5 million tons/year. Over the past five years capacity utilization never exceeded 50 percent and in 1993 it dropped to 31 percent. The mills have no facilities for adding urea or micro-ingredients. A relatively narrow range of livestock feed is produced in Egypt. At present, the so-called "unified feed," formulated from local ingredients, is no longer produced.

The performance of the feed industry, which is a key component of the animal-origin foods system, is reflected in the cost, availability, and quality of feeds. Feeds account for most of the costs for all types of animals produced in this system. The transition to a market economy is being felt in the feed industry as in other industries. Traditional cattle feed factories must purchase ingredients in competition with farmers and other factories and must compete with private-sector firms. Modern, private sector commercial feed mills that were built in response to subsidies and growing markets now find themselves with excess capacity. Access to both local and imported feed ingredients has improved, but supplies of imported feed face problems common to the Egyptian foreign trade sector, such as poor port infrastructure; lack of bulk handling equipment and bulk transport vehicles; poor railway facilities that increase costs or that require use of more expensive trucking services; and inconsistent and untimely inspection services. Continued expansion of commercial dairy, red meat and poultry enterprises will gradually occur, and providing these units with lowest-cost inputs, bulk handling, and bulk transport and delivery services will be necessary. In-depth analysis is needed to assess the requirements for such facilities and identify the

most appropriate roles of the public and private sectors in meeting these requirements.

In general, the industry has adequate capacity and many mills have relatively modern technology, particularly in the poultry sector. Thus, substantial new investment in the feed industry does not appear to be required. Any investment into feed milling should be demand driven, i.e., based on animal feeding requirements and on developments in animal nutrition that can be transferred to Egyptian producers. Specific technology transfer programs, either through technical assistance providing consultancy services, joint venture, or licensing arrangements, should concentrate first on feeding systems and animal nutrition. Once the composition of improved rations is established, assistance should then be provided to feed mills to encourage their production. Either a “fast track” approval process should be available, to allow feed manufacturers to adjust rations flexibly, or the requirement for approval of new formulations should be replaced with an improved system of feed quality control and testing.

The Present and Future Role of Animal Production and Animal-Origin Foods

The role of animal agriculture in Egypt’s economy can be summarized as follows:

- To contribute to national food security through increasing foreign exchange by reducing imports and increasing future exports.
- To promote growth in availability and use of credit, machinery, feeds and better genetic stock to satisfy growing demand and to increase competitiveness.
- To develop markets for livestock and poultry inputs and outputs with associated industries that improve farm production and productivity.
- To play a pivotal role in the gradual transition of the Egyptian economy from an agricultural-based one to an industrial and service-based one.
- To achieve internationally acceptable levels of animal protein consumption.
- To reach production levels that strengthen Egypt’s bargaining power in international markets.
- To focus efforts on commodities for which Egypt enjoys a near or actual comparative advantage, such as poultry meat, eggs, milk and maize.

An intuitive look at where the industry needs to go to meet relatively conservative targets for consumption and production levels by the year 2020 is given in Table 6.3. This table bases consumption estimates on the two balance sheets prepared by the Ministry of Agriculture and Land Reclamation. An alternative simulation of production and prices of animal-origin foods using a statistical projection model is provided later in this chapter.

Table 6.3 Future requirements and sources for animal-origin foods in Egypt, 1995 to 2020

	Per capita consumption (kg/year)	Human population (million)	Total consumption (000'tons)	Local production (000'tons)	Imports (000'tons)	Local production (%)	Imports (%)
Red meat							
1995	11.25	59	675	425	250	63	37
2020	11.25	88	985	600	385	61	39
Poultry meat							
1995	4.7	59	276	276	0	100	0
2020	6.3	88	554	454	100	82	18
Dairy products							
1995	42.5	59	2550	2400	150	94	6
2020	50.0	88	4000	3700	300	92.5	7.5
Fish							
1995	5.93	59	350	250	100	71.5	28.5
2020	12.0	88	1058	858	200	81	19
Table eggs	eggs		bill. eggs	bill. eggs	bill. eggs		
1995	68	59	4.02	4.02	0	100	0
2020	82	88	7.1	6.02	1.08	85	15

Source: M. A. Sharafeldin, Ministry of Agriculture and Land Reclamation, Cairo, personal communication.

Assumptions underlying production growth:

Red meat Allow fattening and slaughtering of cull heifers; expand buffalo calf fattening, feedlot sheep and goats and male dairy calf fattening.

Poultry meat Utilize existing capacity and encourage market expansion and vertical integration.

Table eggs Use existing capacity and total quality management approach.

Fish Expand inland and brackish water fish farming as technically and economically feasible.

Impacts of Policy Reforms on the Animal-Origin Foods System

Prior to 1987, the animal production and feed supply subsectors were subject to numerous distortions caused by subsidies, price controls, administrative allocations of inputs and cropland, and distorted trade regimes. Most animal feed, the major input, was provided from the crop subsector, so distortions in that sector flowed through to animal production. These distortions included administrative controls on planted areas; low procurement prices; subsidized inputs, including water, fertilizer, credit and machinery; and state-owned feedmills that controlled the pricing, procurement and allocation of crop by-products. In the animal production subsystems, distortions included subsidized retail prices for beef, poultry and milk; subsidized feedstuffs and credit; and free services for animal health and artificial insemination. An overvalued currency and numerous quantitative restrictions on trade added other distortions, resulting in discrimination against local producers, lack of export competitiveness and artificially high consumption of animal protein. The overall impact of the reforms starting in 1986 resulted in reduced subsidies for local producers, higher consumer prices, reduced per capita consumption, reduced production of milk and veal, and excess capacity in the feedmill industry.

Impact of Reforms on Prices

For feeds, many subsidies were substantial. For example, subsidies on imported yellow corn often exceeded 70 percent of the market price. As recently as 1989, government feed mills were supplied feed ingredients at far below world market prices (Table 6.4). Animal husbandry extension officers distributed these subsidized feeds to farmers based on types of animals held. This system was subject to wide abuse; black markets for most subsidized feedstuffs, particularly cottonseed cake, wheat bran and molasses, were widespread.

After the major reforms in marketing and pricing of agricultural commodities starting in 1987, subsidies started to decline, and most current feed ingredient prices are at basically import parity levels. Overall, withdrawal of subsidies from 1987 on caused feed prices to increase (Table 6.5). Prices for the primary outputs increased much less than prices for feed, indicating economic reforms had adversely affected profitability of production, particularly for red meat, milk and poultry. However, feed price figures overstate the adverse effects of the reforms on cattle and buffalo production: Diets for the large ruminants consist primarily of roughages. Price increases have been less for roughages than for other feeds, and reforms in the cropping sector have increased the availability of cereal straw and maize for fodder and grain.

The impact of policy reforms on livestock producers was thus opposite to the impact on producers of most crops. As a consequence, the animal-origin foods industries faced severe adjustment problems. In addition to the adverse terms of trade, opening of imports of these products allowed cheap subsidized imports to displace local production, and falling real incomes have reduced effective demand for foods of animal origin, which are generally income elastic. Following is a description of responses to the changed price relationships.

Responses of Animal Inventories and Outputs

Results presented in this discussion are from a simulation model of Egyptian animal inventories, supply and stocks (Winrock International 1995, vol. II). In view of the lack of annual statistics for the sector and the long periods between censuses, an annual database was generated from a simple projection model. Figure 6.1 gives estimated populations from 1980 to 1991 and

Table 6.4 Government transfer prices for feedstuffs compared to 1993 world market prices*

Commodity	Government Transfer Price (LE)	World Market Price (LE)
Wheat bran	37	268
Rice bran	92	188
Cottonseed cake	154	703
Unified feed	221	402
Molasses	25	208

Source: Winrock International 1995.

*1985 transfer prices were adjusted to 1993 for comparison purposes.

Table 6.5 Changes in nominal feed prices and retail prices of major animal products, 1987-1995

	Price of feed (LE/ton)			Price of output (LE/kg)				
	1987	1995	Percent change	Product	Type	1987	1995	Percent change
Dairy feed	95	450	374	Milk	cattle	0.45	0.77	71
					buffalo	0.90	1.90	111
Beef feed	95	420	342	Beef		8.00	14.0	75
Poultry feed	430	750	74	Poultry meat		3.20	5.00	56
Layer feed	410	686	60	Eggs (30)		3.30	5.00	51

Source: Ministry of Agriculture and Land Reclamation, Cairo.

projections for 1992 and 1993 for cattle, buffalo, sheep and goats, and poultry. Figure 6.2 gives output figures for the same groups of animals. Human population increases are also graphed. As noted earlier, the major impact of reforms was on commercial poultry, particularly from 1989 onwards.

Cattle populations declined by 1.7 percent/annum from 1986 to 1993 in response to reduced demand for draft power, low milk productivity and loss of subsidized feed, which led to lower profitability. Buffalo, on the other hand,

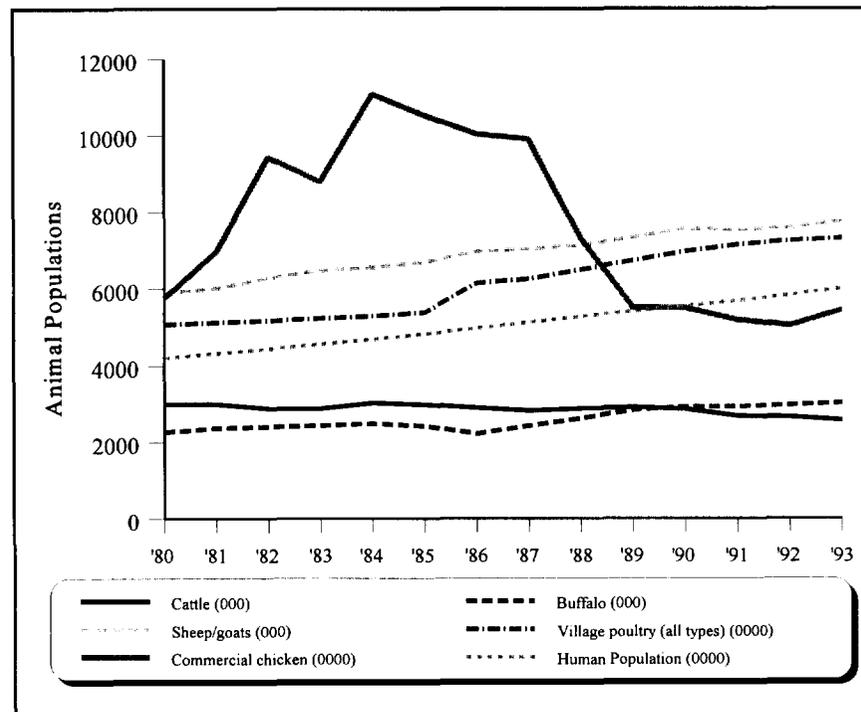


Figure 6.1 Changes in animal populations, 1980-1993

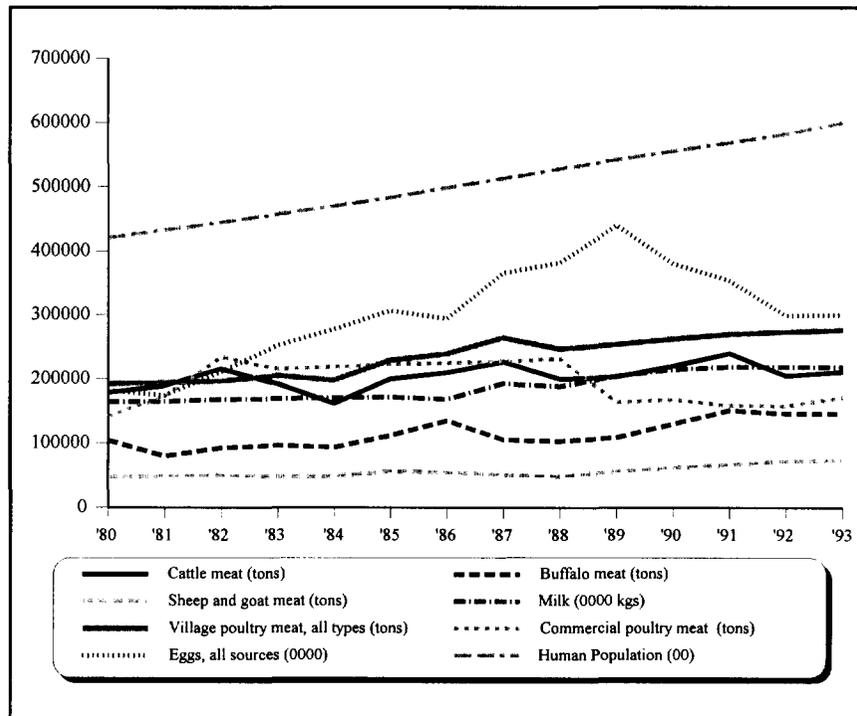


Figure 6.2 Changes in domestic supplies of animal-origin food products, 1980-1993

showed a small population increase over the same period in response to higher milk prices. From 1986 to 1993, buffalo populations increased by an average of 4.5 percent per annum, indicating a positive response to policy reforms. However, this increase was not enough to prevent per capita milk consumption from falling, as much of the buffalo population increase was due to subsidized veal fattening schemes that encouraged farmers to retain male calves (National Buffalo Project 1987-92). Sheep and goats are seldom produced commercially, and policy impacts were thus minimal. Animal inventory increased consistently from 1986 to 1993 by an average of 1.5 percent/annum, an increase that was less than the human population's growth rate.

As with sheep and goats, village poultry populations, which include ducks, chickens, geese, pigeons and turkeys, as well as rabbits, increased in line with local needs and probably have benefitted from reforms in the cropping sector, where strong output growth increased the supply of crop residues and by-products for village feeding. The commercial chicken (broiler and layer) industry was most affected by the reforms; the number of animals dropped rapidly from its peak in

1984 by an average of 8.3 percent/annum during 1987-1993. The figures for domestic supply followed the same pattern, with some exceptions.

Meat supplies from cattle rose as more animals were fattened and draft animals were slaughtered. Total milk production responded to policy reforms, including freeing up the cropping patterns, increasing milk prices, decontrolling feed supplies and permitting joint ventures in commercial operations. Production over 1987-1993 increased by an average of 3.8 percent/annum, but reduced demand for imports led to declining per capita consumption over the same period.

Production of village poultry meat (chickens, ducks, geese, pigeons, rabbits, turkeys) almost kept pace with human population, growing by an average of 2.1 percent/annum from 1986 to 1993. Broiler meat supplies decreased by an average of 3.8 percent/annum over 1986-1993, while commercial egg production declined rapidly after reaching a peak in 1989.

Thus we conclude that the impacts of policy reforms on animal-origin foods were uneven, but only in the case of milk did per capita domestic supplies keep up with population over the period 1986 to 1993. Reforms did, however, put in place many conditions for efficient, long-term growth of animal production, as will be discussed later.

Impacts on Demand and Consumption

Consumption changes do not exactly match the domestic production figures shown in Figure 6.1 and 6.2 because of trade. Liberalization of trade occurred over the same period as removal of subsidies on both inputs and outputs, during which period per capita incomes declined, so the overall impact of reforms on consumption of animal-origin foods is not clear. Changes in consumption of major products are shown in Figure 6.3.

The drop in per capita milk consumption in the early 1980s and lack of recovery in the reform period raise real nutritional concerns. Some of the downward shift in consumption is probably due to urbanization and the replacement of milk with more convenient and more storable foods. Market promotion, along with more widespread use of high-producing dairy cows, could shift both demand and supply up and to the right. These factors, along with resumption of growth in per capita incomes, would help reverse the decline in consumption.

The decline in total egg production is reflected in per capita supplies, since higher imports have not been used to offset the decline in local production. This is unfortunate for both consumers and producers; consumers have missed the satisfaction of higher levels of consumption, and eggs have lost market share. Local producers will now have to achieve a larger market share if they wish to produce and sell additional eggs. To some extent, consumers have replaced eggs with more convenient, processed foods. Stagnant or declining per capita income is also a factor.

Poultry meat consumption has dropped slightly since the middle 1980s as

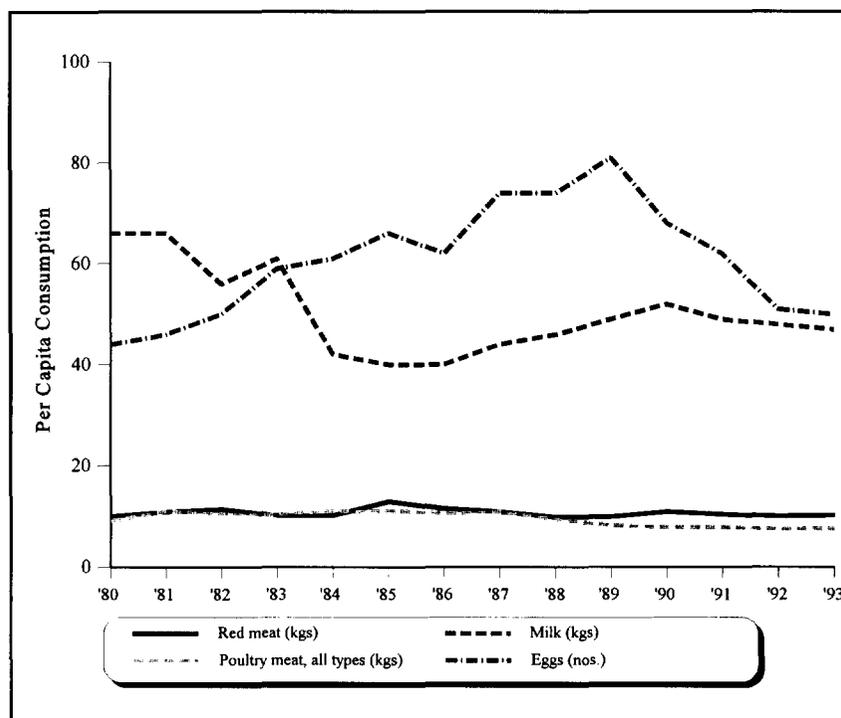


Figure 6.3 Per capita consumption of animal-origin foods, 1980-1993

large decreases in commercial output have been offset only partially by increased supplies from village sources. Poultry meat consumption is not expected to rise through 2003. To offset this stagnant demand, the poultry industry can reorganize, bring in new capital and management, and aggressively develop urban markets for dressed birds. To prevent further consumer dissatisfaction and to force the poultry meat industry to be more competitive, imports could be allowed to enter on a "fair competition" basis. Especially with the successful conclusion of the GATT negotiations, participation in world poultry trade will be beneficial. As shown in the consumption section, imports that amount to as much as 15 percent of production for both eggs and poultry meat will have only a small impact on prices.

Impacts on Trade

Trade policy has traditionally played a direct as well as an indirect role in Egypt's livestock economy. Before the reforms, the government monopolized trade and used subsidized imports of feedstuffs to encourage local

production while also importing and then subsidizing some foods of animal origin. Imports of animal-origin products are shown in Figure 6.4. Red meat is adjusted for imports of live animals, and milk product imports are adjusted to whole milk equivalents.

As Figure 6.4 indicates, imports of all animal-origin products are now below their previous peak levels. This is due to reduced demand and import restrictions for poultry products. Following reforms, trade liberalization for livestock products led to a surge in subsidized frozen broiler imports; this devastated the local industry, which had been operating under a variety of subsidies. Subsidized exports of live cattle and beef from the EEC have also put pressure on profits of local producers. The subsidized exports of live cattle and beef from the EEC and of poultry from the USA and the EEC are a problem because of their price-depressing effect on domestic production. Reduced prices have put pressure on profits of producers and could put some out of business. Subsidized imports of beef are supported by processors and traders because of the substantial profits that can result as low-cost imports are converted to high-priced retail cuts and processed meats. Most likely, these subsidized imports will not be acceptable

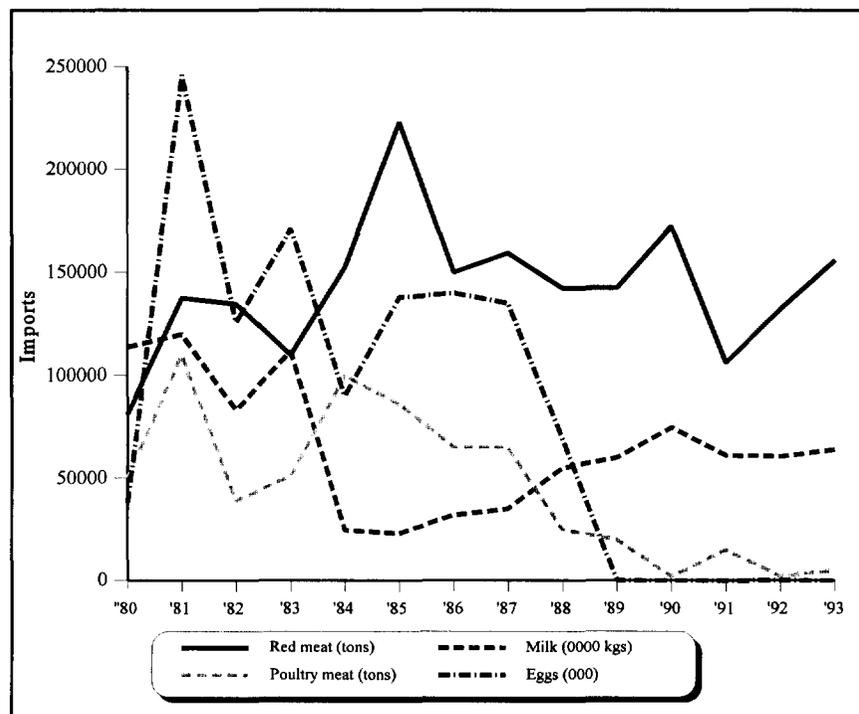


Figure 6.4 Imports of animal-origin foods, 1980-1993

under the GATT agreement. However, “anti-dumping” tariffs could be useful in the interim as beef-growing enterprises get started and as the poultry industry continues its restructuring. The outlook for import prices is discussed later.

Impacts on Input-Supplying Industries

When subsidies were withdrawn after 1986, the feed industry faced higher costs, which were passed on to consumers, resulting in reduced demand. This in turn reduced the demand for formulated feed, leading to even more excess capacity. From 1976 to 1986, the average annual dry matter requirements for meat and egg production increased by 5.8 and 7.1 percent respectively. During the period when major economic reforms were put in place (1987-1993), the respective average annual increases for meat and egg production dry matter requirements were -4.7 percent and 0.2 percent. The number of idle broiler farms increased from 4242 in 1985 to 12,646, which was 79 percent of total production capacity, in 1991. The smaller farms tended to go out of business, however, as poultry feed mill capacity utilization in 1989 was still only 65 percent. Commercial producers tend to build their own mills to their own specifications, resulting in excess capacity concentrated in the state-owned feedmills serving livestock producers and, to a lesser extent, state-owned poultry feedmills.

Impacts on Processing and Marketing

On the whole, it appears that the Government of Egypt is gradually setting in motion policies to establish a market economy environment. The GOE is deregulating, eliminating subsidies, initiating an agricultural policy for food security, putting privatization and entrepreneurship into practice, and developing and importing applicable technology. As these policies have been applied to the animal-origin foods system, however, input supplies have been disrupted. Some of the major impacts on marketing, processing and distribution are discussed in this section.

The poultry meat industry in Egypt has been forced to reorganize as feed subsidies have been removed. The reorganization has eliminated a number of operators and left the entire industry with excess capacity. However, this does not constitute complete restructuring. Both horizontal and vertical integration are needed for Egypt to be competitive with international poultry businesses. Wholesale traders in meat appear to make up an oligopoly, with only 12 to 15 traders controlling both the Cairo and Alexandria markets, where 45 percent of all meat is traded. Reforms to open and liberalize markets have not yet broken up these traditional marketing groups. Brokers are handling the market information function for both buyers and sellers. The existence of such brokers is partially due to the absence of a public marketing information system and to oligopolistic control by wholesale traders. This situation, along with the oligopoly-like conditions in the processing industry, is probably limiting the development of the

market. For the past 25 years, the Egyptian poultry market has lacked two important factors basic to development of this industry: economies of scale and vertical integration. The poultry production industry has provided high profit margins to small production units, with inefficient performance of producers being sustained by extensive subsidies. Further reforms that specifically addressed this problem are discussed in the policy agenda section.

Growth in domestic production of animal-origin foods depends on the emergence of a larger commercial sector. Currently, a significant share of egg production is on a commercial basis and about one-half of poultry meat is commercially produced, but only small amounts of red meat and milk are commercially produced. The commercial sector has been developed by a relatively small number of individuals, and the number of commercial business entities is consequently small, with each holding a large market share. As is true when the number of entities is small in any commodity area, including egg production, a single entity can adjust production and thus affect price levels for the commodity; this is a major criterion used to define oligopoly. This condition does not favor consumers.

These noncompetitive conditions and this type of firm behavior appear at nearly all levels of the animal-origin food industries. As discussed earlier, most wholesale markets are controlled by a few traders, the classic structure for competition that is less than "pure." That is, they can affect price by adjusting the supplies they make available to the market. These noncompetitive conditions also extend to the retail market, where retailers, wholesalers and butchers collude. This is expected behavior, because it is profitable and acceptable under current policy. Policies to promote more competition are discussed in the policy agenda section.

Reforms in the pricing and marketing system as well as the lifting of production controls imply a broader range of consumer choices. As the range of choices expands, the need increases for information that accurately reflects differences in quality. The current grading of red meat, carried out by government officials, identifies the type of animal and its age in the information that is stamped on the carcass. Further grading is carried out by butchers, who divide carcasses into first and second grades of meat for retail pricing. There are no standard measures for grading at this level.

Poultry meat is inspected but not graded at the government slaughter plants. Eggs are sometimes graded according to size by retailers. At the retail market level, consumers appear to prefer traditional farm-produced poultry meat and eggs over the same foods supplied by commercial production units. Traditional farm production is identified and receives a price premium. Milk is sold fresh and is usually identified as buffalo, mixed, or cow milk.

The current forms of grading are traditional. However, in the growing urban market, grades that reflect tastes and preferences would benefit the consumer. Buyers could with greater certainty purchase what they prefer. Consumers appear to select meat on the basis of expected taste and texture; eggs on the basis of size,

color, freshness and, when possible, color of the yolk; and milk on the basis of taste, butterfat content and freshness.

For most foods of animal origin, the informal traditional grading system is not uniform because there are no standard measures for grading. Further, with development of the urban consumer market, tastes and preferences are changing and consumers are unable to use this informal system to purchase the qualities they desire. Both the consumer and the producer would benefit from the development of a uniform grading system that reflected consumer tastes and preferences. Needed reforms are identified in the policy agenda section.

Policy reforms have not yet reached the area of providing market information needed to accompany the liberalization of markets. Basic livestock and poultry information is not available. The information that has been available has been out of date and often misleading. Inventory estimates have been based on projections between census points taken every ten years. Other than the census data, no information on inventories has been estimated on the basis of statistically valid samples. Market trends are not analyzed and market assessments are not made and disseminated to the public.

Estimates of farm prices are not made from actual farm data. Although prices of animal-origin foods are estimated on a monthly basis, the estimates are not made available until a year later. Regional prices are not reported, international market trends are not assessed and forecasts are not disseminated.

To make a market economy work effectively, programs will be necessary for implementing a national agricultural sample survey on an annual basis and for operating an agricultural market information system. If government programs are not put into effect, business organizations will gather and process their own market information but will not make it available to all participants. Recommendations on market information are included in the policy agenda section.

Outlook for Animal-Origin Foods

The projected demands for foods of animal origin are based on a set of relationships between retail prices, consumption and income (private expenditures). To make long-term projections, supplies were projected using simple lagged-price relationships. Beef prices were lagged 3 years in the red meat production relationship. All other prices were lagged one year. The demand and supply relationships are used together in a recursive spreadsheet model to simulate prices, production and consumption of red meat, milk, poultry meat and eggs for the period 1994 through 2003. Scenario I is intended to portray conditions similar to current economic conditions. Scenario II is intended to represent conditions under which population growth slows and imports of poultry meat and eggs rise. Scenario III maintains increased imports of poultry meat and eggs and lower population growth but in addition assumes higher growth of income. The assumptions for these scenarios are summarized in Table 6.6.

Table 6.6 Projections of animal-origin foods using three scenarios

	Scenario I (%)	Scenario II (%)	Scenario III (%)
Annual growth of:			
population	2.7	2.3	2.3
income	6.5	6.5	8.5
Imports as a percentage of production of:			
red meat	30	40	40
milk	33	35	35
poultry meat	0	15	15
eggs	0	15	15

Source: Winrock International 1995.

Red Meat and Milk Production, Prices and Per Capita Supplies

The simulation model indicates that red meat production continues to grow at about long-term trend rates in Scenarios I and II. Differences are due to changes in assumed population growth rates. Production rises more rapidly in Scenario III than in Scenarios I and II because of increased growth in income, which stimulates demand, encouraging higher prices that in turn boost production. Expanded imports of red meat are less likely, because import prices should rise as a result of reduction of subsidies under the recent GATT agreement. The greater per capita supply under Scenario I than under Scenario II is due to decreased human population growth and more imports. Red meat production, perhaps because it is largely a by-product of milk production, appears to be stable, with per capita supplies remaining near current levels under Scenario I. Some increase in imports can occur without a large impact on national production.

Milk production is responsive to milk prices in the short term, apparently because producers can sell cows for slaughter when milking is not profitable. Milk production can also be controlled to some extent by varying the availability of feed. Surprisingly, milk prices are quite sensitive to imports and to added production. A reduced price is evident with only a 2 percent increase in imports. The reduced prices affect production the following year. Milk prices are also affected by income, but not as strongly as red meat prices are. The real concern here is the gradual downward drift of projected per capita milk supplies. However, analysis shows a high income elasticity of demand (1.29) for milk, so the figures from 1962-1984 are somewhat suspect. The acceptance and more widespread use of more productive dairy cows could shift supply and halt this ongoing downtrend trend in per capita supplies of milk. Farming is going through major changes with the sales and slaughter of draft animals, and farmers can thus replace local breeds, which were dual-purpose animals, with specialized dairy breeds.

Poultry Meat Production, Prices and Per Capita Supplies

Two major points emerged from the simulation analysis. First, imports that amount to as much as 15 percent of production can occur without having more than a small impact on poultry meat prices. Second, poultry meat consumption has dropped precipitously since the middle 1980s and is projected to continue declining through 2003 under Scenario I assumptions. To prevent further consumer dissatisfaction and to pressure the poultry meat industry to become more efficient and competitive, imports could be allowed to enter on a "fair competition" basis.

Egg Production, Prices and Per Capita Supplies

Egg production, prices, and per capita supplies appear to make progress under all three projected scenarios. Egg production appears to be cost competitive and comparable to international standards. Following a decline after economic reforms were introduced in 1986, egg production recently began to recover. To the consumer, eggs are competitive with other animal-origin foods; analysis shows a statistically significant substitution of eggs for milk products. Some problems of consumer acceptance do exist among urban consumers, who prefer local farm eggs because they have "more taste." In addition, there are problems of suitable packaging and transportation over long distances, and a specific market has not developed for fluid and dried eggs.

Crop Area Changes and Livestock Production

Agricultural policy reforms have already had major impacts on cropping systems, which directly and indirectly influence animal production through changes in requirements for draft power, through shifts in returns to resources between crops and livestock, and through shifts in the supply of crop by-products, residues and concentrate feedstuffs. A more competitive exchange rate has led to increased emphasis on exports, particularly of fruits and vegetables, which also influences availability of land, labor and water for livestock production. The policy of encouraging mechanization and export of surplus rural labor has led to a dramatic decline in the use of animals for draft power, and most animal power is now used for transportation. Gradual liberalization of crop land allocations and prices has resulted in substantial changes in cropped areas between 1985 and 1990 (Table 6.7).

The decreased area under cotton reflects producer response to controlled procurement prices which, in 1991, still averaged only 66 percent of world prices. If the government succeeds in achieving an agricultural growth rate of 3 percent per annum during the 1990s, farm-level feed supplies from crop residues and by-products should increase by about the same percentage and the supply of animals produced on small farms should be able to expand moderately. However, the farm-level economics of berseem production look less promising, so overall

Table 6.7 Changes in cultivated areas, 1985-1990

Crop	Change (%)
Wheat	+65
Rice	+12
Maize	+11
Long-season berseem	-13
Cotton	-8
Short-season berseem	-7

Source: World Bank 1992.

farm-level feed supplies will probably decline unless commercial dairying increases rapidly, in which case the maize-long berseem rotation would increase in relative profitability and importance. Expected increases in crop yields also have implications for future farm-level feed supplies from crop residues and by-products. Again, the maize-long berseem rotation should benefit from expected yield changes at the expense of most other crop rotations, but relative prices will influence these rotations more than yield changes alone.

The GOE has also been actively divesting itself of agricultural lands, particularly in the new lands area, with around 384,000 feddans of previously reclaimed land sold to the private sector. This also influences livestock supplies. The government policy with respect to large farms in the new lands has changed over the past few years, from a policy of operating state farms to encouragement of private commercial dairies and feedlots. Commercial farms in the new lands often include large areas of fodder and feed mills.

About 80 percent of Egypt's cropped area is under four major rotations: cotton-short berseem, wheat-maize, wheat-rice, and maize-long berseem. Notwithstanding the important role of both short-season and long-season berseem, policy reforms increased the relative profitability of wheat and led to a 13 percent decline of long-season berseem and a 7 percent decline of short-season berseem. During 1985-90, successful introduction of high-yielding dairy cows in conjunction with a modern milk collection system would increase the relative profitability of the maize-long berseem rotation. Alternatively, reforms that free up cotton production and pricing will work to reduce the supply of long-season berseem while favoring production of short-season berseem.

Egypt's Comparative Advantage in Feed and Livestock Production

Based on livestock production costs and using financial costs only, the study on which this chapter draws found that dairy production has a medium to strong comparative advantage based on import parity prices, frozen broiler meat has a small comparative disadvantage and red meat production has a comparative disadvantage in the production of lower-quality meat that must compete with imported grass-fed beef from Australia and New Zealand. Egypt has a comparative disadvantage in the production of maize at full economic costs

but a comparative advantage using financial costs only. In general, full cost pricing of all inputs, including land rent, would make locally produced maize uncompetitive and would push up milk production costs substantially, particularly in the smallholder sector, which is heavily dependent on berseem. Red meat production costs would also go up, making local production even less competitive with imported red meat. There should not be a major impact on poultry production costs, as the commercial sector could rely on imported feedstuffs. These results are tentative and further analysis is needed to determine the economic role of berseem, maize, and village and commercial livestock and poultry production in Egypt's agricultural future. Efficient growth is much more likely to occur through private sector decisions in response to appropriate prices and technology dissemination than through government dictates to promote or discourage production of specific classes of animals and animal-origin foods.

Marketing and Price Reforms

The role of state marketing cooperatives and government controls over feedstuff prices and allocation have declined to the point where they are no longer policy constraints on the subsector. The amount of animal products marketed through the government cooperatives at the retail level is so low that it has little impact on overall market performance. Moreover, these subsidized sales of meat, eggs and dairy products are in the process of being phased out.

Regarding prices, the main issues now affect cotton, water and land. Basically, underpricing of cotton and water both indirectly lead to overallocation of resources to long berseem and to feed production larger than the economic optimum. Underpricing of cotton leads to less-than-optimum production of cotton, which encourages substitution of crop rotations that incorporate long-season berseem as the winter crop. Underpricing of water also leads to overplanting of crops that are heavy users of water, including long-season berseem, sugarcane and rice.

Our analysis indicated that prices of feed and of animal-origin foods are in most cases close to their border prices, and large price distortions are not present in most of the input and output markets. Once cottonseed meal is freely traded, no major price controls will influence performance of the feed sector.

An Indicative Policy Agenda

Policy agendas change rapidly as new policies are adopted, as the political environment changes and with ongoing events. In view of the certainty of continued change, an indicative policy agenda is presented that appears appropriate for further developing a market economy environment for the animal-origin foods system (Table 6.8).

Table 6.8 Indicative policy agenda to further develop a market economy in the animal-origin foods system

Indicative Policy Agenda	Illustrative Alternatives	Probable Beneficiaries
Technology Policy	<ul style="list-style-type: none"> • Create a positive environment for generating, licensing and using modern technologies. 	National Economy
Business Policy	<ul style="list-style-type: none"> • Create a positive business atmosphere for development. 	National Economy
Investment	<ul style="list-style-type: none"> • Eliminate restrictions and promote foreign investment to encourage integration in the poultry and milk industries. 	All Investors and National Economy
Competition	<ul style="list-style-type: none"> • Develop competitive behavior, anti-monopoly, and fair trade practice regulation and enforcement. 	Animal-origin Food Business and Consumers
Private Sector	<ul style="list-style-type: none"> • Provide for representation of the private sector on all government committees related to animal food businesses 	Animal-origin Food Business and Government
Marketing	<ul style="list-style-type: none"> • Support livestock and poultry business organizations in becoming industry spokespersons and disseminators of market and technical information. • Provide incentives for market development of chilled and frozen poultry meat and of processed milk. • Develop a system for formal grading, labeling, and sanitation • Support the public system for price and market information on animal-origin foods. 	Animal-origin Food Business and Government Animal-origin Food Business and Consumers Animal-origin Food Business and Consumers Animal-origin Food Business and Consumers

Source: Authors.

Technology Policy

The technology and research policy in the animal-origin foods system can be improved by reforms that will reward and nurture the innovator and encourage the adoption of competitive technology. Currently, patent rights must be established and protected. Regulations need to allow the collection of royalties. Research needs to be directed to current business problems and supported with government or endowment funding. Programs for improving the animal-origin foods system will need to build on the perceived potential comparative advantage, or near-comparative advantage, in poultry meat, egg and milk production. Beef production, which is largely a by-product or complementary product to dairy production, will continue to play a role in the sector, although at a declining level. There is also a need to introduce such technologies as bulk grain handling in the feed industry to reduce losses and transport costs. As the animal-origin foods system grows, larger amounts of feeds and feed ingredients will be required, and such large volumes cannot be easily moved and stored in sacks. The need for grain concentrates will also grow rapidly, particularly with the expected growth in poultry, eggs, fish farming and milk production. For example, the use of hybrid seed and input intensification could double the yield of corn. It should be noted that public sector investments in research and extension are permitted under the recent GATT agreement.

Business Policy

There is a need to enhance effective investment, technology and management by supporting domestic and international joint-venture investors in commercial poultry meat and milk production. Also needed are feasibility analysis and assessment of the alternative financial instruments that can be used to finance such projects. For example, can bonds or stocks be sold to raise funds for investment or can loans be arranged on a profit-share basis? Can several small farmers be organized to produce on a commercial basis? International investors can provide the know-how in integrating poultry operations, from production through marketing. They can also help develop either a privately owned or a cooperative collection network among small farmers for fresh milk and for white and cottage cheeses. Solving existing marketing problems will provide further incentives for expanding supply and encourage the adoption of more productive animals and management techniques.

Business organizations need to be strengthened with management and organizational support to augment their skills as industry spokespersons and as disseminators of market information within the industries. Currently, producers either are not organized or do not perceive their organizations as a means of communicating policy positions to legislative and executive personnel. In the developing market economy, it might also be useful for industry organizations to promote and carry out national advertising campaigns for their commodities and products.

On a parallel line, government agencies must become better organized to provide market and technical information in an open, transparent way. As the market economy develops, price and market information is necessary for planning operations and investments. At the very least, an annual survey of livestock numbers and slaughter is needed to assess the supplies moving to market. In addition, information on daily market prices at the retail, wholesale and farm levels are necessary to locate market opportunities and assess the efficiency of distribution. The ministry has provided outlook and market information with the publication of the "Poultry and Eggs Situation and Outlook Report" by the Commodity Analysis Division of the Agricultural Economics Research Institute and the "Red Meat Situation and Outlook Report" and "Dairy Situation and Outlook Report" through the National Agricultural Research Project (Abdel El Nabi and Shalaby 1991). These efforts should be continued and expanded. Finally, regular calculations of costs and returns to meat, milk and egg production, processing and distribution are needed, to assess the financial health of the industry participants.

Scale economies and vertical integration must be utilized to improve linkage of marketing functions and achieve better price coordination. First, the Egyptian market requires expansion to the level of mass production that guarantees small profit margins per unit of production. Second, vertical integration among the successive stages of the industry should be encouraged as a policy goal in the

Egyptian market. Such integration shrinks marketing costs, helps establish a market-driven industry, and creates coordination and consistency in the various production and marketing stages. Consequently, it will lead to more stable prices, particularly if associated with horizontal integration that ensures a lower production cost because of large-scale production. More specifically, modern international processing companies have integrated backward through contracting and forward by developing packaging, dressed bird and piece sales, and cold storage and transportation. It now appears that the poultry meat industry could be reorganized so as to be substantially more competitive. Indeed, poultry meat could even be competitive with the preferred red meats.

A mixture of both vertical and horizontal organization will fit the Egyptian market. The government should undertake some functions that the private sector is not expected to provide fully, such as quality control, financing, veterinary services, market promotion and research. In the slaughterhouse area, the current policy of prohibiting slaughter of female animals has encouraged the continued existence of "off-slaughterhouses" (unofficial slaughterhouses), which lead to issues of public health, externalities caused by pollution and wastage of valuable by-products.

Similar integration in the milk industry also would be helpful. For example, a coordinated system of milk production, collection, processing and distribution would support both management and technology transfer. Marketing management is needed to expand the market, and production management and technologies are needed to expand production in a cost-efficient way.

Policies must also try to foster more competitive markets. Now that the commercial sector is established, further growth would be more likely if more competitive conditions could be promoted and further developed through policies and regulation. Generally, a serious lack of regulation is apparent in the areas of price fixing, market sharing, and other anti-competitive behavior. In view of the small number of firms in the inputs and processing components of the animal-origin foods system, the regulatory regime needs to be reformed with respect to anti-competitive behavior, quality control, development of competitive markets and removal of regulations that restrict growth of new business. In the food processing sector, excess capacity in the state-owned sector (e.g., Misr Co. for Milk) has hampered private-sector investment, as total supplies of milk are inadequate to serve the processing capacity of both the state-owned firms and the new private-sector processors. However, observation shows that both public- and private-sector firms are competing in milk procurement and final-product marketing and that privatization of state-owned firms in the processing sector is moving ahead through the formation of holding companies. State ownership is not a major policy issue restricting the supply of animal-origin foods as long as current trends toward open markets and divestiture continue.

Red meat marketing, as previously described, will probably be subject to market restructuring and reform. This market, in its present organization, does

not approach competition, because of the absence of market and technical information dissemination; current economic policies that encourage fattening rather than growing and conditioning of veal; the lack of regulatory enforcement with respect to grades and quality standards; and oligopoly control at the processor and wholesaler levels that dampens further development of markets.

As urbanization continues, markets become larger and traditional practices are no longer viable. For example, to reach the larger market, it will probably be necessary to distribute chilled and frozen poultry and red meat, packaged eggs, and pasteurized or UHT milk. However, traditionally poultry is sold live, red meat in unchilled carcass form, and milk in a raw state. In more densely populated urban areas, it is difficult to slaughter live birds, and warm carcass red meat and raw milk cannot be held long or transported readily in congested areas. Eggs, which are traditionally packed without protection, cannot be transported long distances or distributed in congested areas without costly breakage.

The lack of market and technical information is probably the largest current barrier to operation of an effective market economy in the animal-origin foods system. Not all elements of the system are able to access up-to-date market information. Every enterprise interviewed on that topic indicates that market information must be gathered directly by the firm itself. Some businesses have several individuals who gather and analyze market and technical production information.

As the market economy evolves and as the commercial sector of the animal foods system expands, tax incentives and selected deregulation will be helpful in market development. Currently, incentives are needed to encourage the development of a market for chilled and frozen poultry meat. As this market develops, fewer birds will be purchased live at retail and slaughtered. A similar situation exists with respect to cow milk: Buffalo milk is now preferred to milk from the more productive exotic and crossbred cows, and promotion efforts will consequently be necessary to increase acceptance of the less-preferred products.

The Government of Egypt still owns considerable feed milling capacity, which is concentrated in the production of cattle feeds. The production of poultry feed is concentrated in the private and joint-venture firms. With the freeing of feed ingredient and mixed feed prices, state-owned feed processing factories have relatively little influence on the market. Demand for their products is low, particularly since smallholders have lost access to heavily subsidized government feed. Most trade is now from government feed mills to government-owned or government-controlled farms, whereas private firms dominate the supply of concentrate feeds for commercial dairies, poultry farms and feedlots.

State feed mills have received subsidized supplies of feed ingredients (primarily cottonseed meal, wheat bran, rice bran and molasses) from other state-owned processors and have sold the processed feed at highly subsidized prices. Currently, cottonseed meal seems to be the only product with respect to which

private sector access to supplies still presents problems and a large difference still exists between the international price and domestic price. In some cases, local demand has pushed tradable feedstuff prices up to, or even above, world market prices. Thus the existence of state-owned feed mills does not, in itself, pose a major policy constraint at present, although the government does face problems in terms of absorbing financial losses of these enterprises and unemployment of staff as these units are closed or privatized.

The transition to a market-oriented economy has not included a major facilitating function needed in such an economy, that of a timely and credible information system. The role of the agricultural research and extension system and other supporting systems has not been reoriented towards serving the needs of a market economy. In particular, breed improvement programs, specifically artificial insemination services, have been implemented poorly. The same is true for much of the animal health area. As long as the government agencies provide insemination and animal health services on a heavily subsidized basis, private sector suppliers of such services will not have an adequate profit incentive to enter these areas. However, privatization of such services must be accompanied by strong marketing, publicity and credit programs, as well as a vastly improved product procurement system (particularly for fresh milk), which will reduce producers' risk from adoption of these higher-cost technologies.

Trade Policies Affecting Livestock

As described earlier, trade liberalization in Egypt led to a surge of frozen broiler imports that devastated the local industry, which had been operating with lush subsidies. This led to a governmental ban on broiler imports. Subsidized exports of live cattle and beef from the EEC are also putting pressure on local producers. Successful completion of GATT negotiations should gradually relieve these pressures, but interim measures are probably needed. We believe it is important that trade be open to allow imports of meat, eggs and milk products whose prices reflect full costs. Such a "fair competition" policy will provide discipline to the development of the animal-origin foods system and help insure that the industry is sustainable as public subsidies are eliminated. However, care must be taken to insure that these imports are priced at full costs of production and transportation. If meat, eggs or milk products are imported into Egypt at below cost (i.e., "dumped"), this will inefficiently constrain the national development of animal production, feed processing and marketing firms. All restrictions on feed ingredient imports should be lifted.

Insuring that imports are priced at full world market values will require that current legislation be adapted and that further "anti-dumping" legislation be developed to comply with the GATT. The executing agency will need to act quickly and must therefore have clear protest procedures and communications on

import price decisions. Measures of world prices, both "fair" and subsidized, can be obtained from the new World Trade Organization. It should be noted that this policy recommendation is not a recommendation to ban imports of red meat. A substantial deficit of red meat exists, and a ban on red meat imports would seriously disrupt both the market and the welfare of consumers. Further, imports are a source of the less-expensive meats that are purchased by the poor, who are at nutritional risk. To further the development of the market economy and to be in line with the GATT, it will also be useful to avoid restricting imports of poultry through administrative controls. Imports are necessary to force a restructuring of the industry so that it is competitive at the world price levels. Our simulation analysis indicated that imports spread out over the year in the range of 10-20 percent of production will not unduly lower prices and injure local producers.

The Uruguay Round agreement under the GATT significantly changed the rules governing international trade in agricultural products.¹ These changes occurred in four basic areas: market access and tariffication, export subsidies, domestic subsidies, and sanitary and phytosanitary barriers. The first area leads to conversion of monetary barriers to tariffs and then a gradual reduction of these tariffs. Developed countries are obligated to reduce all tariffs by an average of 36 percent over the six-year period 1995-2000, with a minimum reduction of 15 percent; comparable figures for developing countries are 24 percent and 5 percent, respectively. Subsidized exports must be reduced by one-third from base (1986-90) levels, and budget expenditures on export subsidies by developed countries must be cut 36 percent during 1995-2000. The volume of subsidized exports must be reduced by 21 percent over the same period. Comparable figures for developing countries are 24 percent by value and 14 percent by volume. The agreement, which binds all trade-distorting domestic subsidies, requires that developed countries reduce these subsidies by 20 percent in aggregate between 1995 and 2000 from the 1986-1988 base levels of support. The comparable figure for developing countries is 14 percent for the period 1995-2004. By more closely linking domestic prices to international prices, the agreement should decrease world market price volatility.

The major world commodity markets that influence the Egyptian animal-origin foods sector are coarse grains and meat and dairy products. The European Union, the main exporter of animal-origin foods to Egypt, has made a major commitment to reduce export subsidies (Table 6.9). The 40 percent reduction of subsidized beef exports and 25 percent reduction of subsidized dairy product exports should help relieve pressure on Egyptian domestic producers of competing products. The United States, also, is committed to major reductions in export subsidies (Table 6.9). However, even after these trade-distorting changes are put into effect, Egyptian red meat producers will still face stiff competition from Australian and New Zealand exporters, particularly of grass-fed beef, whereas Egypt should be able to retain the market for better quality feedlot beef and veal.

Table 6.9 Commitments under the Uruguay negotiations round of the GATT to reduce export subsidies

Product	Million ECU		Thousand Tons	
	1995	2000	1995	2000
European Union				
wheat	2,069.4	1,141.1	19,118.6	13,436.4
feed grains	1,296.7	882.9	12,182.6	9,973.4
cheese	505.2	281.1	406.7	305.1
butter and butter oil	1,245.9	848.2	447.2	366.1
skim milk powder	347.9	236.9	297.2	243.3
beef	1,900.6	1,259.4	1,118.7	817.1
poultry meat	137.8	91.6	440.1	290.6
eggs	37.4	25.5	107.2*	83.3*
USA				
wheat	765.5	363.8	20,238	14,522
feed grains	67.7	46.1	1,906	1,561
cheese	5.3	3.6	4	3
butter and butter oil	44.8	30.5	43	21
skim milk powder	121.1	82.5	108	68
beef	33.5	22.8	21	18
poultry meat	21.4	14.6	34	28
eggs	7.6	1.6	30	7

Source: U.S. Department of Agriculture, 1994.

*Million dozen.

A recent study by John Mellor Associates (1994) summarized the results of 17 different studies simulating the price effects on both developed and developing countries of trade liberalization under the Uruguay Round of GATT over a time horizon of 15-20 years. Looking at the two groups of countries together, the majority of the models indicated relatively small price changes for coarse grains and meat and large price effects for dairy products. The models developed by the United States Department of Agriculture and the International Institute of Applied Systems Analysis (IIASA) represent some of the larger efforts; their results for long-term projected price increases by commodity group for developed and developing countries are as follows:

Model	Price Increases (percent)		
	Coarse Grains	Meat	Dairy Products
USDA/SWOPSIM	8-19	7	84
IIASA	13	11	34

Long-term price changes are much greater for dairy products because of the high subsidies and support levels traditionally provided to this industry.

Policies toward crops also impact upon the animal subsector. The implicit export tax on cotton discriminated against cotton production and encouraged alternative summer crops that fit into a crop rotation using long-season berseem. Despite planting requirements that forced farmers to grow cotton, more berseem and hence more feed was planted than would have been the case under a cotton-

pricing regime with producer prices closer to border prices. The net effect was to raise the production of berseem, which in turn increased livestock output above what it would have been in the absence of the crop price distortions.

Summary and Conclusions

This chapter attempts to disaggregate the effects of economic reforms on the animal-origin foods system. Emphasis is on production, including production by the livestock (cattle, buffalo, sheep and goats) and non-ruminant (primarily poultry) sub-systems, although impacts on inputs, consumption, prices and trade are also treated. Policies that impacted upon the system include economy-wide macroeconomic reforms, reforms directed towards the crop sector and reforms aimed specifically at the livestock and poultry industries.

Pervasive controls and distortions in every area characterized the pre-reform animal-origin foods system. Controls and disincentives in the crop-production sector restricted the supply of high-quality feeds such as green maize and maize grain and thus encouraged overfeeding of valuable commodities such as wheat grain and cottonseed meal. The feedmilling industry was state owned, and heavy subsidies for feeds were used to counteract subsidized prices for meat and milk. Credit, particularly for commercial poultry units, was heavily subsidized. Processing and distribution were through state-managed cooperatives and were either state owned or subject to heavy controls. An overvalued currency encouraged cheap imports, to the detriment of local producers. Relatively little emphasis was given to improving smallholder systems, and much of the subsidized feedstuffs supplied to smallholders entered black markets, where it was purchased by larger producers.

Liberalization of prices, trade and production in the heavily controlled and subsidized animal-origin foods system impacted differentially upon the livestock and the non-ruminant industries, but it worsened profitability in all subsectors. The commercial poultry industry, which was the most heavily subsidized and which received the most import protection, was hit hardest, particularly for broiler production. Egg production was also affected, but not to the same extent. Traditional village poultry producers (including producers of ducks, geese, pigeons, turkeys and rabbits) were little affected, as they were not recipients of earlier subsidies and, after reform, were able to take advantage of increased crop production that provided additional crop residues and by-products to their animals. Compared with commercial broilers, village poultry products are preferred, command higher prices, and are consumed primarily in rural areas, where income impacts of economic reforms have been more positive than in the major urban centers. Sheep and goats, like poultry have never been significant recipients of subsidized inputs.

Economic reforms led to large decreases in per capita consumption of milk

and milk products, poultry meat, and, to a lesser extent, red meat and eggs. Increases of market prices following the reforms were very low compared with increases in feed costs following removal of subsidies. The initial fall in real personal incomes following the reforms also reduced demand for these products, which have relatively high income elasticities of demand. Removing restrictions on poultry imports led to a surge of subsidized frozen broiler imports which further depressed prices. This led to a temporary ban on poultry imports, a ban which should now be reconsidered, because industry adjustments, coupled with implementation of the GATT agreement, should allow a modest amount of imports to encourage competition and expand consumption.

Following these reforms, most areas of the animal-origin foods system adjusted to the new economic environment. Some additional reforms and support are needed to help complete the transition, to increase efficiency and competitiveness, and to reduce costs. Our analysis indicated that domestic red meat supply should be able to maintain its total market share. Increased supplies will come from more fattening of young stock and surplus males from the dairy sector, which should experience strong expansion. Per capita consumption of red meat is not projected to increase much. Low-cost imports of grass-fed beef from Australia and New Zealand should fill the lower end of the market and should have relatively minor impacts on domestic producers.

Milk production and demand were found to be quite price sensitive. Implementation of the agreement from the Uruguay Round of the GATT will diminish the supply of subsidized dairy products on the world market and provide increased incentives to local producers. This, coupled with income growth and substantial potential to increase productivity of milk animals in Egypt, should lead to a gradual increase in local production and consumption. Poultry meat production and consumption are recovering, but only moderate growth is predicted in production and consumption. Egg production and consumption will grow under all scenarios used in the projections.

Policies that need to be implemented to support a modern, efficient and progressive animal-origin foods system are identified in this chapter. Technology policy should focus on protection of patent rights and on the conduct of relevant research, particularly for the priority areas of dairying, poultry production and local production of maize as well as other feedstuffs. Additional research is needed to find ways to reduce the costs of transport and handling of bulk feedstuffs, live animals and final products.

Probably the most important set of policies revolve around the business environment needed to actively promote domestic and foreign investments in facilities, technology and management through joint ventures or other forms of equity investment. This should go hand in hand with regulations that put in place a framework for competitive behavior, anti-monopoly regulations and fair trade practices.

Protection and subsidies have masked the need for increased vertical and

horizontal integration in the poultry industry and, to a lesser extent, in the dairy industry. These industries are still fragmented, and market coordination and information functions are deficient. Noncompetitive behavior in marketing channels is still evident. Needed changes can be encouraged by promoting representation of the private sector and industry associations on government committees related to the animal-origin food industries. Support should extend to provision of facilitating functions such as much-improved market information and systems for grading, labeling and product warranting, as well as provision of incentives to encourage vertical integration in the poultry industry and to increase supplies of chilled or frozen meat and processed milk.

Trade policy should be used selectively to reduce injuries from current "dumping" practices on local industries and, in the long run, to encourage the use of imports to maintain locally competitive industries. Imports can also be used to supply specific segments of the population with products the local industry cannot supply in adequate quantities, and to expand local consumption and thus encourage market growth for animal products. Implementation of the GATT agreement should gradually provide relief against below-cost imports of animal-origin foods and encourage increased local production of such foods. Additional attention needs to be given to further policy reforms and appropriate forms of public support to encourage the transition of the animal-origin foods system to an efficient, responsive and low-cost supplier of foods that furnish high-quality protein to the rapidly growing population of Egypt.

Note

1. We thank John Mellor and Robert Thompson for their assistance with the assessment of the GATT agreement. Any errors in the discussion, however, are ours.

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7

Impacts of the Policy Reforms on Agricultural Income, Employment and Rural Poverty

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In the 1970's, Egypt initiated its economic transformation from a socialist system to a more liberal and market-oriented economy. However, the initial measures taken toward transformation were partial and unsystematic. The policy regime followed from 1974 to the early 1980s was termed the "open door" economic policy. Policy emphasis was more on consumer welfare than on investment and the production sectors. By the early 1980s, the government began serious study of the required steps for policy reforms and the anticipated economic impacts.

As discussed in detail in Chapter 4, in the mid-1980s the government began to implement policy reforms in the agricultural sector and strengthen market-based incentives. Before the reforms, the government closely controlled the agricultural sector in Egypt. Major agricultural crops were under a government-administered marketing and pricing system, based on quota deliveries. The government centrally planned the cropping pattern for major crops. The entire cotton and sugarcane crops had to be delivered to the government through the Principal Bank for Development and Agricultural Credit (PBDAC) and the agricultural cooperatives. Prices of most agricultural inputs were set by the government and subsidized at different rates. The PBDAC distributed the subsidized inputs as in-kind credit at below market rates. Most agricultural exports and imports were in the hands of the government. Inputs were imported through the PBDAC. There were two exchange rates: the official exchange rate, which was overvalued, and the black-market exchange rate, which was much lower than the official rate.

During the period of reforms, most government controls on the agricultural sector have been eliminated. The prices of crop products and inputs are determined, for the most part, through market forces. The government offers

floor prices only in case of market failure, and buys only products voluntarily delivered at these prices. Where the private sector fails, the government distributes inputs in remote areas. Credit is no longer subsidized. The private sector has become more active in marketing and agribusiness. The government does not enforce a cropping pattern: The farmer is free to determine his crop rotation with few restrictions from the government; restrictions now apply only for cotton and sugarcane. Sugarcane is the only crop for which the entire production continues to be delivered to the government. The government decided to liberalize marketing of cotton starting with the 1993 crop

Further details of the reforms implemented since 1986 were given in Chapter 4, which also described some of the broad impacts of the reforms. Crop production responses to the reforms were then closely examined in Chapter 5. Discussion of the reforms continued in Chapter 6, which covered impacts on livestock and feed production, consumption and trade. The main objective of this chapter is to focus on the impacts of the reforms on agricultural income, employment and rural poverty. Each of these three welfare-related indicators is discussed in one of the following sections of this chapter.

Impacts of the Policy Reforms on Profitability of Crop Rotations and Output Values

The policy reforms, which involved important changes in both crop and input pricing, had immediate impacts on the relative profitability of the main crop rotations. Gross profits per feddan for the four main crop rotations were calculated by deducting estimates of cash production expenses from the revenues generated by each crop combination. The relative net returns per feddan for the four rotations are shown in Figure 7.1. Revenues and costs are in nominal prices so that the year-to-year changes in estimated net returns reflect inflation as well as real changes in profitability.

The long berseem-maize rotation was the most profitable one from 1980 through 1987. The wheat and rice rotations became relatively more profitable for the following two years (1989 and 1990). As a result of price reforms for those crops, the three grain rotations were about equal in 1991. Through the early reform years, the cotton rotation remained the least profitable because of the fixing of low cotton prices. However, by 1991 the net return for the berseem-cotton rotation became comparable to net returns for the grain rotations, and since 1991 the cotton rotation has remained dominant in profitability. In 1990, cotton yields reversed their decline of 30 percent since 1980 in response to the policy reform measure by which the government increased fixed procurement prices to two-thirds of border prices. Farmers finally found cotton production more profitable than production of other crops and responded by impressively increasing yields, by 42 percent in just 3 years. Chapter 4 discussed why cotton area failed to rise along with yields, and Chapter 5 analyzed future prospects for cotton production.

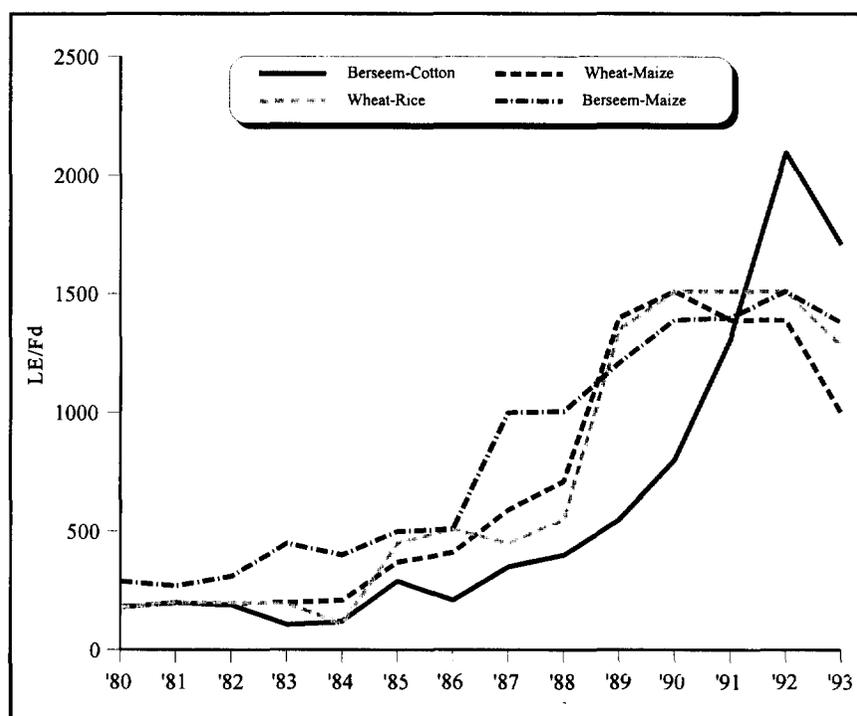


Figure 7.1 Nominal net returns per feddan for four crop rotations

The preceding paragraph concerns relative returns to the main rotations. Deflation of the nominal net returns per feddan are necessary to see what impacts the reforms had on the profitability of production in absolute terms. Real returns per feddan for the four main rotations are shown in Figure 7.2, where the implicit GDP deflator was used to remove inflation from the nominal net returns. This figure reveals that the reforms have not greatly improved the real profitability levels of the rotations. Short berseem-cotton showed gains after 1989 but some of those gains were given back after 1992. Some gains to the grain rotations occurred in the early years of the reform period; however, these gains were in large part also dissipated by falling world prices and higher prices for non-subsidized inputs in the later reform years.

The net effects of production and price changes on the value of the 23 major crops in the Nile Valley are shown in Table 7.1. As the production indices discussed in Chapter 5 indicated, production was stagnant between 1980 and 1984. Nevertheless, nominal output values increased 63 percent and real values increased 24 percent in that four-year period. During the entire pre-reform period from 1980 to 86, both the constant-price index (using 1980 prices) and the

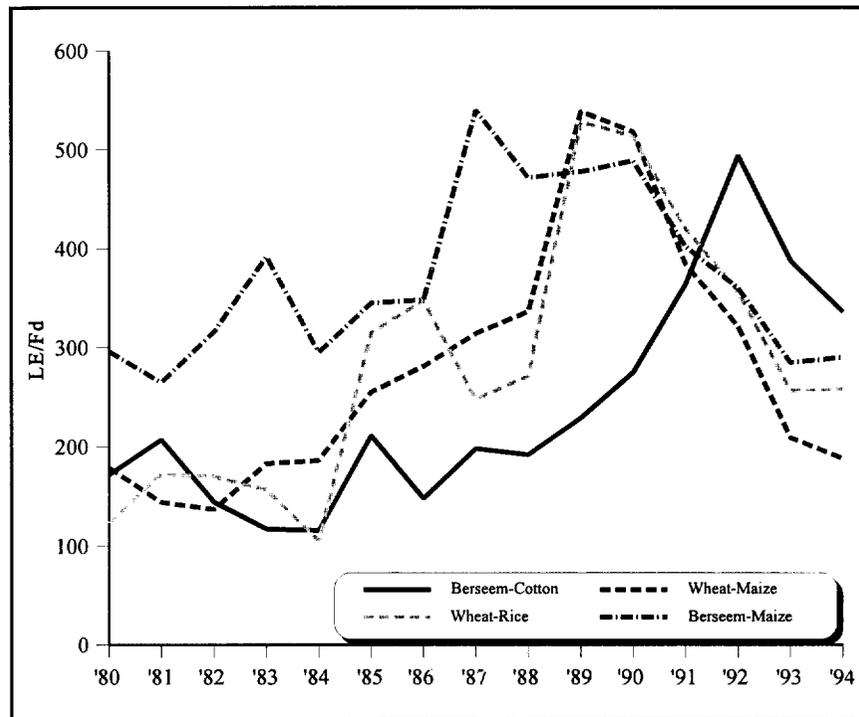


Figure 7.2 Real net returns per feddan for four crop rotations. (Note: Nominal returns per fd deflated by the implicit GDP deflator)

current-price index of agricultural production (presented in Chapter 5, Figure 5.3) remained fairly stable, increasing only 5 percent. Table 7.1, however, shows that nominal crop values more than doubled and real values increased 45 percent in the pre-reform years.

During the reform period after 1986, in which the constant 1980 price-weighted production index showed output growth rising to 2.7 percent per year from 1.1 percent annually in the pre-reform period, nominal output values soared, more than tripling by 1993. However, those were years of high inflation. When nominal output values were deflated by the implicit GDP deflator as the best available indicator of overall price inflation, it is seen that real output value rose by about 10 percent in 1987 over 1986 but has shown no definite trend since. Real crop value was slightly less in 1993 than in 1987. In the intervening years it fluctuated between higher and lower levels. Thus, in the reform period real value of crop output moved to a plateau about 10 percent above its level at the onset of the reforms. Moreover, much larger year-to-year fluctuations in real output values occurred in the reform period than in the pre-reform period (Table 7.1).

Table 7.1 Value of agricultural output (23 major crops)

Year	Nominal ^a	Real ^a	Index ^b	
			Nominal	Real
1980	2,312	2,312	100	100
1981	2,527	2,527	109	109
1982	2,957	2,706	128	117
1983	3,460	2,920	150	126
1984	3,777	2,873	163	124
1985	4,824	3,383	209	146
1986	5,413	3,360	234	145
1987	6,766	3,654	293	158
1988	7,260	3,380	314	146
1989	9,668	3,867	418	167
1990	11,654	3,958	504	171
1991	13,093	3,644	566	158
1992	14,329	3,335	620	144
1993	16,984	3,571	735	154

Source: Based on unpublished data from the Department of Agricultural Economics and Statistics, Ministry of Agriculture and Land Reclamation, Cairo.

Note: Real values were derived by using the implicit GDP deflator.

^aLE million

^b1980 = 100

Impacts of Policy Reforms on Agricultural Income

While the product price reforms tended to raise prices received by producers, at least until world prices declined, the reductions in input and credit subsidies squeezed farmers by raising costs of production. The changing relationship between output and input prices over the reform period was reviewed in Chapter 4. This section examines how the reforms overall have affected the generation of income in agriculture.

Growth of Real Agricultural Gross Domestic Product

The broadest measure of income generation in a sector is its gross domestic product (GDP), which deducts the costs of inputs purchased from other sectors from the value of sector output. The resulting value-added in the sector measures the total income accruing to sectoral factors of production. Real agricultural GDP in Egypt grew at an average annual rate of 1.3 percent during 1980-93 (World Bank 1995, p. 164). This rate was well below the rate of population growth, leading to escalating food imports, as discussed in previous chapters.

Annual real agricultural GDP data for the 1980-93 period reveals that growth in sector value-added after the policy reforms was lower than before them. This result is less surprising when effects of the reductions of protection for animal production and subsidies on agricultural inputs and of inflation are considered, because subsidy reduction caused agricultural input prices to increase more than the increase in agricultural output prices. Animal production suffered from the reductions in protection, as described in Chapter 6. Moreover, even nominal

prices of key agricultural crops declined after 1990. It is hoped that this phenomenon will be short-lived inasmuch as the elimination of subsidies was a one-time event, commodity prices are beginning to recover on world commodity markets and higher productivity in agriculture will lower unit production costs. That the phenomenon occurred clearly indicates the importance of public investments in infrastructure, research and extension, as well as improvements in land tenure and supporting services needed to put agricultural GDP on a higher growth path.

Agricultural Resource Income

Ideally, producer and consumer surplus before and after reforms would be measured to capture the welfare effects of policy changes. However, partial and multi-market models to generate the needed economic surplus measures are not yet available. Nevertheless, it is possible to approximate welfare effects by calculating agricultural resource income generated by production of the major crops over the pre-reform and reform periods. Agricultural resource income is defined as the difference between the gross value of agricultural crop production and the costs of current inputs purchased from outside the agricultural sector. Its purpose is to assess the aggregate income attributable to the land, labor, water and capital resources used in production of the crops. To assess real changes in income, nominal agricultural resource income was deflated by the implicit GDP deflator as a measure of overall inflation in the economy.

To measure changes in the levels of income accruing to agricultural resources, the agricultural resource income for 11 selected crops was estimated using Ministry of Agriculture and Land Reclamation data. These crops account for approximately 80 percent of the cropped area in the Nile Valley. Changes in resource income for the 11-crop aggregate are likely to be indicative of sector changes but do not represent totals for the sector.

The eleven crops are: wheat, maize (summer), rice, cotton, long berseem, short berseem, broadbeans, potato (summer), soybeans, sugarcane and tomato (winter). The analysis covered 1980 through 1993, with the pre-reform period, 1980-1986, compared to the reform period, 1987-1993.

The results for nominal and real agricultural resource income (ARI) are shown in Table 7.2. Nominal values doubled in the pre-reform period and then tripled in the reform period. Some observers have pointed to changes in nominal values such as these as indicators of positive effects of the reforms. But general price inflation must be removed before any such conclusions can be reached. This is done in the real ARI column, where the implicit GDP deflator was used to adjust nominal ARI for inflation.

The real ARI measure, like the nominal ARI, shows positive effects of the reforms. Its average annual value in the reform period was 19 percent higher than its average value in the pre-reform years. If the pre-reform years are compared

Table 7.2 Agricultural resource income (ARI) for an aggregate of 11 crops, 1980-1994

Year	LE million	
	Nominal*	Real
1980	1,840.9	1,840.9
1981	2,118.1	2,118.1
1982	2,406.8	2,208.1
1983	2,764.8	2,536.5
1984	3,023.0	2,307.6
1985	3,827.8	2,676.8
1986	4,192.3	2,603.9
1987	5,194.1	2,807.6
1988	5,472.0	2,545.1
1989	7,316.7	2,926.7
1990	9,176.6	3,121.3
1991	10,251.9	2,855.7
1992	11,241.6	2,614.3
1993	12,268.2	2,577.4
1994	12,762.9	2,681.3
Average		
1980-86	2,882.0	2,327.4
1987-94	9,210.5	2,766.2

Source: Calculated from data obtained from the Department of Agricultural Economics and Statistics, Ministry of Agriculture and Land Reclamation, Cairo.

*Nominal ARI deflated by the implicit GDP deflator.

to the 1987-1990 reform years, the increase in annual real ARI was 22 percent. As discussed elsewhere in this book, rising input prices due to subsidy reductions and falling output prices on world markets somewhat reduced real incomes of Egyptian farmers beginning in 1991, a decline that is shown in Table 7.2. Although the gains may appear modest, the reforms made it possible for farmers to use the same resources to generate an additional 19-22 percent of income attributable to those resources each year in the reform period. The added income came from greater efficiency, higher prices and improved incentives. These are precisely the kinds of gains that justify the political risks that policy decision makers confronted when formulating the reforms.

Impacts of the Policy Reform on Agricultural Labor

The Egyptian labor force was estimated at 14.5 million in 1993. It has grown over the past two decades at an average rate of 2.7 percent per year. For the rest of this decade, the increase in the labor force will be at least 2.5 percent per year. The participation rate for males in the 15-64 age group is high (84 percent), but for females it is only 10 percent (World Bank 1995, p. 145).

In 1989, 42.5 percent of the labor force was classified as agricultural. Of those workers in agriculture, the vast majority were nonwage family workers (85 percent). The remaining 15 percent of the agricultural labor force worked for

others for wages (World Bank 1995, p. 147). These figures undoubtedly understate the participation of women and children in farm work.

Demand for labor in the agricultural sector is seasonal. In the planting and harvesting seasons, demand for labor is high and wages rise. If the agricultural labor wage rate in high-demand periods is not enough to compensate for the lower rate in the low-demand periods, then workers tend to migrate to urban and international employment.

There are two broad types of agricultural labor. Skilled labor works in specific agricultural operations such as machinery operation, which require high levels of expertise. This kind of labor is not easily replaced in the short run. Unskilled labor performs routine and manual work. It is relatively easy to replace unskilled labor even in the short run.

A March 1994 study showed “. . . an increase of one million LE in agricultural output, *ceteris paribus*, was associated with producing 326 jobs in agriculture. A one million LE increase in industry output yielded 281 jobs, and a one million LE increase in services yielded 191 jobs. If we also estimate the cross-elasticity effects on employment then a one million LE increase in agricultural output yields 709 total jobs. The same increase in industrial output yields 367 jobs, and a services output increase yields 318 jobs” (Goode 1994).

Careful interpretation of these figures is prudent. The direct output/employment elasticity, which is based on historical output and employment growth data, means something quite different in a sector with demand-driven employment growth than in a sector that absorbs available labor at low levels of productivity. Industry is typically a demand-driven sector. Workers are hired as needed at wage and productivity levels that are higher than elsewhere in the economy. In labor-abundant economies such as Egypt, unskilled labor is absorbed in low-wage, low-productivity work. Agriculture is the traditional sector in poorer countries for labor absorption, although the urban informal sector increasingly plays that role.

The high cross-elasticity of employment for agriculture is perhaps more indicative of the role agriculture can play in employment. It reflects the linkages between agricultural production and the nonfarm employment that arises from the manufacture and distribution of agricultural inputs and the processing and distribution of agricultural outputs. As agriculture uses more purchased inputs and produces more high-value products, and as consumers demand more processed and prepared foods, employment in the associated agribusiness activities rise. Further policy reforms needed to encourage additional private investment, and hence employment growth, in these agribusiness industries are discussed in Chapter 10.

The data on 11 crops used to calculate the agricultural resource income measures also shed some light on agricultural labor use and wages. These data show an increase in hired labor per feddan in the reform period. Also, real wages paid fell during the reform period after having increased during 1980-86. The decline in real wages of hired labor was probably not due to demand for

agricultural labor and the intensity of production. As already stated, the amount of labor hired for the 11 crops rose, as did their yields. Agricultural wage rates are also affected by nonfarm work. Slow overall economic growth during the reform period, higher unemployment and falling real nonfarm wages also produced lower real agricultural wages. Declining opportunities for international migration to the Gulf countries contributed to the poor performance of the rural labor market.

Impacts of the Policy Reforms on Poverty and Food Security

To identify the poor, one of several indicators is commonly used: total household income or expenditure, per capita income or expenditure, per capita food consumption, or proportion of household budget spent on food. However, there are several other factors that determine the standard of living and affect welfare, and that may not be reflected in a single monetary measure. Examples of such factors are access to education, quality of education, health care and its quality, safe drinking water, and housing amenities.

Food is the most important basic need for humans, followed by health, education and other needs that come into play when people receive at least minimally adequate food. Thus, while in principle food is not the only indicator of poverty, it logically can be given a greater weight in measuring poverty in poorer countries.

Because of scarcity of data, the impact of reforms on poverty will be reviewed using three indicators—food security, health and education. We will view the improvements that occurred in education and health only in terms of an increase in quantity, because we lack information about changes in quality.

Given the empirical problems of evaluating all the many possible poverty indicators, an expenditure-based criterion was adopted in a recent International Food Policy Research Institute study, the best recent source of information on this topic (1994). In this study, the main concern was individual welfare. Thus, the welfare measurement used throughout the study was total expenditure per capita.

Based on household income-expenditure survey data obtained from the Central Agency for Public Mobilization and Statistics (CAPMAS), the poverty rate seems to have decreased somewhat between 1974/75 and 1990/91 (Figure 7.3). However, based on these percentages, the absolute number of poor people would have increased during the period since the total population of Egypt increased from 1974/75 to 1990/91 by more than the poverty rate decreased.

Among urban areas, Cairo Governorate was found to have the greatest number of poor people. However, this was primarily because of Cairo's large share of the total population; only 27 percent of the population in Cairo Governorate was poor compared with 61 percent of the population in Assuit Governorate, for example.

It is not clear how much the poor have been affected on balance by the

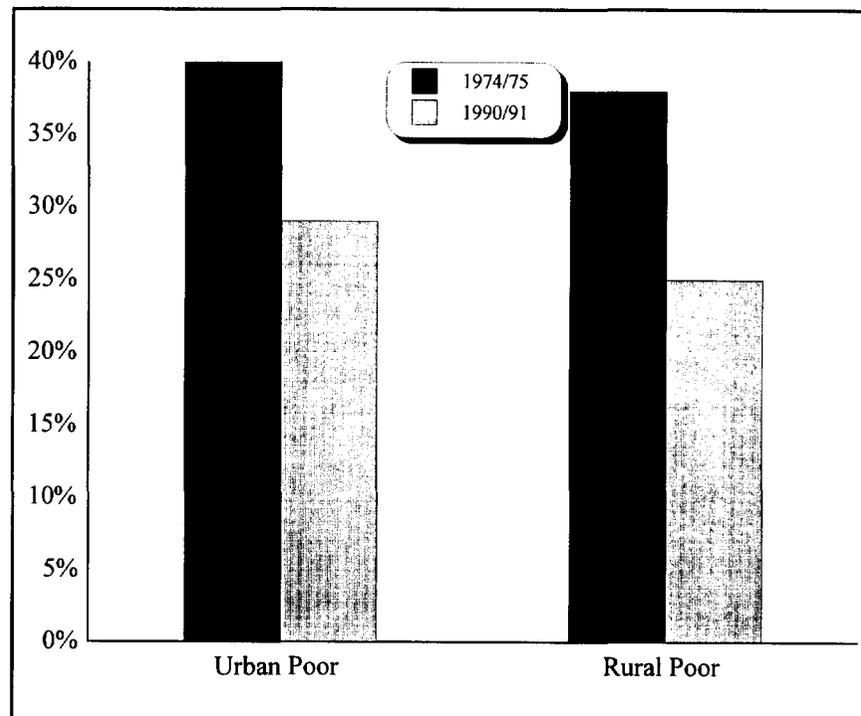


Figure 7.3 Proportion of poor people in urban and rural Egypt, 1974/75 and 1990/91

reform program; more research is needed on the impact of adjustment on the poor in both rural and urban areas. In addition, while the IFPRI study analyzed poverty by region and over time, the available data did not permit an analysis of poverty by occupation or socioeconomic group. For this reason, future work should include collection of data that will pinpoint the incidence of poverty by occupation and economic group, such as government employees, farmer-owners, landless agricultural laborers and service workers.

In both urban and rural areas, food is the dominant item in total household expenditures. At mean levels, food expenditures in Egypt account for about 50 percent of total household expenditures; in contrast, the poor spend up to 70 percent of their total expenditures on food (Figure 7.4). For both poor and nonpoor, the bulk of these food expenditures are on grain and high-carbohydrate foods. During the period of structural reform, the price index for grain and starchy foods increased markedly, from 113 in 1987 to 348 in 1992.

To maintain food security in the face of rising prices, Egypt has relied heavily on food imports and food aid. As a result of these efforts, total food availability has been high and has been maintained in the reform period. In 1991

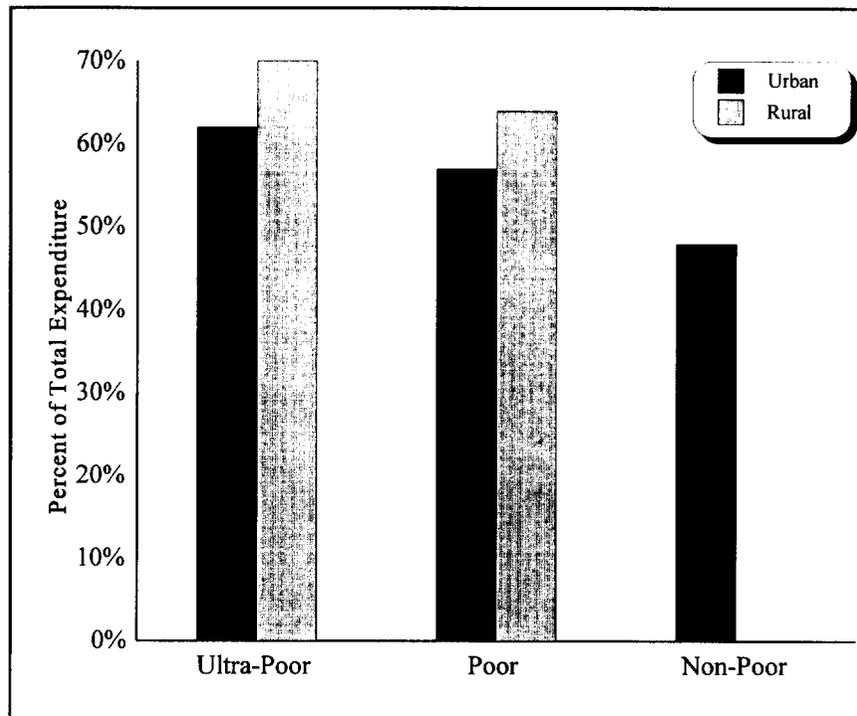


Figure 7.4 Household expenditures on food in Egypt, 1990/91

total calorie availability per capita per day in Egypt was estimated to be 3,700 Calories. For that year, the Food and Agriculture Organization of the United Nations (FAO) recommended a minimum daily dietary allowance for Egypt of 2,540 Calories per capita.

Given these high levels of food availability, it is disappointing and paradoxical to note that malnutrition is still a problem in both urban and rural Egypt. According to a 1991 survey, stunting (low height for age) affects 23 percent of urban children and 34 percent of rural children under five years of age. Stunting is most serious in the poorest area of Egypt—rural Upper Egypt—where it affects almost 40 percent of children under age five. One researcher's results shows that high levels of malnutrition are partially explained by low levels of education of mothers and inability of mothers to care for their children (Ali et al. 1994).

To protect the food status of the poor, Egypt has in the past maintained a comprehensive food subsidy system that was administered through a system of ration shops, government retail stores and cooperatives. Because nearly 90 percent of the Egyptian population was covered under the ration card system, the budgetary costs of this program were large. In 1991/92, food subsidies still

accounted for 10 percent of total government expenditures, even after some attempts to reduce subsidies had been made. This subsidy system is analyzed in detail in Chapter 13.

Because of these unsustainable costs, the government has continued to try to reduce food subsidies. The goal is to withdraw all general food subsidies by 1996. This is likely to have serious consequences for the Egyptian poor, especially those in urban areas. In 1990/91, food subsidies accounted for 17 percent of the total expenditures of urban households in the lowest income quartile. For rural households in the lowest income group, food subsidies accounted for 5 percent of their total expenditures in 1990/91. The difference in these figures points to the "urban bias" in the Egyptian food subsidy system: food subsidies have benefitted urban households more than rural households.

The main findings of the IFPRI study regarding the relationship between food security and poverty were:

1. The largest concentration of poor and ultra poor individuals is found in Upper Egypt, in both urban and rural areas. This may partly explain the considerable social problems and unrest occurring in this region.

2. The level of inequality varies across governorates. In general, urban areas have greater inequality than rural areas. Although rural Upper Egypt is characterized by its large percentage of poor individuals and by deep and severe poverty among the poor, expenditure is distributed more nearly equally there than in any other region in the country.

3. In urban and rural areas, food is the dominant item in total expenditure. It represents about 50 percent of total expenditure, with a larger food share for poorer individuals. The low shares of expenditure on health, education and transportation, and the low level of spending for these services by the poor groups, may be explained by the fact that government provides these services free or at highly subsidized rates and that poor individuals depend heavily on these publicly provided goods and services.

4. Investigations into changes of poverty over time and over a wide range of poverty lines (based on different sets of assumptions) reveal that in urban and rural areas, the poverty rate decreased between 1974/75 and 1981/82. Poverty slightly increased during the period from 1981/82 to 1990/91 in urban areas, regardless of the poverty measure chosen and over the entire range of poverty lines. In rural areas, for poverty lines less than LE 80 (42 percent of mean per capita expenditure of 1981/82), the proportion of individuals who spent less than LE 80, as well as the depth and severity of their poverty, decreased in 1990/91 compared with 1981/82. But if the chosen poverty line was between LE 80 and LE 103, P_0 the percentage of poor persons was higher in 1990/91, while the depth and severity of poverty were lower in the later year. That is, although the number of poor individuals who spent less than LE 103 was lower in 1981/82, the gap between their expenditure level and LE 103 was higher than in 1990/91. If the

poverty line lies between LE 103 and LE 112, the depth of poverty was higher in 1990/91 than in 1981/82, while the severity of poverty was lower, which again suggests that the problem of poverty among the lowest expenditure groups was more severe in 1981/82. For any poverty line above the expenditure level of LE 112, which represented 60 percent of mean per capita expenditure in 1981/82, poverty slightly increased between 1981/82 and 1990/91, regardless of the poverty line or poverty measure used.

5. It is clear that poor individuals depend heavily on food subsidies, as indicated by the relatively large percentage of subsidies in total expenditure. If food subsidies were removed, total expenditures, and consequently incomes of poor individuals, would have to be raised by almost 17 percent to maintain the same welfare levels.

The proposed withdrawal of food subsidies in Egypt and other proposed policy changes call for further analysis of the impact of these actions on the poor. What is needed is increased understanding of the conditions for successful reform of the food and agricultural sector in Egypt by analyzing the following policy issues:

- a) To what extent can market reforms and structural change of Egyptian agriculture be effective in improving food security, agricultural growth, national welfare and the management of natural resources?
- b) How can effective market reforms be implemented while protecting the poor and vulnerable segments of Egyptian society?
- c) How can institutional and policy changes contribute to increased rural employment and reduced poverty?

Some further analysis of these questions is included in Chapter 13.

Other Social Indicators

As mentioned earlier, other priority indicators of poverty are health status and access to education. In general, health and education services cover almost all of Egypt. The quality of services may differ from one area to another based on the population density and geographic location. In each village there is at least a clinic and perhaps a school or two. However, a recent IFPRI study (1994) indicates that there is a steady decline in per capita expenditures on health and education as well as in expenditures as percentages of total government expenditure and as percentages of GDP.

Education

The number of schools and classes, and the number of pupils per class, are indicators of conditions in education. Table 7.3 shows the changes that occurred in schools and classes between 1987/88 and 1991/92.

As shown in the table, the number of schools increased by 21.8% between

Table 7.3 Number of schools and classes by level

School Level	Number of Schools			Number of Classes		
	87/88	91/92	percent change	97/88	91/92	percent change
Primary	15,119	16,960	12.2	156,350	166,132	6.3
Preparatory	4,551	6,719	47.6	60,499	89,776	48.6
Secondary	2,241	3,036	36.1	43,518	51,547	18.4
Diploma	124	121	(2.4)	2,895	804	(72.2)
TOTAL	22,025	26,836	21.8	263,262	308,259	17.1

Source: Ministry of Education, Cairo.

1987/88 and 1991/92, and the number of classes increased by 17.1% in the same period. This means that resources have been allocated to provide more educational facilities for Egyptians during the period of reform. The number of pupils per class is 43-44, which may not be higher than for other third world countries similar to Egypt. According to 1990/91 budget data, the government's expenditure on education was about 3.9% of Gross Domestic Product and about 9.8% of the overall government budget.

The IFPRI report concluded that poor individuals spend only a small share of their total expenditure on education (1994). Therefore, it is expected that poor children depend on cheap or free publicly provided education, or they do not go to school at all. Moreover, the lower quality of education provided in public schools, the size of classes, and the widespread use of private tutoring in secondary and higher education have reintroduced an element of social bias against the poor, who have unequal chances of obtaining an adequate level of early education and progressing to higher levels.

Investigating the distribution of government expenditure on education across governorates shows that Cairo had the largest share of recurrent expenditure on education over the period 1982/83-1991/92. In 1990/91, governorates in Upper Egypt received recurrent expenditure shares that were below their shares in population eligible for schooling; Lower Egypt's governorates had larger shares of total recurrent expenditure than their population shares. Thus per capita recurrent expenditure on education is higher in Lower Egypt than in Upper Egypt. Higher education recurrent expenditure represents 40 percent of expenditure on education, reflecting a bias towards the middle and upper classes, as a large proportion of students in universities come from those higher income classes.

Health

As granted by the constitution, every Egyptian has a right to receive free health services. Health units are located throughout Egypt, but the quality of service is not guaranteed.

In the move towards a market economy the private sector can establish what are termed "Investment Hospitals." Because these hospitals are very expensive,

only wealthier people can afford to use them. They are, however, expected to reduce the demand on government hospitals, thus giving the poor more opportunity to obtain treatment in free government hospitals.

Potable water and proper sewage drainage systems are also very important health issues. The government attempts to provide fresh and clean water for human use all over Egypt, including the new lands in the desert. Again, the quality is not guaranteed, especially when funds are short in the government budget for maintenance or replacement.

The information provided in the IFPRI study indicates decreasing government expenditures per capita on health, and the existing low quality of services provided by government hospitals and health units is expected to hit poor individuals disproportionately hard, as they depend on those units for their basic health care (1994). In general, the highest mortality rates, which are indicators of health status, are found in those governorates where the concentration of the poor is highest and where poverty is deepest and most severe.

Conclusions

This chapter reviewed the impacts of the policy reforms on agricultural income and employment. It provided evidence that the total income attributable to resources used in production of 11 crops increased in the reform period. Most of the increase occurred early in the reform period and was due to more favorable product prices. The higher incentives encouraged producers to be more productive and efficient. Income gains were eroded in the latter part of the reform period by falling world prices and higher prices for inputs.

Available poverty measures were analyzed. The rate of poverty in Egypt is high in both urban and rural areas. While the poverty rate declined in both segments of the population during 1974/75 to 1990/91, population growth caused some increase in the total number of poor. Since 1990/91 decreases in food subsidies, rising unemployment and falling real wages have probably worsened the conditions of the poor groups and pushed more households below the poverty line. Further structural adjustment and fiscal austerity may lead to continued real income losses for the poor and creation of more poverty. Concern for this problem led to the establishment of the Social Fund for Development to try to ease the burdens of adjustment on the poor. The problems of maintaining food security for the poor, as well as their access to adequate educational and medical services, will continue to be of paramount concern to the government in the 1990s.

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III

Impacts of the
Agricultural Policy
Reforms on Agribusiness
Enterprises, Industries
and Markets

8

Private-Sector Distribution and Market Pricing of Agricultural Inputs: Fertilizers, Pesticides, Seeds and Machinery

FRANCESCO GOLETTI

Background of Input Market Reforms

Reforms of agricultural input markets in Egypt have taken place within one of the most intensive agricultural systems of the world; with a cultivated area of about 6.2 million feddans, Egypt achieves a cropping intensity of 1.91 through a combination of very favorable conditions for intensive agriculture, such as fertile soil, plentiful water, and a mild winter climate. The use of modern inputs in Egyptian agriculture is well established. Nitrates were introduced from Chile in 1902, while domestic production of phosphate fertilizer and nitrogen fertilizer began in 1936 and 1951, respectively. The growing demand for food, the excellent climatic conditions, the availability of irrigation water, the need to improve soil fertility following stoppage of alluvial silting after the completion of the Aswan High Dam and the diffusion of modern high-yielding varieties have all contributed to the continued increase in use of fertilizers and pesticides (El Fouly 1993).

Comparison with the rest of the world shows extremely high uses of fertilizers and machinery in Egypt (Table 8.1). Nitrogen fertilizers represent about 80 percent of total fertilizer use in Egypt (Table 8.2). Use grew rapidly in the 1960s but leveled off in the following two decades, although rapid growth was sustained for potash in the 1980s. Domestic production supplies about 90 percent of nitrogen and 96 percent of phosphates used, whereas potash is entirely imported.

Subsidies on fertilizers and pesticides grew rather dramatically in real terms over the 1970s and started to decline during the 1980s. For fertilizers, the decline accelerated starting in 1988 (Figure 8.1). In nominal terms, fertilizer subsidies to the PBDAC, the major state enterprise involved in input distribution, was about



Table 8.1 Comparative use of modern technology, 1990

Region	Fertilizer use (kg/ha)	Tractors in use (per 100,000 ha)	Harvesters /threshers in use (per 100,000 ha)
Egypt	372	2,029	90
USA	42	1,101	154
Japan	350	40,434	24,413
Africa	3.3	52	6
World	28.4	548	82
Developed countries	38.0	112	193
Developing countries	22.1	178	10

Source: Agrostistics, Food and Agriculture Organization, Rome.

LE 183 million in 1988/89 and had dropped to LE 33 million by 1992/93 (Table 8.3).

During the past two decades, the Egyptian government has taken upon itself the burden of producing, importing and distributing most of the modern technology. In spite of tremendously increased input use, however, agricultural growth stagnated in the decade preceding 1986. Policy reforms began in the 1980s within the Ministry of Agriculture, but not until several years later did the first positive signs of liberalization of input and output markets, as well as the lifting of some acreage controls, start to have an impact on agricultural growth (Wally et al. 1983). After 1986, impressive production growth of major crops such as wheat, maize and rice occurred. Liberalization of agricultural inputs marketing took place within this more promising environment for agricultural growth.

Table 8.2 Production and growth rates of fertilizer use

	1960s	1970s	1980s	1990-91
Production (percentage of use)	53	37	89	61
N	140	140	96	113
P	-	-	-	-
K	51	51	87	67
Nutrient use (percentage of total)				
N	85	86	78	83
P	15	14	19	16
K	0.4	1	3	1
Growth rate of fertilizer use (percent per year)				
N	5.3	5.3	2.7	5.1
P	-3.3	10.0	5.4	6.8
K	02.4	12.8	18.8	15.9
NPK	3.9	5.9	3.5	5.5
Fertilizer use rates (kg per feddan)				
N	39.2	62.4	112.7	73.9
P	6.8	10.4	27.5	15.6
K	0.2	0.5	4.1	1.7

Source: Agrostistics, Food and Agriculture Organization, Rome.

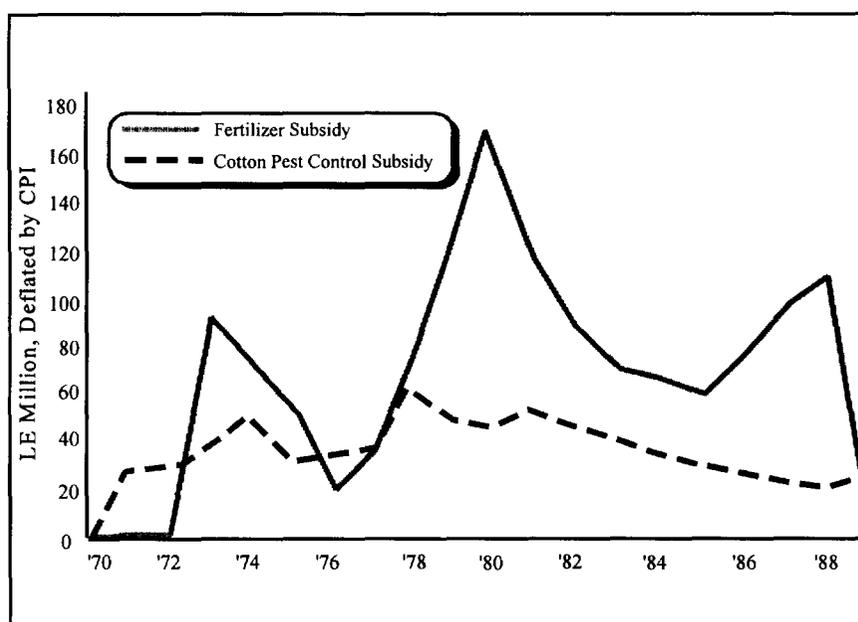


Figure 8.1 Fertilizer and cotton pest control subsidies

Evolution of Reforms Affecting Input Markets

The system of controls of input and output markets was largely dismantled during the period 1986 to 1993. The reform process was very slow in the first phase (1986 to 1989) but gained momentum after 1990. Reforms of output markets, which started before reforms of input markets, are still to be completed. Output market reform was concerned first with the main grain crops—wheat, maize and rice—and is only slowly extending to cotton and sugarcane. The production effects were very visible for wheat and maize, and, in the first period of reforms, tremendous growth in

Table 8.3 Fertilizer subsidies to the PBDAC (LE million)

Year	PBDAC subsidy (LE million)
1988/89	183
1989/90	176
1990/91	194
1991/92	76
1992/93	33

Source: Field Survey, Tranche VI, Ministry of Agriculture and Land Reclamation 1994.

acreage and production of these two crops came largely at the expense of berseem and cotton. In the second phase of the reform process, from 1990 to the present, rice showed the most spectacular growth, reflecting a liberalization of price controls. Both rice and wheat processing are still heavily dominated by public companies, with the most technologically advanced mills controlled by these state enterprises. Decontrol in marketing of inputs has proceeded very rapidly along with fast growth of the private sector and virtual elimination of the input distribution function of the main state enterprises involved in input distribution, namely the PBDAC. It is estimated that private sector participation in fertilizer distribution rose from virtually zero in 1990 to almost 80 percent by 1993 (International Fertilizer Development Center 1993).

Understanding the sequence of reforms affecting agricultural input markets in Egypt is useful in viewing the effects of reforms in a more general context. The process of reform of agricultural markets is a complex one, characterized by many decisions being made at various times. The task here, however, is to identify the most critical turning points of the process so as to derive useful lessons from the experience.

First, an enabling policy environment was created even before specific reforms in agricultural input markets were put in place. The Ministry of Agriculture's sustained effort since the early 1980s, together with donors' support, were the driving forces behind the implementation of reforms in the face of opposition from various parastatals negatively affected by the process. The consistency of policy over time is critical for the success of reform, because it contributes to establishing the credibility of the government as a reforming agent. Only after such credibility is established will the private sector be confident enough to participate actively in the reform process.

Second, an enabling policy environment would not be sufficient to ensure the success of reforms unless structural conditions in the economy favor the emergence of an efficient private sector. When markets are thin and the use of agricultural inputs is low, it will be much more difficult for market reforms to take effect, as experience has shown in most of Sub-Saharan Africa. Risk of adoption, high transaction costs, and low incentives for marketing seriously limit the development of a thriving private sector in such a context. In Egypt, structural conditions in the agricultural sector facilitated the liberalization process. Well-developed infrastructure, extremely high use of modern inputs and very intensive agriculture supported fast responses by the private marketing system.

Third, even before the private sector was allowed to participate in the distribution system for agricultural inputs, subsidies were gradually lowered. Subsidies on fertilizers and other chemicals were reduced; there was an effort at bringing the ex-factory prices of fertilizer closer to border prices. Ultimately fertilizer subsidies were ended. Other subsidies, such as those on credit, electricity and fuels, were also reduced. These reforms in public pricing of inputs prepared the terrain for subsequent structural reforms.

Fourth, output markets were liberalized before input markets. Acreage controls on major cereal crops were lifted shortly after 1986. Once production of major crops such as wheat, maize and later rice started to increase dramatically, then input subsidies were also reduced. In contrast to the experiences of other countries, increases in input prices were lower than increases in output prices (see Chapter 4 of this book).

Fifth, the marketing system was opened to private sector participation. Once output response became strong and input subsidies were reduced, further liberalization measures allowed other parastatals, cooperatives and the private sector to participate in fertilizer delivery activities previously controlled by one parastatal. Many previous quota restrictions were eliminated and the private sector was allowed to participate in fertilizer imports and exports. This opening was accompanied by a more general trade liberalization, as a result of which quota restrictions were converted to tariffs and tariff rates were then lowered, at least for some classes of imports.

Sixth, major restructuring of state enterprises in most cases took place during the last part of this process, once pricing reforms were fully under way and the private sector had been allowed to participate in the distribution system. The PBDAC was transformed into a purely agricultural credit institution, and plans to change the Central Administration of Seeds (CAS) into an inspection agency for seeds have been approved.

The overall process of reform has not been uniform across subsectors, and various controls are still in place. After several aspects of input and output markets were liberalized, pockets of protection still remained (e.g., control over some fertilizer imports, pesticides applications, cotton seed, and production and importation of some machinery). Some of these pockets of protection were maintained because of political bottlenecks or economy-wide links; a typical case is the cotton sector, where opposition to market reforms persists because of the repercussions affecting both the commercial and industrial sector. Other pockets of protection were kept to control health and environmental hazards resulting from irresponsible marketing of pesticides. The main danger, however, is that previous reforms may be reversed and the persistence of these still heavily protected areas could compromise the success of a partial approach to liberalization.

Market Reforms in Fertilizers, Seeds and Agricultural Equipment

Input subsidies are often introduced to encourage the adoption of modern technology. When agricultural technology is not well developed and markets are thin, there is a rationale for this approach. However, as modern technology spreads and modern input use increases, input subsidies are often maintained as a means of compensating farmers for lower output prices, a situation that characterized Egypt up to 1986.

The argument that subsidies are necessary because of slow adoption rates is obviously inapplicable to Egypt, as the country's agriculture is very input-intensive and characterized by the use of a broad range of modern technology.

Since the reforms began, the government has made a sustained effort to reduce subsidies on the most important agricultural inputs: fertilizers, cotton pesticides and applications, agricultural equipment, and agricultural credit. Fertilizer and pesticide subsidies actually started to decline early in the 1980s, but after the reforms began the decline in fertilizer subsidies was more sustained (Figure 8.1). Subsidies on fertilizer production and distribution were rapidly and drastically reduced in the second phase of the reform period, from 1990 to 1993 (Table 8.3).

Reforms have mainly affected participation in the marketing system, prices and the use of agricultural inputs. The following paragraphs briefly describe some of these effects.

Fertilizers

Before 1990, the General Organization for Agricultural Price Stabilization (GOAPS) imported fertilizers on behalf of the PBDAC, the distributor of fertilizers. In 1989, a plan was implemented to allow agents other than the PBDAC to participate in the distribution of fertilizer, and since 1990, factories have been allowed to sell to dealers and cooperatives, and to distribute through other channels (e.g., the Egypt Agricultural Organization).

The major change in the fertilizer sector has been the breaking of the PBDAC sales monopoly and the emergence of the private sector in the distribution system. Private distributors and cooperatives are important channels in the distribution of agricultural inputs, and the functions that in the past were centralized in the hands of the PBDAC are now decentralized among a variety of marketing agents, including private wholesalers, retailers and cooperatives. Given the opening of external trade to these various agents, it is possible to envisage an emerging future configuration of marketing channels that will completely take over the current marginal presence of the PBDAC and the EAO. The old and the emerging marketing channels are those depicted in Figure 8.2.

After the opening of marketing to the private sector and to cooperatives, the two most important policy reforms have been those affecting prices and those affecting use of fertilizers. In 1988, sustained reductions in fertilizer price subsidies began. As a consequence, retail prices increased and, except for potash, subsidies were virtually eliminated by 1992; even in the case of potash, the subsidy was reduced. Significantly, the private sector was allowed to buy from domestic factories in 1990/91 at fixed ex-factory-delivered prices but was allowed to sell at market prices. Imports from the private sector were also allowed, but tariffs of 30 percent were imposed on phosphates and nitrogen imports.

The fixed ex-factory prices of domestic factories were closely aligned with border prices, to ensure the competitiveness of domestic production. In turn,

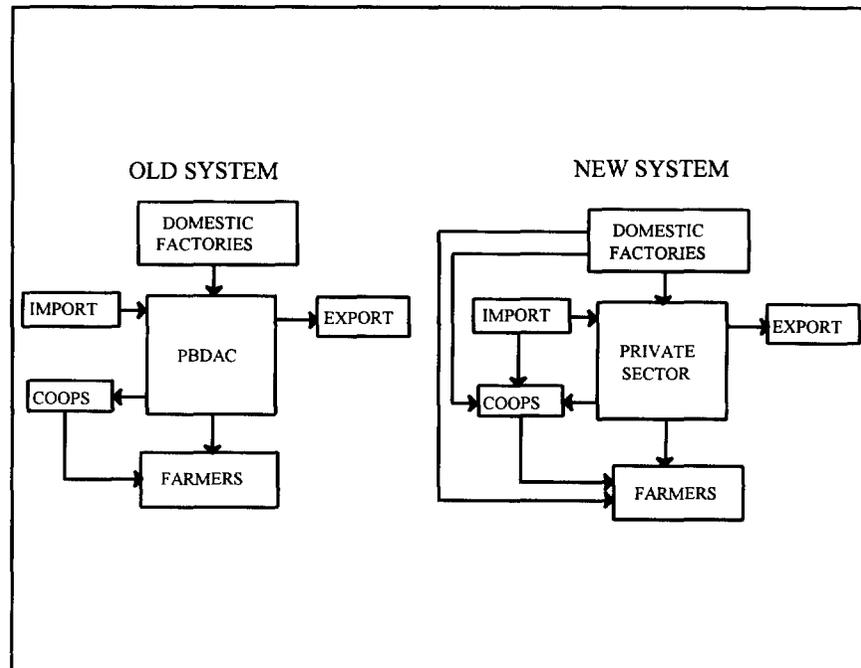


Figure 8.2 Fertilizer marketing channels

border prices were established on the basis of long-term behavior of international prices in order to avoid the violent short-term fluctuations that have in recent years affected international markets such as those of Libya and countries of the former Soviet Union and that were caused by distress sales of fertilizers. International prices have been characterized by a declining trend and high variability in the past few years (Figure 8.3). Based on these calculations, ex-factory prices were set within very close margins of border prices, suggesting that the Egyptian fertilizer market is now generally in line with international markets (Table 8.4).

Nominal domestic fertilizer prices have increased in the period of reform. However, real prices declined substantially in the six-year period 1986-91 relative to the pre-reform period 1980-85 (Table 8.5). Even the ratio of fertilizer prices to crop prices declined substantially in these periods.

Consumption of fertilizer also grew continuously during the reform period, with a sudden dip only in 1991/92, when subsidies were drastically cut. However, in the following year (1992/93) there is evidence that fertilizer consumption growth regained its previous level.

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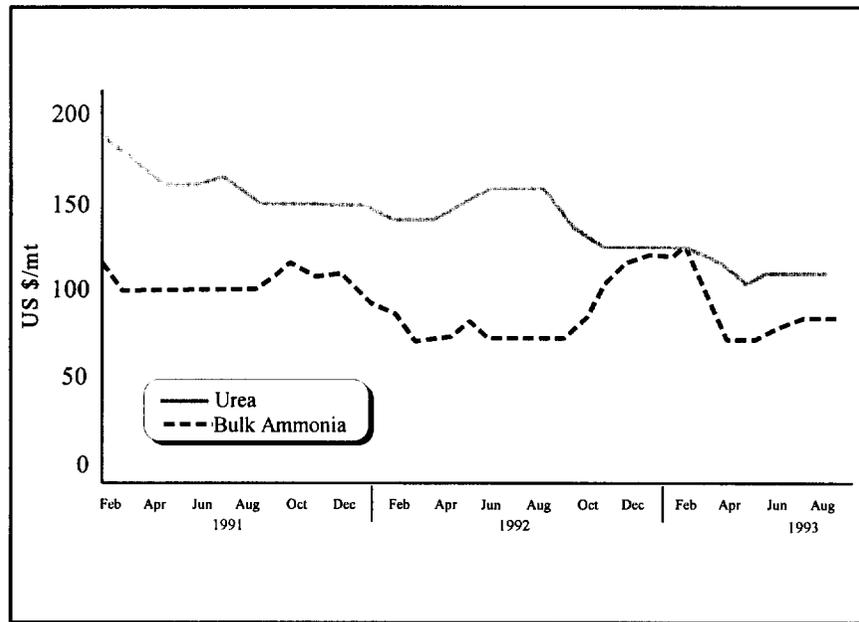


Figure 8.3 International prices of nitrogen fertilizers

Table 8.4 Calculation of fertilizer border equivalent prices (January 1993)

Product	Urea Abu Qir (bulk)	Urea Talkha (bulk)	AN Abu Qir	AN Talkha	GTSP
World trade prices (US\$/mt)	130	133	116	116	180
Border price (LE/mt)	433	433	386	386	599
Loading	-8	-8	-10	-10	2
Transportation	-8	-12	-8	-8	
Bagging	20	20	-2	-2	
Nutrient adjustment					-111
Subtotal	437	443	366	366	491
Loss (0.5 percent)	2	2			2
Quality adjustment				-40	-49
Border price equivalent	439	445	366	326	444
Ex-factory price	450	450	395	345	416
Margin, ex-factory to border price (percent)	2.5	1.2	7.9	5.8	-5.5

Source: Field Survey, Tranche VI, Ministry of Agriculture and Land Reclamation 1994.

Table 8.5 Effect of the reforms on prices, consumption and use rates of fertilizer nutrients

Item	Average (1980-85)	Average (1986-91)	Percent change
Fertilizer nutrient prices (deflated LE/mt)			
N	191.15	116.86	-38.87
P ₂ O ₅	149.19	103.47	-30.64
K ₂ O	85.81	51.54	-39.93
NPK	182.11	113.02	-37.94
Fertilizer nutrient consumption (mt)			
N	626	802	28.09
P ₂ O ₅	135	182	35.40
K ₂ O	13.8	26.4	91.22
NPK	775	1,011	30.69
Fertilizer nutrient use rate (kg/feddan)			
N	106.20	130.80	23.16
P ₂ O ₅	22.88	29.84	30.42
K ₂ O	2.34	4.32	84.80
NPK	131.42	164.97	35.52
NPK: Farm crop price ratios			
Wheat	2.50	1.26	-49.49
Rice	2.15	1.37	-33.22
Cotton	4.05	2.38	-41.30
Maize	1.89	1.24	-34.30
Sugarcane	13.31	9.30	-30.15

Source: International Fertilizer Development Center 1993.

Seeds

The Government of Egypt has prepared legislation to change the structure and function of the Central Administration of Seeds (CAS) from a seed production and distribution agency to a seed inspection agency, with the distribution and production functions transferred mostly to the private sector. Since 1992 a National Seed Council (NSC) to discuss privatization issues has operated. The reorganization of CAS and the privatization of its activities encountered difficulties in the implementation stage, because only one seed company was formed using Ministry of Agriculture and Land Reclamation (MALR) plants. Among the major barriers to entry of the private sector into the seed business is the issue of seed prices, which remained unresolved. At prices that prevailed until 1992/93, private companies could not operate at a profit.

Certified seed prices are still controlled by the government. Moreover, the bid for privatization has been very slow because too little is known about the production and operation costs of seed processing plants currently operated by the MALR. This is compounded by the presence of excess employees in public plants. The German Technical Assistance Agency (GTZ) is now examining the cost of seed production and its benefit to farmers. One major issue is the high replacement ratios of seed by farmers.¹ Ratios of about 80 percent are not uncommon in Egypt for rice and wheat, versus 20 percent in the U.S. This waste is also linked to faulty seed storage practices by farmers, which induce losses and spread diseases.

Since cotton seed is produced at the gin, the privatization of cotton seed production is linked to the issue of privatization of cotton gins. As a result of current practices, the cost of cotton seed per feddan in Egypt is equal to the cost in U.S., but the quality of seeds is much lower, suggesting a large potential for technological improvement. A seeding rate of 60-70 kg/feddan is currently used, whereas a rate of 10-20 kg/feddan of good seed is considered sufficient. Cost savings along with a substantial improvement in quality could be obtained by allowing involvement of cotton gins in seed distribution.

The private sector, which in the past was allowed to distribute only vegetable seeds, can now also distribute maize seeds. However, there is a widespread concern that current prices fixed by the government do not cover costs. Notwithstanding a very favorable disposition of public sector companies toward privatization, the private sector has responded very cautiously. Cooperatives continue to be very active in seed distribution.

Farm Equipment

Because of the small size of land holdings, mechanization has spread through the use of customer services provided by cooperatives. By 1982, about 90 percent of farmers were using tractors for plowing, but only 2 percent owned tractors.

Most local manufacturers are state enterprises and have a privileged relationship with foreign companies. The major manufacturer, El Nasr and Company (NASCO), had licensing arrangements with manufacturers of Rakovica tractors in former Yugoslavia and manufacturers of Universal tractors in Romania. NASCO annually assembles 3000-4000 tractors in the 60-65 hp range. Diesel machinery is produced by Helwan Diesel Engine Company, a public sector enterprise that assembles diesel engines under license from the Deutz Company of Germany.

Local manufacturing was heavily protected in the past and mostly concentrated in the hands of public companies. Small producers were discriminated against, particularly by being prevented from importing spare parts and by being denied institutional support. On the marketing side, credit constraints restricted the development of large markets for domestic private producers (Khan 1993).

In August 1992, the government announced new tariffs for 106 commodities, including a 50 percent tariff on 10-85 hp machinery. Given that such machinery is produced within the country, the tariff represents continued protection of domestic production, although it is a step in the right direction with respect to the previous quota system. The decree listed 78 prohibited imports (including clothes, carpets, furniture, soap and chickens), while all remaining goods could be imported. In 1993, the government further reduced the number of goods banned from importation to only three: poultry, textiles and ready-made garments. Many farmers still prefer tractors and other machinery imported from Eastern Europe, mostly because these machines have a price advantage over Western and Japanese machines, which are considered superior in quality.

Structure, Conduct and Performance of Input Markets under Reform

The major actors in the new distribution system for fertilizers are (a) factories, (b) distributors, (c) wholesalers, (d) retailers and (e) cooperatives. Since 1991, the role of the PBDAC has rapidly been reduced to its current virtual lack of involvement in the distribution of inputs and the PBDAC has been transformed into a rural bank providing mostly credit services.

Market structure is evolving in a highly hierarchical fashion. Unlike other countries that have liberalized the fertilizer sector (Ahmed 1993), Egypt has instituted reforms in a top-down approach, in that big dealers respond first, followed by wholesalers and retailers. Big dealers have been in the position of extending credit to a large network of wholesalers throughout the country. Because storage facilities are inadequate, the private sector operates mostly at a rapid turnover rate. Storage facilities of the PBDAC have been used largely as a result of links between storage availability and concession of credit.

In 1991/92, factories started to sign contracts directly with distributors. During the subsequent two years of operations, the number of contracts declined from 76 to 39, and the number of private dealers contracted decreased from an estimated 30 to 40 to less than 20 (Ministry of Agriculture and Land Reclamation 1994). This concentration is still proceeding, with most sales currently in the hands of only three or four dealers. Distributors are able to get a discount of 2 percent of the ex-factory price if they commit to a minimum monthly tonnage from the factories. The big dealers sell most of the fertilizers lifted from domestic factories to other dealers or to merchants. Only 7 percent was sold directly to farmers in the summer of 1992, and that figure increased to 13 percent in the winter of 1992/93.

Increasingly, merchants' sources are distributors instead of factories or public companies. The average purchase is much smaller for merchants than for dealers; during 1992/93, the average merchant's purchase was 1,037 metric tons, whereas for distributors it was about 9 times that amount. In lower Egypt, the average quantities dealt with are smaller, suggesting that there may be more competition there (Table 8.6).

Competition and Barriers to Entry

Private agents perceive the licensing of fertilizer dealers as too exacting. Licensing involves three main requirements related to business, technical and storage aspects. Dealers particularly dislike the technical requirement that the manager of a licensed store must belong to the Association of Agricultural Engineers, because this prevents participation of traders who lack the academic credentials. Dealers also complain about the requirement that storage facilities be located a specified distance from inhabited areas, a requirement difficult to meet in densely populated areas.

In spite of these perceived obstacles, the number of licensed traders has

Table 8.6 Average purchases by fertilizer distributors and merchants (metric tons)

	Summer 1992	Winter 1992/93
Distributors	8,500	9,700
Merchants		
Upper Egypt	758	1,095
Middle Egypt	1,156	865
Lower Egypt	534	319
Entire country	718	1,356

Source: Survey data for Tranche VI, Ministry of Agriculture and Land Reclamation 1994.

increased tremendously. In June 1993, there were 1,059 licensed dealers in fertilizer and insecticides, 64 percent above the previous year; by February 1994, the estimated number of licensed fertilizer dealers was around 1,500.

There now seems to be ample competition in the trade; the number of participants is increasing and price margins are quite low, although barriers to entry may become more serious if dealers are able to organize themselves into cartels. There is anecdotal evidence that members of the private sector themselves may attempt to limit competition in the future. For example, licensing rules that prohibit ease of entry into fertilizer marketing and the fixing of marketing margins are two practices already discussed by some observers of the private sector. There seems to be some attempt by insiders to exclude outsiders so as to avoid competition. However, it is still very difficult to say how effective these attempts will be in the future.

Even though cooperatives are still perceived as a legacy from the system of state controls, they currently operate without the heavy subsidies received in the past. There is some indication that the current system of cooperatives may be unable to compete with the private sector, suggesting the need to find a new role that may preserve their function. Because many of these cooperatives are the offspring of bureaucracy rather than an expression of farmers' voluntary association, they are mostly incapable of operating efficiently in a business environment.

Price Margins

Because of smaller volumes, merchants charge higher prices than distributors. However, the margins between purchase prices and sale prices are smaller for merchants, indicating greater competition among merchants. Moreover, the margins for both distributors and merchants are increasing over time, which seems to indicate increasing market power of large distributors. Whereas private trader margins are increasing, the competition between private and public sectors seems to have reduced the margins between prices paid by farmers in the two sectors (Table 8.7).

Table 8.7 Fertilizer price margins

Type of fertilizer	A	B	C
Summer season 1992			
Urea	4.1	4.1	3.2
AN	4.8	6.9	3.4
SSP	3.9	6.9	3.4
Average	4.2	5.0	3.6
Winter season 1992/93			
Urea	1.9	5.1	3.6
AN	0.9	3.3	3.3
SSP	0.7	9.8	5.2
Average	1.5	6.2	3.6

Source: Field Survey, Tranche VI, Ministry of Agriculture and Land Reclamation 1994.

A: Margin between prices paid by farmers in private and public sectors

B: Margin between prices paid by farmers and purchase prices paid by distributors

C: Margin between prices paid by farmers and purchase prices paid by merchants

Integration of Input Markets

Geographically, it seems that some degree of market integration is taking place. The average prices of fertilizers in Upper Egypt are generally smaller than the national average, and the difference between regional and national prices is declining over time. The margins between private and public sector prices, which were particularly high in Middle and Upper Egypt during the summer of 1992, seem to have declined quite substantially in the winter of 1992/93 relative to the previous season (Table 8.8). Whereas Table 8.8 does not show a comparison of 1992/93 with the previous season, Table 8.9 does. Both the margins between public and private prices and the margins between regional and national prices are becoming very small.

More importantly, price differences among various governorates are quite

Table 8.8 Average prices along fertilizer marketing chain

	Price Margin						
	Private sector above public sector			Total Sample	Regional above national, private		
	Upper Egypt	Middle Egypt	Lower Egypt		Upper Egypt	Middle Egypt	Lower Egypt
Summer							
Urea	7.5	4.9	3.8	4.1	2.32	4.72	-2.52
AN	7.2	10.3	0.3	4.8	-0.72	4.52	-1.60
SSP	-0.5	16.2	2.2	3.9	-3.97	6.78	0.09
Average	6.4	8.4	2.1	4.2	-0.79	5.33	-1.36
Winter							
Urea	-1.0	5.2	1.9	1.9	-2.02	1.77	-0.33
AN	4.4	-1.5	2.2	1.0	3.9	-0.07	-0.96
SSP	0.6	2.5	-0.4	0.7	-2.82	0.77	0.29
Average	1.0	2.5	1.2	1.5	-0.31	0.82	-0.33

Source: Field Survey, Tranche VI, Ministry of Agriculture and Land Reclamation 1994.

Table 8.9 Regional distribution of fertilizer prices paid in the private sector (prices in LE per 50 kg sack)

	Summer 1992			Winter 1992/93		
	Urea	AN	SSP	Urea	AN	SSP
Sohag	24.45	21.60	10.24	24.65	21.98	11.00
Aswan	—	20.00	10.00	—	22.00	15.00
Assuit	24.79	18.45	9.50	23.62	20.79	9.53
Aena	26.00	20.03	9.50	24.07	21.50	10.91
Giza	24.58	22.00	—	23.49	20.61	10.84
Minya	24.33	19.79	9.41	25.01	20.45	10.34
Benisuef	25.00	21.96	11.69	24.29	20.35	10.10
Fayoum	25.80	21.79	11.13	25.81	21.10	10.09
Alex	24.14	25.00	11.00	25.79	—	11.00
Behira	23.12	21.98	10.89	23.28	21.71	10.39
Daqialis	23.33	18.00	9.58	25.09	19.66	10.36
Dametto	24.06	18.25	9.27	24.36	20.25	10.01
Gharbys	23.32	19.61	9.81	24.24	20.06	10.15
Ismalya	26.00	26.00	10.92	26.00	21.00	11.00
Kofr.sheekh	22.78	22.78	10.03	24.93	20.21	10.14
Menoufya	23.86	23.86	10.77	25.13	20.48	10.49
Kolyobia	22.50	22.50	10.88	—	21.44	11.00
Sharkhis	24.10	24.10	10.16	24.46	20.38	10.34
Maximum	26.00	26.00	11.00	25.81	22.00	15.00
Minimum	22.15	22.15	9.27	23.28	19.66	9.53
Difference (percentage)	17.38	17.38	26.10	10.86	11.90	57.39

Source: Field Survey, Tranche VI, Ministry of Agriculture and Land Reclamation 1994.

— No data

substantial in the private sector. The percentage difference between maximum and minimum governorate prices in the private sector also seems to have declined across the two seasons (Table 8.9), at least for urea and AN, if not for SSP.

Constraints and Incentives Facing Private Traders

The private sector has responded strongly to reforms in agricultural input distribution, particularly for fertilizer, and less for pesticides, which were already relatively liberalized, and still less in the seed sector. From a situation in which virtually all fertilizer distribution was controlled by one parastatal in 1990, in 1994 almost 80 percent was reported to be in the hands of private sector marketing agents. The incentives provided by a profitable business have attracted many operators and, as a result of the non-enforceability of licensing requirements at the retail and wholesale levels, participation of traders in fertilizer distribution has increased rapidly.

Various factors explain the private sector's strong response to participate in fertilizer distribution. First, Egypt's very intensive agriculture, with high use of modern inputs, creates great demand for fertilizers. Farmers are generally dependent on modern technology, including high-yielding varieties, fertilizers and pesticides, and modern agricultural equipment, as well as irrigation; in fact,

agriculture in Egypt is not viable without such modern technology. Therefore, a sustained demand for these inputs is generated by the large number of farmers who are knowledgeable of input requirements and who need minimum support by extension agents. Those traders operating at the retail level have entry costs that are quite low and, in practice, do not generally need specialized training for selling the technology to farmers.

Second, the private sector considered the reform process credible, as the government supported its reform program through a series of mutually consistent policies (i.e., exchange rate, input and output market reforms, elimination of parastatals, etc.). This credibility convinced the private sector that the opening of marketing was not temporary, but there to stay.

The result of private sector participation has been a rapid increase in the number of marketing agents who have established themselves throughout Egypt. The mode of operation in the trade of fertilizers is characterized by quick turnover and consequently a very low level of investment in storage by the private sector. Because of the high cost of credit, long term storage is not profitable for marketing agents. An estimate of operating costs for merchants was obtained in the survey of merchants and dealers sponsored by the MALR and USAID for the monitoring of the reform process. If an interest rate of 18 percent (1.5 percent per month) as in 1992 is assumed, an examination of the major components of the merchant cost indicates that with operating costs of 1.9, 2, and 2.5 percent for urea, AN, and SSP respectively, the markup over cost would be only 1.3 to 2.5 percent (Table 8.10). This suggests that a policy of seasonal discounts in selling prices by domestic factories may have important effects in terms of encouraging private sector storage (International Fertilizer Development Center 1993).

Table 8.10 Operating costs of fertilizer merchants (LE/mt)

Item	Urea	AN	SSP
Merchant purchase price	450	400	200
Estimated cost			
Labor	1.50	1.50	1.50
Storage	.50	.50	.50
Interest	6.75	6.00	3.00
Total operating cost if fertilizer is held for:			
One month	8.75	8.00	5.00
Three months	23.25	21.00	12.00
Six months	45.00	40.50	22.50
Break-even percentage markup if fertilizer is held for:			
One month	1.94	2.00	2.50
Three months	5.17	5.25	6.00
Six months	10.00	10.13	11.25

Source: Field Survey, Tranche VI, Ministry of Agriculture and Land Reclamation 1994.

Initial Responses by Farmers

The share of the private sector in fertilizer purchases by farmers increased rapidly after liberalization of marketing in 1991/92, from 30 to 53 percent of the total, a remarkably high growth given the short period of time (Table 8.11). Nevertheless, there is much variation of private sector participation among governorates that cannot be directly explained in terms of regional differences, i.e., Lower Egypt versus Upper Egypt.

Although farmers have increasingly used the private sector, they initially preferred the old system of supply from the public and cooperative systems. Gradually, farmers have started to rely more on private sales; 25 percent of farmers in the summer season of 1992 indicated the private sector as first choice of a supplier of any input, and that percentage rose to 32 in the following season (Input Survey, Tranche VI, MALR 1994).

Farmers have expressed their preference for fixed prices over negotiated prices, so they would rather stay with the public sector, which has supplied fertilizer at lower prices. Another important reason for preferring the public sector to private supply is the availability of credit. Whereas the cooperatives give about 30 percent credit on total input purchases, merchants give only 10 percent (Table 8.12). Unlike the situation in the fertilizer market, where the private sector has taken over most of the distribution system, cooperatives still play an important role in the seed market. The role of the private sector appears somewhat important for vegetables, soybeans, sesame, wheat, fava beans and berseem, whereas it is still negligible for maize and cotton (Table 8.13).

An additional source of dissatisfaction with the private sector is the supplying of pesticides that are not suited to needs, an issue that deserves further attention from the government in light of the health and environmental consequences.

Over time, the difference has decreased between prices farmers pay to the private and public sectors. The farmers have adapted to the new distribution system; reforms in fertilizers were initially accompanied by reduction of input use by farmers, but this decline was soon eliminated, with use of fertilizer returning by 1993 to its 1991 level.

More importantly, there was a shift in use; nitrogen fertilizer use increased considerably, while use of potash and phosphates, which had previously been

Table 8.11 Market share of fertilizer sales to farmers by private sector merchants (percent)

Fertilizer type	Summer 1992	Winter 1992/93
Urea	35	57
AN	25	47
SSP	24	54
Total	30	53

Source: Field Survey, Tranche VI, Ministry of Agriculture and Land Reclamation 1994.

Table 8.12 Purchases of fertilizers and other inputs by farmers (percent)

Item	Upper Egypt	Middle Egypt	Lower Egypt	Total
Purchase from private merchants				
Summer	59	45	46	47
Winter	67	62	67	66
Pay cash				
Summer	100	84	88	90
Winter	98	87	84	87
Purchase from cooperatives				
Summer	2	25	53	39
Winter	38	41	46	44
Pay cash				
Summer	100	90	65	69
Winter	81	87	62	70
Problem				
Input unavailable	9	39	43	40
Quality of pesticide	0	30	28	26
Prices unstable	27	22	21	21
Spare parts unavailable	36	4	21	19
Winter season	10	30	33	28
Problem				
Input unavailable	75	74	61	65
Prices unstable	50	50	69	63
Bad packaging	0	29	5	11

Source: Field Survey, Tranche VI, Ministry of Agriculture and Land Reclamation 1994.

heavily subsidized, declined substantially. The implication of this shift for balanced use of different nutrients has yet to be determined.

The effect on production has been positive, given that both production and yields have increased. There is some evidence that farmers' incomes have not declined; for example, higher nominal prices of fertilizers have not translated into higher real prices. However, informal interviews point to a squeezing of farmers' income during the accelerated phase of input reforms.

Table 8.13 Sources of crop seeds (percentage)

	PBDAC	Private merchants	Cooperatives	Other farmers	Own previous crop
Summer 1992					
Maize	19	8	29	2	42
Cotton	40	1	59	0	
Sorghum	47	47	0	6	
Other crops	50	50	0	0	
Winter					
Wheat	24	8	39	2	27
Fava bean	18	28	13	10	32
Berseem	4	39	4	15	38

Source: Field Survey, Ministry of Agriculture and Land Reclamation, October-November 1992, January-March 1993.

Note: Other crops include sesame, soybeans and vegetables.

Small farmers have found the new system penalizes them somewhat in that they have to pay higher prices than before, even though the availability of the input is more prompt and there is more choice among different suppliers (retailers) of bagging and transportation services. It is not clear if access to these services has improved farmers' income, particularly for farms less than 5 feddans in size.

Implications for Agricultural Input Policies

Most of the reforms affecting agricultural input and output markets have already been implemented. The most notable exceptions are seen in the case of cotton and sugarcane. Processing of grain and fertilizer is still in the hands of public companies, mainly because of high fixed costs. Possible privatization of these activities is envisaged in the medium to long term.

In the transition period, one of the main tasks of the government is to monitor the movement of agriculture toward the desirable outcomes of the reform: increased economic efficiency, a competitive environment, an open economy, and higher and sustainable growth of agricultural productivity and income. By assisting in the formulation of better policies, the monitoring function will facilitate the emergence of a thriving private sector and help those farmers and agricultural workers who have been penalized by the current reforms. To guide the monitoring and decision-making process, a few problems need to be further studied and then addressed.

The Impact of Reforms on Farmers

The private sector involved in marketing has welcomed most of the reforms implemented by the government in both agricultural input and output markets. These reforms have allowed the private sector to participate to a degree unthinkable just a few years ago. The private sector reacted with suspicion initially, especially in product markets. For commodities such as wheat and rice, traders are still hesitant to discuss their business in detail, partly because of the common and universal reticence of traders to do so, and partly because past policies were characterized by heavy government intervention and a distrust of the merchants. Input markets have reacted more quickly, raising the expectations of big dealers who were already experienced with international fertilizer and pesticide markets. Most marketing agents think that reforms are moving in the right direction. However, there is concern that the pace of reform is too rapid, and this concern produces social and political tensions that might compromise the success of the reforms. It is clear that parastatals are the big losers, and the notion is widespread that farmers are also losing in the process of reform. In spite of productivity gains, the evidence on

farmers' income is very scanty, although anecdotal evidence from marketing agents suggests that farmers may be suffering substantially from input market reforms. This may be especially true for small landholders, who lack easy access to modern inputs and credit. The emergence of a private sector of marketing agents may well have left the small farmers in an institutional vacuum, given that the old cooperative system cannot continue to function under the pressure originating with liberalization and reduction of subsidies.

Role of Cooperatives in the Context of Liberalized Input Markets

Development of rural institutions that meet the needs of small farmers and complement the private sector will be critical to the success of the overall reform process. Cooperatives and the private sector are the most important marketing agents in the delivery of agricultural inputs. The role of cooperatives is, however, ill-defined. Their presence is more an inheritance from a past system characterized by bureaucratic control than an expression of the real needs and interests of farmers. It appears necessary to identify those situations in which cooperatives have been successful in benefitting their members and raising productivity. There are at least three areas where cooperatives seem to play an important role. The first is agricultural mechanization, in the form of rental services to the huge number of farmers who cannot afford to buy tractors and other equipment. The second area is seed production and distribution that would allow economies of scale and specialization to benefit a large number of farmers. The third is extension of credit facilities to its members, to facilitate their access to agricultural inputs such as fertilizers. Especially in the area of credit, there already appears to be an accumulation of experience on which to build. Since cooperatives give farmers more credit than merchants do, they may have some advantage in the cost of information about borrowers that could make them more efficient and competitive. It will be necessary to understand the constraints to development of a cooperative system that is efficient and able to compete with the private sector. Innovative institutional arrangements could be devised to meet those needs that are now being only partially met by the private, non-cooperative sector. The main challenge will be to transform the cooperative system from a system dominated by a bureaucratic mentality to a system able to provide services to farmers and to function as a business enterprise.

Encouraging Competition Within the Emerging Private Sector

Although development of a private marketing system seems to be proceeding thus far without undue difficulties, there is a danger that the system may evolve toward an oligopolistic structure. The increasing margins of merchants and distributors, the potential threat of collusive behavior by private distributors, and the promotion of licensing schemes by insiders to prevent the entry of outsiders are some signals whose future development must be closely watched. The government needs to monitor this process and ensure that barriers

to entry and exit are removed so that a competitive environment develops. Such barriers can be established either through regulations enforced by the public sector or by tacit collusive behavior on the part of the private sector. It is necessary to keep a vigilant eye on the marketing system to detect and prevent these negative tendencies. In-depth study of marketing costs will shed further light upon this complex issue and help to monitor and guide the reform process, so as to ensure that it actually leads to lower transaction costs and consumer prices.

The Role of the State in Liberalized Input Markets

In the present environment, which is characterized by competitive markets, a new role for the government has to be defined. In the past, parastatals have been heavily involved in the production, trade, and distribution of most agricultural inputs; the present system is increasingly dominated by the private sector.

In the case of fertilizers, parastatals will continue to be heavily involved in production. However, privatization of production may be a feasible option in the next few years, especially in light of the apparent comparative advantage of some domestic factories in the production of nitrogen fertilizers. The role of the government in the fertilizer sector increasingly appears to be that of a monitoring agency as well as the provider of information services that facilitate the production, marketing and trading of fertilizers in domestic and international markets. Available projections of fertilizer requirements and availability based on current capacity of domestic factories show a growing need for imports of nitrogen and phosphate fertilizers in the future. A main question, then, is whether Egypt should continue its dependence on international markets or increase its domestic production capacity. Both the government and the private sector will have to be involved in such important decisions that affect Egypt's future supply of fertilizers. Relevant information on the fertilizer sector will have to be collected, organized and analyzed to facilitate this decision-making process, and the government may be in the best position to lead the task of providing this information.

In the case of seeds, the government of Egypt has endorsed the legislation that would transform the CAS primarily into an inspection and extension agency, while production and distribution are taken up by the private sector. Research into new varieties as well as new methods to increase the efficiency of use of available varieties will be an enterprise that could generate innovative collaborative arrangements between the private and public sectors. There is a need to explore whether the current price policy on seeds provides sufficient incentives to encourage the private sector to participate in the production and distribution of seeds. Even after the right incentives are set, it is doubtful, on the basis of available evidence, that the seed sector will be privatized in the foreseeable future. The public sector could, however, facilitate both seed distribution and the research effort of the private sector by providing the legal environment that ensures quality control and protection of patent rights.

In the case of pesticides, the major role of the government will be in the setting and enforcing of safety and environmental protection rules as its involvement in production, distribution and application of pesticides is increasingly transferred to the private sector. Even in this case, however, a useful service of government will be that of providing relevant information on pesticide types, requirements and characteristics in order to counteract unscrupulous behavior by some merchants.

For agricultural machinery, the main problem will be to eliminate the protection of domestic industry and allow the importation of any type of foreign machinery, in view of the already high level of mechanization of Egyptian agriculture. Subsidies to promote agricultural mechanization should be eliminated. It is necessary, however, to understand how market reforms are affecting agricultural mechanization in Egypt. The very high levels of mechanization may well be a result of past policies of heavy subsidization. On the other hand, heavy protection of domestic industry also may have limited the range of international technology available to farmers. In light of comprehensive reforms affecting agricultural credit, imports of agricultural machinery, fuel costs, and the predominant small-holding structure of farming, it is difficult to predict the effects of the reforms on the level and structure of mechanization. This issue is particularly relevant in view of its links to rural wages, industrialization and agricultural productivity.

In general, for all inputs, one of the most important future functions of the government is that of providing information to raise market transparency and competition. It is very important for the government and the private sector alike to have access to reliable and prompt market information related to prices, trade flows, marketing costs, marketing channels, production and incomes, as well as information on the potential and limitations of new technology. In most of these areas, the available information is often scanty and unreliable. Moreover, an appropriate information system will help policymakers design and implement better policies to facilitate the development of the private sector. Particularly needed will be information concerning input qualities, demand for modern inputs, prices, and assessment of future demand and supply.

Future Research Needs

The previous discussion of policy issues suggests a need to provide relevant information to improve the reform process.

The research tasks that could be organized around the main policy issues are described in this section.

Impacts on Farmers

To answer the question about the benefit to farmers of the current reform process, it is necessary to examine the impact of reforms on cost of production and subsequently on farmers' income. So far, very little is known

about this issue. Official statistics indicate that aggregate production, and productivity have increased, as has the ratio of product prices to chemical prices. However, other costs of production such as the costs of mechanization, credit, land rental, seeds, fuel and electricity, have also increased. Thus the net effect is not clear. Moreover, it is important to understand the differential effect these reforms have had on various groups of farmers. A hypothesis that needs to be tested is that small-holders have been penalized by the reforms. Effects of reforms on the incomes of small and medium-size farmers, who comprise the backbone of family farms, warrant particular attention.

Promoting Competitive Input Markets

Evidence of increasing concentration in the fertilizer sector remains scanty but still suggests caution. More information is needed on the cost of transactions of different marketing agents to explain margins. Marketing margins and their determinants should be explained in order to identify the most serious obstacles to entry and exit and thus to avoid increased concentration and oligopolistic behavior. More is known about fertilizer markets than about other input markets. It is necessary to investigate other input markets such as mechanical equipment, seed, feed and pesticide markets.

Institutional Development and the Role of Cooperatives

By examining the current structure of the cooperative sector, one could better understand the performance of various cooperatives in the provision of agricultural inputs. The objective is to identify those cases that have been successful and distinguish between technical efficiency, which could be based on location-specific factors, and economic efficiency. A study of the transaction costs of various cooperatives and a comparison of cooperatives to the private sector could shed some light on these important issues. The purpose would be to understand the role that cooperatives may play in providing services to small-holders while complementing the private sector distribution system. Identification of constraints to achieving high levels of efficiency would enable policymakers to formulate policies for a sustainable cooperative system in rural Egypt.

Financing the Emerging Input Distribution Systems: Institutional Needs

In the past, most of the financing of input distribution systems was done by the PBDAC. Since its restructuring and conversion into an agricultural bank, its role in financing the distribution of major modern inputs has declined. A recent survey showed that the decline had to do with credit availability for the private sector, one of the major difficulties of farmers. It is not yet clear how the overall financing of the new marketing system is proceeding: How much comes from personal funds, and how much from institutional

channels? What is the state of access to credit of different marketing agents and farmers? The role of the PBDAC, commercial banks, large distributors and cooperatives is critical in this respect. It is known that traders have very quick turnover of their stocks. No investment in storage is made because of the very high cost of credit. It would be useful to understand the extent of credit constraints that face different agents in the distribution system, from farmers to factories, so that appropriate policies to improve the efficiency of input delivery systems could be implemented. Given the aversion to price variability that farmers have expressed repeatedly in recent surveys, it is also important to explore alternative financial instruments and institutions that could reduce such variability. Useful lessons could be derived from investigations of the performance of various marketing agents.

Fertilizer Demand and Prospects for Imports

In recent (February 1994) interviews with some fertilizer dealers, a concern was expressed that too little is known about domestic demand for fertilizer, particularly with regard to location-specific factors, income factors and the importance of factors other than prices. In addition to seasonal aspects, credit constraints and other domestic factors, the instability of the international market complicates the planning of domestic production and imports. Major decisions related to investment in new domestic production capacity will depend on the outlook for fertilizer demand in Egypt and the rest of the world in the next 10 years.

Private-Sector Response in the Seed Industry

Even though the government has approved legislation to encourage private sector participation in the production and distribution of seeds, the response of the private sector so far has been lukewarm. More information is needed on the constraints and incentives to the private sector. The persistence of price policies inconsistent with the general trend toward liberalization must be evaluated in relation to other factors, such as cost of production and returns from investment in research and development.

Agricultural Mechanization under Reform

In spite of the small average farm size, agricultural mechanization in Egypt is very high, partly because of heavy subsidization in the past. In the new liberalized environment, it would be useful to know the reaction of farmers and traders to questions such as the following: Are the higher prices of equipment and rental services affecting their level of use and their cost of production? Are the market reforms making available a broader range of products from international markets? Is mechanization having important effects on productivity of labor and demand for labor?

Conclusions

Egyptian agriculture has become one of the most liberalized sectors of the Egyptian economy. Within agriculture, input markets have gone far in the direction of market reforms. To date, the private sector in the distribution system has responded rather well. Real prices of fertilizers and pesticides have decreased, productivity has improved and production of major crops has increased. The distribution system has been increasingly characterized by a variety of private marketing agents.

Several lessons can be learned from the sequence of reforms in input markets in Egypt. First, one of the main reasons for the positive response of the private sector in the distribution system was that use of modern inputs was already very high. For example, Egyptian farmers use some of the highest fertilizer application levels in the world, suggesting that Egyptian farmers are familiar with modern technology. Second, implementation of input market reforms started only after some output market reforms were already in effect and production of major crops had started to improve. Third, marketing reforms allowing the private sector to participate in the distribution system, together with the opening up of trade to the private sector, were introduced relatively late in the sequence of reforms, after adoption of some price policy measures such as the reduction of subsidies. At the same time, the rapid reduction of operations of the PBDAC, the main state enterprise involved in the previous system, led to a restructuring of that parastatal and its conversion into an institution devoted primarily to agricultural credit. The final step in the sequence of reforms might be privatization of some plants and enterprises still in the hands of parastatals, such as fertilizer factories, seed production and processing plants, and agricultural equipment production plants.

However, reforms already under way need to be brought to completion. The private sector still responds only very cautiously to market reforms in the seed sector. This points to the need for policy measures to raise seed prices and to improve the replacement rates of grain seeds and the distribution of cotton seeds. Tariffs on some fertilizers and machinery imports are still very high, and the subsidies on fuel and electricity could be reduced further.

The reforms raise a few questions concerning the role of the government in a post-reform period, as well as revealing specific policy issues that will have to be resolved in the medium term. Of immediate concern is the evaluation of effects of current reforms on farmers' income, because it is not yet clear that farmers have profited from current reforms. What is important to note is that elimination of input subsidies has not resulted in collapse of input demand and of agricultural production; however, it is essential to know if farmers are actually benefitting from the policy changes and, if so, how. What is happening to income of farmers with small and mid-sized farms warrants particular attention.

In the medium term, the prospect for fertilizer demand and the degree of competition within the distribution system will need to be evaluated in order to improve the performance of the input delivery system. The performance of the seed sector and the prospects for agricultural mechanization will also need to be

evaluated in light of the possibility of setting up institutional arrangements in which both the private and the public sectors may contribute so as to increase productivity.

Finally, the complex institutional issue of the role of cooperatives must be examined. The general question of the survival of cooperatives in a competitive environment will need to be addressed through research on their current performance and understanding their comparative advantage as a supplier of services such as seed distribution and agricultural equipment rental and repair services, and as a facilitator in financing the distribution of fertilizers.

Note

1. The replacement ratio is the ratio of seed purchased or obtained from sources other than the farm to the total amount of seed used in the new crop. The higher the replacement ratio, the lower the amount of seed saved from the previous crop.

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9

Output Price Discovery and Transmission in Egypt's Liberalized Agricultural Markets

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The ultimate objective of liberalizing domestic markets is to create an environment in which the market mechanism can function effectively and marketing services can be provided efficiently. The success of market reforms can be judged by their contribution to reducing costs of marketing and distribution services and enhancing the mechanism for discovery and transmission of prices within domestic markets. Price stability is also an important criterion for measuring market performance impacts of policy reforms.

The objectives of this chapter are (a) to assess the price discovery function in domestic markets for major agricultural commodities, (b) to evaluate changing relationships of border and domestic prices in the policy reform period, (c) to review price trends in world markets and draw conclusions about expected prices in domestic markets, and (d) to identify alternative policy approaches for domestic market stabilization and recommend effective policies for reducing risks to national food security from import shortages and high world prices.

Price Reforms and Market Liberalization Policies

For most crops, Egypt's government-imposed policies of low prices between 1964 and 1986 changed to market-oriented policies that permitted higher prices, especially for cereals, after 1986. The government began liberalizing the marketing of cotton starting with the 1994 crop. Sugarcane is the only crop that is still under government control of both area and price. At present, voluntary procurement or floor prices exist for wheat, maize, rice and, for the first time, cotton. Prices of all other field crops and of vegetables and fruits are set by market forces.

Consumer prices are determined by the market for all foods except vegetable oils, sugar and bread. Vegetable oils and sugar have been provided at subsidized prices under a ration card system to about 90 percent of the population. Bread is subsidized by selling 82 percent extraction flour at low prices to bakeries to produce price-controlled baladi loaves.

Price Discovery and Transmission under Liberalization

Increased integration among domestic agricultural markets is critical for promoting responses to the higher incentives that the reforms are expected to cause. The rationale behind the analysis of integration among local foodgrain markets is that information is needed about the level of interaction among prices in spatially separated markets and the impacts of market integration on market participants' adjustments to the reform measures. It is through changes in market signals—prices—that adjustments by the multitude of market participants are coordinated. In efficiently operating markets, integration is high. If markets are not integrated, prices for the same commodity can move independently in each of the different markets. As a result, consumers and producers would not be induced to adjust appropriately to overall market changes.

Improved integration of domestic markets is one of the objectives of the agricultural policy reforms. Information about the level of integration serves as an indicator of structural and institutional deficiencies that imply the need for other measures to accompany the implementation of liberalization. Also, knowledge about price transmission across different local markets acquires more importance in the context of liberalized, private-sector-based marketing systems. The withdrawal of the government from the direct control of markets means that it has to pursue its policy objectives in the agricultural commodity sector through indirect measures, of which the price mechanism is the key instrument. For instance, the objectives of price stabilization and food availability in vulnerable areas implies the need to monitor changes in local markets. Knowledge of the process of cross-market price transmission is a critical input into the design of market monitoring systems. It can help identify central markets on which such price-reporting systems can concentrate, thereby reducing costs and simplifying management of the process.

A recent study of food market integration in the reform period had three objectives: (a) to study the extent of market integration and segmentation and derive implications for the reform process, (b) to identify sets of central markets leading the process of price formation within local foodgrain markets, and (c) to study patterns, magnitude, and speed of price transmission across local foodgrain markets (IFPRI 1994).

The analysis covered the period 1975 to 1992 for urban prices and 1982 to

1992 for rural prices, so as to include both the pre-reform period (before 1986) and the reform period that began in 1987. Implementation of reforms was not uniform for the different commodities; major reforms affecting the marketing of rice, for example, came only during the last year of the study period. Conclusions about price performance in the reform period must take this implementation pattern into consideration.

Price Behavior for Major Crops Before and After the Policy Reforms

Data on monthly national wholesale prices for January 1976 to December 1992, monthly governorate-level retail prices from 21 urban markets for January 1976 to December 1992, and bi-monthly governorate-level retail prices from 16 rural markets for January 1982 to December 1992 were used. To assess the impacts of various policy changes introduced after 1986, it is useful to examine the pre-reform period first. Reforms targeted at maize and wheat began in 1986 and 1987, respectively, and reforms targeted at rice in 1991.

Wholesale Prices

Real growth for wholesale prices of wheat was 9.5 percent during the pre-reform period and 2.9 percent during the reform period. For maize, real wholesale prices grew by 0.6 percent before reform but fell by 4.2 percent during the reform period. For rice, prices fell in real terms, by 0.3 percent during the pre-reform period and 4.5 percent during the reform period.

Inter-year variability of wholesale prices, as measured by the standard deviation of percentage deviations of actual prices from trend, was greater during the pre-reform period than during reform for all commodities. Intra-year variability was also greater pre-reform than during reform for wheat and maize, but greater in the reform period than pre-reform for rice.

Retail Prices

Rural retail prices for wheat, maize and rice fell in real terms during the reform period. For wheat and maize, real growth was positive during the pre-reform period, whereas for rice, inflation exceeded rural retail price growth. Both inter-year and intra-year variability were greater in the pre-reform period than in the reform period, except for inter-year variability for rice, which was higher in the reform period.

Urban retail prices generally grew faster than the inflation rate in the pre-reform period. In the reform period, wheat retail price growth exceeded, while maize retail price growth fell short of, the inflation rate. For both commodities, inter-year variability was greater prior to the reforms than after reforms began. Intra-year variability was greater in the pre-reform period for wheat and in the reform period for maize.

In general, growth of grain prices fell short of the general inflation rate during the reform period. Within-year and between-year variability, however, were less during the reform period, with the notable exception of rice. Within-year variability was similar for wholesale and retail prices. However, except for rice, between-year variability was greater for retail than for wholesale prices. Urban-rural retail price margins were roughly 13 percent in each period for wheat, but for maize they were 13 percent in the pre-reform period and only 3 percent during the reform period.

Seasonality

Wholesale prices show seasonal patterns for wheat, maize and rice. The low in prices occurs in September for wheat (harvested in May), in November for maize (harvested in October), and in September, during the post-reform period only, for rice (harvested in October). For rice, the range (difference between maximum and minimum values) of the seasonal indices triples from the pre-reform to the reform period. Urban retail prices do not exhibit clear seasonal patterns. The seasonal index range is consistently higher in the pre-reform period than in the reform period for wheat and maize rural retail prices, consistent with higher inter-year variability before the reform. Although rural retail prices do exhibit clear seasonal patterns, they do not drop to a minimum immediately after harvest, as expected for producer prices. Seasonality (measured by the range) increased for urban retail prices but decreased for rural retail prices for wheat and maize in the years studied. The differing trends in seasonality may reflect the freeing of urban markets during the reform period; this freeing allowed markets to adjust to changes in supply conditions, which made prices more volatile. In contrast, the elimination of restrictions on local trading raised foodgrain mobility and decreased price volatility in rural foodgrain markets.

The absence of clearer and theoretically expected seasonal patterns may be due to poor data, failure of prices to reflect true scarcity, and the fact that, at each level in the marketing chain, only higher prices have been reported. Better price reporting is needed to establish and monitor seasonal price patterns.

Inter-Market Price Relationships

The study used two methods to measure relationships between prices in different local markets. The first is based on the percentage difference between the maximum and minimum governorate prices at each point in time. The difference is related to transportation and other intermediate costs and may be affected by price policies. When the averages over the pre-reform and reform periods were calculated, declining trends were detected in both urban and rural areas, which implied that the extreme price deviations had been reduced. The second method of measuring relationships between local market prices is based on the degree of variability as indicated by the coefficient of variation among market prices. The results of this analysis indicated that spatial variability

among market prices decreased after liberalization. The evidence, which was stronger for rice than for other crops, suggested that integration among markets had increased but does not show conclusively that greater transmission of price signals between markets had increased. To explore that issue, the degree of market integration was further examined.

Extent of Market Integration among Major Agricultural Crop Markets in Egypt

Spatial price relationships show the extent to which markets are integrated. Where price information flows freely between markets, and products can easily be shifted in response to price differences, prices in different markets will show a high degree of correlation. This means correlation analysis can be used to test market integration.

Correlation Analysis

Correlation of price series between different markets is one measure of market integration. This is recognized intuitively, because integrated markets exhibit coordinated movement of prices, which intermarket price correlations measure. However, tests of market integration based on correlation coefficients of local prices may fail to reveal other factors, such as general price inflation, seasonality and population growth, that affect prices in all markets. This problem can be reduced by computing correlation coefficients based on changes in prices rather than on absolute price levels.

This technique was applied to retail price series of wheat, maize and rice in different governorates to estimate the extent to which price movements in these markets were correlated. The higher the estimated coefficient, the stronger the relationship between the prices in the markets. The results are summarized in Tables 9.1 and 9.2. The estimated coefficients were in general higher for rural retail prices than for urban retail prices. Furthermore, coefficients tended to be higher in the reform than in the pre-reform period, particularly for rural retail prices. Correlations for urban retail wheat prices were generally weak, meaning that the level of integration was lower between urban than between rural markets for wheat; however, the correlation increased during the reform period.

In general, estimated coefficients of correlation were higher for rural retail prices than for urban retail prices. Moreover, the number of negative correlations among rural prices was much larger in the pre-reform period than in the reform period.

For maize, correlations of urban retail prices were quite weak during both periods. Correlations for rural prices were somewhat higher and increased during the reform period. Negative correlations decreased during the reform period for rural prices.

Coefficients for rural retail prices for rice were generally higher for the Delta

Table 9.1 Average correlations of first differences of prices (percent)

Retail Prices	Wheat	Maize	Rice
Urban			
Pre-reform Period	9	8	–
Reform Period	12	9	–
Rural			
Pre-reform Period	18	10	24
Reform Period	48	40	11

Source: International Food Policy Research Institute 1994.

governorates. In the pre-reform period, most of the negative correlations that were observed were among markets in Ismailia, Assuit, Sohag, Quena and Aswan. In the reform period, negative correlations were found around the Giza, Assuit, Sohag, Quena and Aswan governorates.

In summary, there seems to be much stronger interdependence between prices in rural markets than between those in urban markets. In addition, the situation for rural markets seems to have improved during the reform period. The negative correlations evidenced mostly among Upper Egypt governorates for rural prices and among major cities for wheat suggest a certain degree of segmentation among these markets. There is, however, some indication that the degree of market interdependence is increasing during the reform period, even though the impact seems to be greater in rural than in urban areas.

Co-Integration Analysis for Wheat, Maize and Rice

Even if seasonal and trend effects are eliminated in the estimation procedure for the correlation analysis among market prices, there is still the possibility that the degree of interdependence indicated by the coefficient of correlation does not have systematic long-term validity. In fact, it is that long-term relationship of interdependence among local market prices that is of greatest interest in the analysis of market behavior. The long-term dimension of the interdependence among prices in local markets can be captured through statistical co-integration techniques. The study being summarized utilized the co-integration concept to analyze market prices of foodgrains (IFPRI, 1994).

Table 9.2 Percentages of first-differences-of-prices correlations higher in the reform than in the pre-reform period

Retail Price	Wheat	Maize	Rice
Urban	57	54	–
Rural	79	79	40

Source: International Food Policy Research Institute 1994.

The study investigated the degree of "segmentation of markets." Segmentation exists if price movements in one market are completely irrelevant for making forecasts of price movements in other markets. Because markets for the same commodity are rarely completely segmented, the operational goal is to shed light on the stability of relationships among prices in different local markets. If, over time, a consistent relationship can be established between prices in different markets, then the prices are described as co-integrated. The level of co-integration between the price series reveals the extent to which the markets are integrated with each other.

The study of price integration among local foodgrain markets enables analysts to identify markets that lead other markets in the price transmission process. If two markets, A and B, are co-integrated, then there must be some "causality" running from one market to the other. This concept of causality means that prices in one market (or set of markets) contribute to the predictability of prices in other markets. If the causation is unidirectional, then, technically, past prices in one market can be used to forecast prices in the other market. If the analysis can identify a market whose prices can be used to systematically predict prices in the remaining markets, then that specific market is called a "central market." A "regional center" is a market whose prices affect prices in all markets within that region without being affected by the other markets.

The study applied this approach to the monthly governorate prices of wheat, maize and rice in urban and retail markets and the bimonthly prices in rural markets. The results of the co-integration tests indicated that most of these markets have a stable long-term relationship over the period of analysis. The link between two foodgrain markets is considered segmented if price series between two markets are not co-integrated in either direction (from market A to market B or from B to A). This analysis was used to determine the number of segmented links among foodgrain markets in Egypt. The number of segmented markets was found to be negligible for maize markets, both urban and rural, and for rural wheat markets. The results indicated also that rural rice markets show a proportion of segmented market links that exceeded 12 percent.

The analysis of segmentation was used to find the extent to which the ongoing program of market reforms had affected the level of integration among local foodgrain markets. Comparison of the results of the segmentation analysis carried out separately over the two subperiods (before and after 1986) revealed a tendency towards increasing levels of integration for wheat and maize, as the number of segmented markets decreased in the reform period. However, urban markets for these two commodities appear to be less integrated than rural markets. The number of segmented markets for rice increased in the liberalization period, perhaps because liberalization of rice was later than that of wheat and maize, so the analysis for rice covered only the first year of market liberalization, 1992.

To identify central foodgrain markets, the study tested causality for all pairs

of intergovernorate markets. Because price data for urban rice markets were lacking, the computations were confined to wheat and maize. It turned out that Alexandria, Damietta, Kaliobia and Giza are the most important regional centers for price formation in the case of wheat, whereas maize regional market centers are located in Alexandria, Damietta, Kaliobia, Kafr El Sheikh, Behira, Menia and Aswan. Cairo was not a regional center for either wheat or maize. The centrality of these markets indicates that price movements in them could be the focus of future market monitoring programs to predict the behavior of prices and adjustments overall within the grain markets.

Dynamic Adjustments among Major Agricultural Markets

For food policy purposes, it is important to have information not only about the magnitude of the interdependence of markets but also about the speed with which changes in the price system are transmitted across individual markets. This additional information allows improved interpretation of changes in central markets in terms of the implications for price behavior in more distant markets and the possibility of improving the design and implementation of food security programs and of future foodgrain programs such as market stabilization, floor pricing and market information systems.

As used earlier, the term "market segmentation" has been defined as the absence of co-integration. With perfect integration, the price in one market is an exact translation of the price in another market; this implies that price changes are fully transmitted between the two markets. In reality, perfect integration, like perfect segmentation, is only the extreme case, and intermediate degrees of integration and segmentation are the normal situations. The goal then becomes the measurement of the magnitude, or degree, of intermarket price transmission. Such measurement was done by applying autoregressive techniques to local foodgrain price series to yield dynamic multipliers, which were then used to measure the transmission of price changes.

It is useful in the context of intermarket price transmission to distinguish between the immediate effects of shocks and their cumulative effects, because the price transmission process usually takes time to reach all markets. The process involves complex adjustments, and analysis of this price adjustment process allows the speed of price transmission to be studied, to determine the time required for price changes in one subset of domestic markets to be transmitted fully or partially to another subset of markets.

The speed of cross-market price responses is determined by the efficiency of the distribution system and the structural characteristics of local markets. The better integrated a pair of markets, the less time is required for the two markets to complete the adjustment to price shocks. The ratio between the estimated

coefficients for the magnitude and speed of transmission was computed and normalized between 0 and 1. The values 0 and 1 designate, respectively, the extreme cases of total segmentation and full market integration. The actual estimation applied autoregressive procedures to foodgrain prices across governorates to obtain indicators for the magnitude and speed of price transmission across the markets. First differences of individual foodgrain prices were used in the estimation that provided direct measures of percentage changes. The estimated coefficients of the autoregressive process in this case show how price changes in one subset of markets are related to price changes in another subset.

The results of the analysis are presented in Table 9.3. The first row contains the percentage of individual foodgrain markets that show some degree of price interdependence. The higher the coefficients, the higher the frequency of interconnected markets. The second and third rows give figures indicating the magnitude of integration within each given category of markets. The higher the numbers in the second row, the greater the intensity of interdependence among the corresponding markets. The fourth and fifth rows contain the indicators of the speed of transmission of price changes across individual foodgrain markets. The longer it takes for price changes to be transmitted, the higher the coefficient in the fourth row. The last row presents a combined indicator of market integration, which is computed as the ratio between the figures in rows two and four. The higher the intensity of intermarket transmission and the faster the transmission takes place, the higher the coefficients in the last row, and the better integrated the major agricultural markets. The results support the following conclusions:

- Rural grain markets in Egypt appeared to transmit prices to a higher degree than urban markets. For wheat, the contrast between urban and rural markets was particularly striking.
- On average, rural market prices in the long run adjusted to about 68

Table 9.3 Dynamic indicators of market integration (percent)

Indicator	Rural		Urban		Combined		
	Wheat	Maize	Rice	Wheat	Maize	Wheat	Rice
Percentage of significant market links	75	60	63	32	62		
Average μ of long-term multipliers μ^a	0.68	0.57	0.61	0.35	0.48	0.73	0.49
Standard deviation of μ^a	0.25	0.26	0.26	0.36	0.29		
Average τ of times τ^b to adjust to long-term (in months)	4.47	4.79	4.85	3.53	2.77	2.6	5.7
Standard deviation of τ^b	1.56	1.99	1.64	1.18			
Ratio of μ/τ of average r of long-term multiplier to time to adjust	0.15	0.12	0.12	0.099	0.17	0.28	0.086

Source: International Food Policy Research Institute 1994.

Note: The time τ to adjust to the long-term value μ is given when $|\mu_t/\mu - 1| < \epsilon$, for every $K > \tau$, where ϵ is the prespecified tolerance limit (taken equal to 0.01).

percent of initial shocks originating in other markets. The adjustment for urban markets was only 35 percent.

- Prices in rural markets took more time to adjust than those in urban markets. In the case of maize, for example, rural markets took two months longer than urban markets.

- Rural grain markets seemed to react more powerfully than urban markets because rural markets are more closely linked with production. However, urban markets transmitted information more rapidly because of better infrastructure and communications.

- In total, rural foodgrain markets were better integrated than urban ones, despite better market information infrastructure in the latter. The difference could be explained by the higher level of control of price movements and foodgrain distribution activities in the urban markets and the higher level of private sector participation in rural markets.

- Slow flows of price information among rural foodgrain markets (low adjustment speed) and rigidity in urban price structures (low adjustment magnitudes) were found.

- There was a high frequency of unconnected links among urban foodgrain markets. For wheat, only 32 percent of urban market links had significant long-term price relationships. This implies that the majority of urban wheat markets are not affected by what happens in the rest of the country. This is the case for major cities (Cairo, Alexandria and Port Said), which seemed almost entirely segmented from the rest of the country; this may reflect a dichotomy between the import-dependent urban wheat markets and the rural markets, which are more closely linked to domestic production.

Border and Farm-Gate Prices for the Major Crops

Border prices at the farm gate were computed for wheat, maize, rice and sugar in the two periods, pre-reform and reform. To obtain border-price equivalents at the farm gate, world prices of the commodities were first converted to domestic currency. Transportation, marketing and processing costs were then taken into account to put world prices on a comparable farm-gate basis with domestic prices.

Border-price-equivalent prices for rice, as an export crop, were obtained by subtracting marketing and processing costs from its FOB world prices converted to domestic currency. Border-price equivalents at the farm gate for wheat, maize and sugar (importables) were obtained by adding market and processing costs to the CIF world prices converted to domestic currency. Two different exchange rates were used to convert world price in U.S. dollars to domestic currency: the official rate, i.e., the central bank rate, and the free rate (as a proxy for the shadow rate).

The results of computations of border-price-equivalent farm-gate prices for

the four crops during the period 1980-92 are reported in Table 9.4. Prices were computed for both official and shadow exchange rates for 1991 and earlier years. In 1992, exchange rates were unified and freed, so only the average market exchange rate was used.

Structure of Producer Prices

For comparison, average producer prices for wheat, maize, rice and sugarcane are reported in Table 9.5. Wheat, maize and rice were subject to mandatory delivery quotas in the pre-reform period and subject to voluntary deliveries in the reform period; prices are weighted averages of the prices received by farmers for the quantities delivered to the cooperatives (i.e., to the government) and for the quantities marketed through private channels. As for sugarcane, data on prices are official government prices reported by the MALR. Sugarcane is entirely procured by the government and delivered by farmers to public-sector sugar mills.

During the reform period (1987-92) guaranteed floor prices were offered for wheat and rice (after removal of mandatory marketing). Wheat floor prices are determined by the Ministry of Agriculture in consultation with the Ministry of Supply, which is responsible for bread and other food subsidies. The floor price for wheat is announced at planting time, which makes it possible for farmers to respond during the current season. Previously, administrative prices were usually announced at harvest time. Because wheat is a major importable crop, the Ministry of Supply has a great deal of weight in the pricing decision. It supervises

Table 9.4 Border-price-equivalent farm-gate prices for major crops, 1980-1992 (LE/mt)

Years	Wheat		Rice		Maize		Sugarcane	
	P _o ^b	P _s ^b						
1980	64.85	122.12	38.10	120.96	49.13	72.40	30.09	57.65
1981	140.82	163.86	111.21	158.59	211.70	129.30	32.75	38.11
1982	129.46	168.18	96.30	161.02	120.02	124.90	17.62	22.76
1983	128.33	186.15	114.76	163.88	98.26	183.40	17.70	25.68
1984	123.78	197.70	114.76	156.40	86.60	183.40	11.95	18.72
1985	112.67	203.40	99.30	136.40	57.51	178.60	10.03	17.47
1986	99.30	187.70	83.10	137.57	50.31	153.10	14.20	26.73
1987	105.72	243.00	81.70	207.56	59.96	179.50	15.98	37.76
1988	132.44	337.44	103.80	288.26	64.95	260.00	22.44	59.59
1989	227.90	439.58	162.90	348.13	129.85	307.40	41.00	81.97
1990	190.94	439.58	160.14	392.10	109.66	363.89	43.45	97.34
1991	320.20	449.68	283.58	468.73	291.08	397.10	51.20	72.37
1992	-	568.01	-	481.71	-	411.97	-	88.12

Source: Calculations by authors using data from the Ministry of Agriculture and Land Reclamation, Cairo.

Note:

P_o^b = Border farmgate price measured at official exchange rates.

P_s^b = Border farmgate price measured at shadow exchange rates (market rate in 1992).

Table 9.5 Farm-gate prices of major crops, 1980-1992

Year	Current LE/Ton			
	Wheat	Maize	Rice	Sugarcane
1980	87.3	122.9	80.9	9.6
1981	91.0	93.9	99.0	14.9
1982	81.7	124.9	131.4	15.5
1983	108.6	167.6	129.6	18.2
1984	124.0	172.8	136.4	20.2
1985	172.0	194.3	211.5	27.2
1986	224.7	219.3	247.3	30.5
1987	223.3	255.3	206.0	34.0
1988	237.3	324.3	256.5	38.0
1989	436.7	405.0	362.0	50.0
1990	473.3	428.6	267.0	58.0
1991	298.0	440.7	453.8	58.0
1992	526.7	435.7	482.8	66.0

Source: Department of Agricultural Economics and Statistics, Ministry of Agriculture and Land Reclamation, Cairo.

the activities of the General Authority of Supply Commodities (GASC), the agency responsible for importing the wheat needed to meet the demand for bread.

Import levels have some influence on domestic farm-gate prices because part of the imported wheat is sold on the free market. The government has been attempting to maintain relatively high farm-gate prices for wheat and to bring them closer to, or even higher than, international prices by increasing floor prices each year. The average farm-gate price for wheat almost doubled in 1989 compared with the previous year's price, increasing from LE 237.3 per ton in 1988 to LE 436.7 per ton in 1989. In the reform period, because floor prices of wheat are set relatively high, there have been no great deviations of free market prices from the floor price. Table 9.6 compares floor and free market prices for the major cereal crops for the years 1990-92. The market price for wheat exceeded its floor price by only 15.6 percent at most.

Floor prices for maize have been set by the Ministry of Agriculture since the

Table 9.6 Floor prices compared to free market prices for major crops, 1990-1992

	1990			1991			1992		
	Floor price (LE)	Free market price (LE)	Free Floor (%)	Floor price (LE)	Free market price (LE)	Free Floor (%)	Floor price (LE)	Free market price (LE)	Free Floor (%)
Wheat	467	540	115.6	498	550	110.4	500	526	105.2
Maize	429	550	128.2	480	560	116.7	411	435	105.8
Rice	300	450	150.0	400	510	127.5	400	451	112.8

Source: Egyptian Agricultural Situation, 1994, Agricultural Office Annual Report, Embassy of the United States, Cairo.

Principal Bank for Development and Agricultural Credit (PBDAC) began procuring maize through cooperatives. Free market prices of maize have been higher than floor prices, with the deviation reaching 28.2 percent in 1990 but decreasing to only 5.8 percent in 1992. Maize farmgate prices are also influenced by wheat prices (because maize is a close feed substitute for wheat).

Floor prices for rice are set by the Ministry of Agriculture. Public rice milling companies have control over the modern milling capacity in which export rice is milled. Rice farmgate prices have shown dramatic differences between floor prices and free market prices (Table 9.6). In 1990, free market prices were 50 percent above the floor price that year. However, the discrepancy decreased in the next two years, to 27.5 percent in 1991 and to 12.8 percent in 1992. Although rice exports represent no more than 10 percent of total rice production, rice farmgate prices are affected by the international prices of rice and the levels of exports.

Prices for sugarcane are set by the Ministry of Agriculture. In fact, the government has a monopoly to mill, refine and trade refined sugar through the government-owned Egyptian Sugar and Refining Company. Because sugar is subsidized for consumers, providing a higher price to growers has a negative impact on the government budget. Inefficiencies in the sugar mills, reflected in high milling costs, also undoubtedly contribute to the difficulty of raising producers' prices.

Domestic and Border Prices and Nominal Protection

Analysis of the relationship between domestic (producer) prices and border prices of the agricultural commodities studied reveals that the relationship changed more in the reform period than in the pre-reform period. Figures 9.1 to 9.4 show the evolution of crop farmgate prices relative to their border-price equivalents. The gap between domestic and border prices began to decrease after 1987. In most cases, however, the actual farmgate price increased even more. As a result, implicit taxation of the studied commodities diminished, as was verified by calculating nominal protection coefficients.

Nominal protection coefficients (NPC) also reflect the changing relationship between domestic and border prices.¹ Coefficients at the producer level were computed for the four crops for the period 1980-92, using the border-price equivalents measured at shadow and market exchange rates. The results are reported in Table 9.7. Computed nominal protection coefficients in the pre-reform period reveal that, with few exceptions, cereal crops (wheat, maize and rice) were taxed whereas in the reform period, nominal protection coefficients approach or even exceed 1, which means that price distortions at the producer level have been essentially eliminated. Sugarcane continues to be taxed.

Domestic and Border Price Variability

Measures of variability include variance, coefficient of variation and the Z-statistic. Variability measures were calculated for both domes-

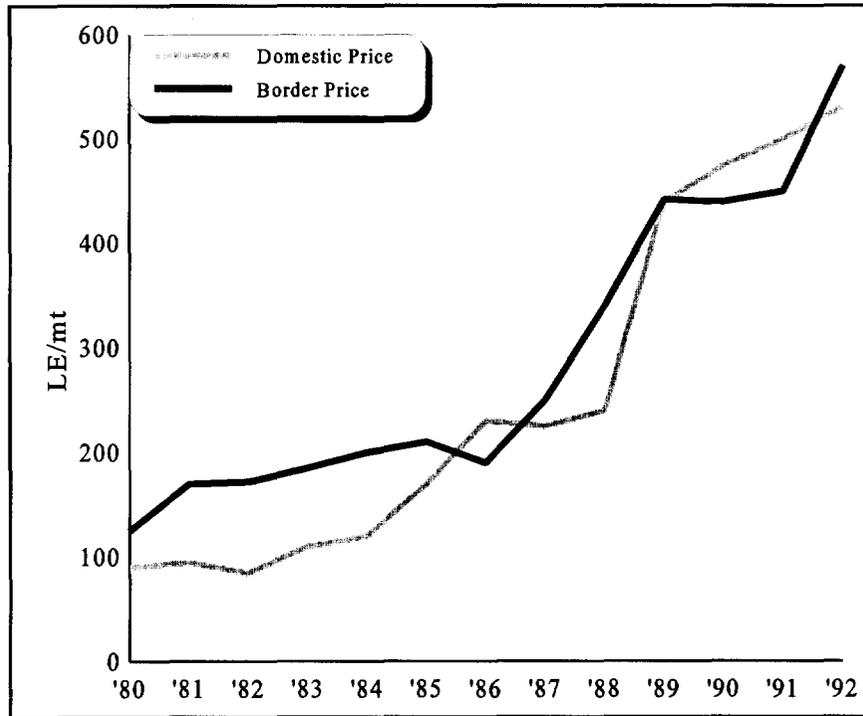


Figure 9.1 Domestic and border prices for wheat

Table 9.7 Nominal protection coefficients for major crops, 1980-1992

Year	Nominal protection coefficients (current LE/ton)			
	Wheat	Maize	Rice	Sugarcane
1980	0.71	0.67	1.70	0.16
1981	0.56	0.62	0.73	0.39
1982	0.49	0.82	1.00	0.68
1983	0.58	0.79	0.91	0.71
1984	0.63	0.87	0.94	1.08
1985	0.85	1.55	1.09	1.56
1986	1.20	1.80	1.43	1.14
1987	0.92	0.99	1.42	0.90
1988	0.70	0.89	1.25	0.64
1989	0.99	1.04	1.32	0.61
1990	1.08	0.94	1.18	0.60
1991	1.11	0.93	1.11	0.80
1992	0.93	0.94	1.06	0.75

Source: Derived from Table 9.4 and 9.5.

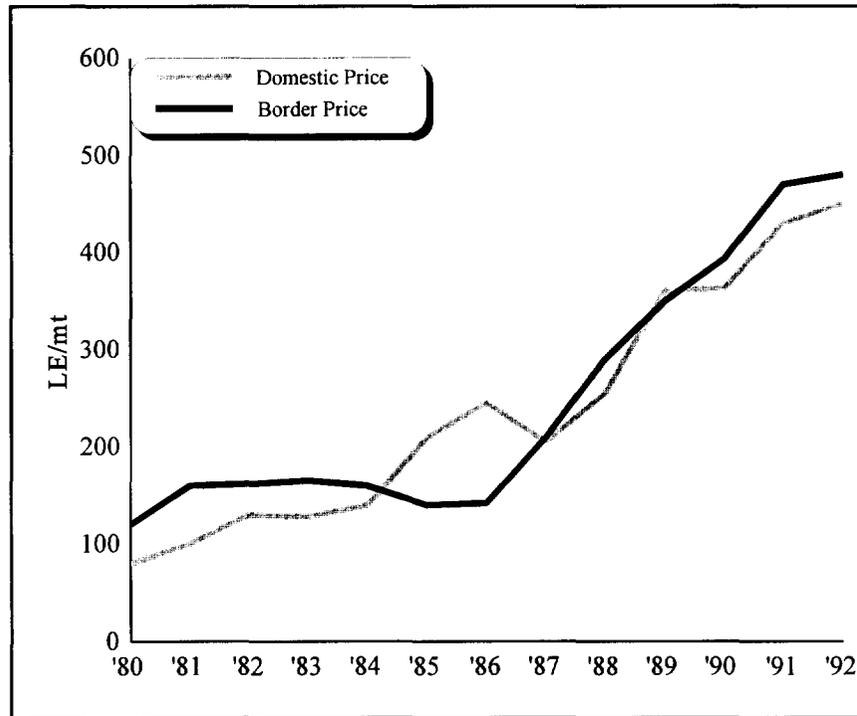


Figure 9.2 Domestic and border prices for maize

tic and border prices for crops in the pre-reform and reform periods as well as for the entire 1980-92 period (Table 9.8). When the pre-reform and reform periods are compared, the variance indicates that producer prices were more stable for all crops in the pre-reform period than in the reform period. However, coefficients of variation are higher in the pre-reform than in the reform period.

Differences in variances may be misleading inasmuch as the variance reflects the average distance from the mean of a variable. In principle, a policymaker may be more concerned about annual price fluctuations than about deviations from the mean. Therefore, an alternative measure to the variance and coefficient of variation is used to measure yearly fluctuations; this "Z-statistic" is defined as

$$z = \left[\frac{\sum_{t=2}^n (p_t - p_{t-1})^2}{n-1} \right]^{1/2}$$

where t = year of time period and n = number of observations of the price. Thus, the Z-statistic reflects the difference of price at time t from the previous year's price.

Estimates of the Z-statistic indicate that domestic (producer) prices were more stable in the pre-reform period than in the reform period. This result is expected, because more fluctuations usually accompany market-oriented price policies than prices based on government interventions.

In terms of domestic and border prices, the Z-statistic estimates show that domestic prices were more stable than border prices in the cases of maize and sugar but less stable in the cases of wheat and rice.

Needs and Alternatives for Stabilization of Prices of Agricultural Commodities

In terms of world price volatility, it is generally expected that reductions and changes in the form of agricultural protection through the recent GATT agreement on agriculture will allow a greater

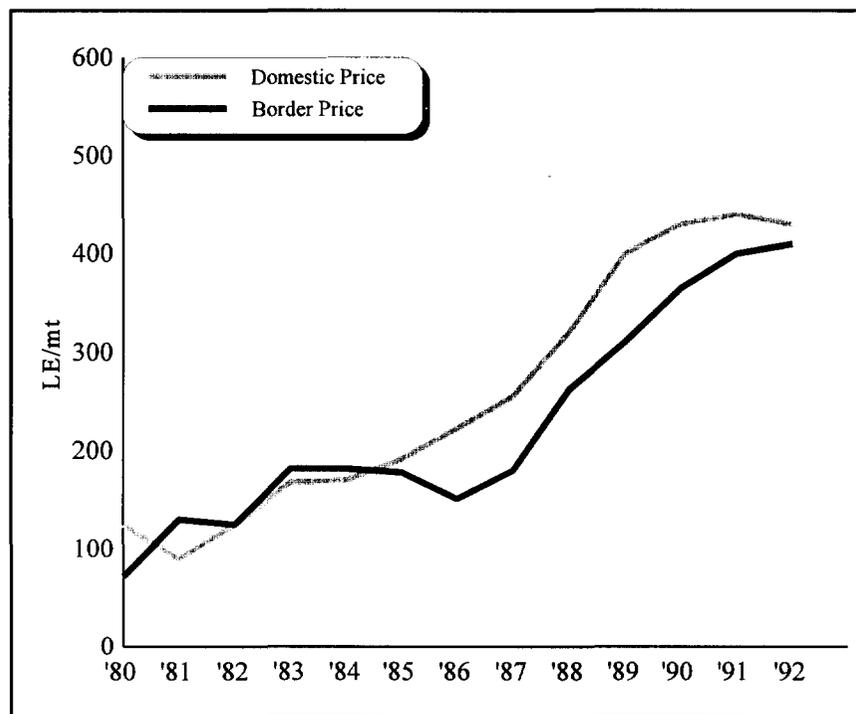


Figure 9.3 Domestic and border prices for rice

Table 9.8 Mean and variability measures for domestic and border farm-gate prices of major crops, 1980-1992

	Current LE/Ton											
	Wheat			Rice			Maize			Sugarcane		
	P _p	P _o ^b	P _o ^b	P _p	P _o ^b	P _o ^b	P _p	P _o ^b	P _o ^b	P _p	P _o ^b	P _o ^b
Mean												
1980-86	127.4	114.2	175.6	148.0	96.2	147.8	156.5	93.9	146.4	19.4	18.3	29.5
1987-92	399.2	182.9	412.8	346.7	109.3	364.4	381.6	132.0	320.0	50.7	29.1	72.9
1980-92	252.6	136.6	250.6	240.4	102.2	247.8	260.4	111.9	226.5	33.9	23.8	49.6
Variance												
1980-86	0.24	0.06	0.07	0.31	0.28	0.02	0.17	0.06	0.14	0.00	0.01	0.02
1987-92	1.50	1.01	1.02	0.78	0.83	0.82	0.47	0.76	0.66	0.01	0.03	0.04
1980-92	2.66	0.55	0.23	1.53	0.54	1.61	1.57	0.44	1.13	0.03	0.02	0.07
Coefficient of variation^a												
1980-86	0.386	0.207	0.146	0.375	0.553	0.102	0.262	0.268	0.259	0.346	0.432	0.446
1987-92	0.306	0.617	0.245	0.259	0.834	0.265	0.181	0.660	0.255	0.225	0.613	0.271
1980-92	0.646	0.545	0.592	0.515	0.719	0.512	0.481	0.589	0.470	0.534	0.609	0.548
Z-statistic												
1980-86	22.63		14.14	26.93		16.10	2.88		7.97	19.87		24.75
1987-92	59.67		55.16	42.62		43.75	5.00		10.97	26.74		34.09
1980-92	63.82		57.02	50.42		46.62	5.77		13.56	33.31		42.13

Source: Computed from data in Table 9.4 and 9.5.

^a Coefficient of variation is the ratio of the standard deviation to the mean, multiplied by 100.

Notes:

P_p = Farmgate price.

P_o^b = Border farmgate price measured at official exchange rate.

P_o^b = Border farmgate price measured at official exchange rate.

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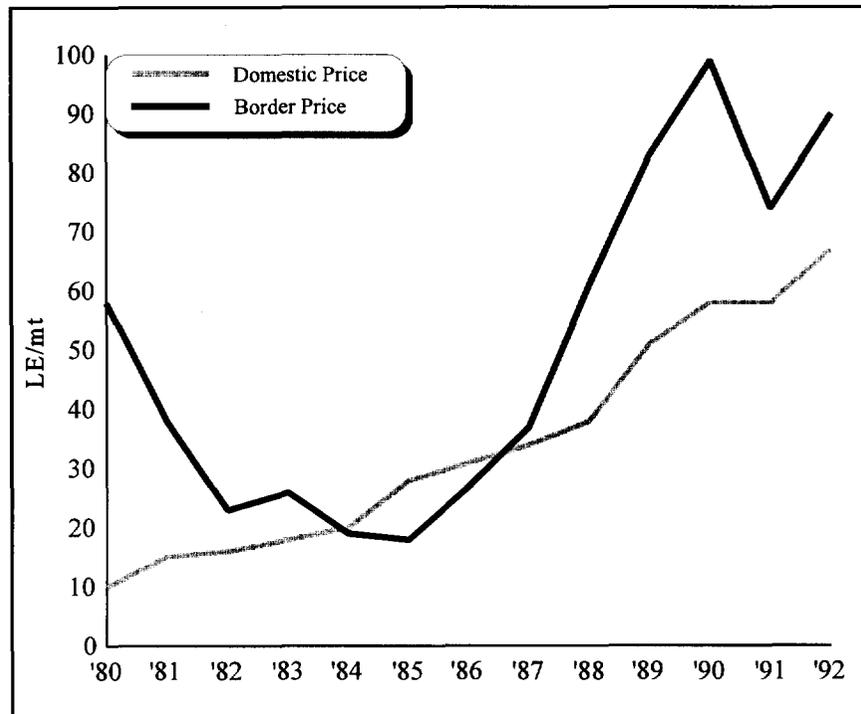


Figure 9.4 Domestic and border prices for sugarcane

transmission of world price changes to previously insulated markets, which in turn would reduce world price volatility on these markets. World price fluctuations would be dampened if production and consumption were more responsive to these fluctuations. However, reductions in instability will be less in practice than those expected in theory, for a number of reasons. One is that increased price uncertainty in industrialized countries could lead to greater production instability. A second reason concerns the impacts of reform on global cereal stocks, which in the past have been heavily influenced by the mechanisms for income support in industrialized countries. More market-oriented policies in these food-exporting countries will lead to a reduction in the level of public stocks, and this reduction may not be offset by private stocks. Thus, trade liberalization is likely to reduce the overall level of global stocks, which in turn could lead to increased price variability. In any event, if international price volatility is fully transmitted to the domestic market, then Egypt would experience greater instability of domestic prices.

Objectives of Price Stabilization

Price stabilization is meant to decrease domestic price fluctuations compared with world price fluctuations, both to minimize the macroeconomic effects of international price shocks and to reduce the impacts of price variability on producers and consumers. Macroeconomic effects are those that concern inflation, foreign exchange flows and government budget outlays. Price fluctuations can result in ups and downs in foreign exchange flows, which could potentially destabilize fiscal and monetary policies. However, price stabilization may result in destabilization of the government's budget, leading to macroeconomic and (in the case of food imports) balance-of-payments problems. In Egypt, where the government tries to maintain low domestic prices of bread, high world prices of wheat would dramatically increase the food subsidy budget. Price stabilization can also be justified by the adverse microeconomic effects of uncertainty created by price volatility (Knudsen and Nash 1990).

Domestic Price Stabilization Schemes for Tradable Agricultural Commodities

Domestic price stabilization schemes, which aim to minimize the impacts of international price fluctuations by stabilizing either domestic prices or export revenues (or import expenditures), have been used often in developing countries. Examples of price stabilization schemes include buffer funds and marketing board operations. However, for many schemes, actual objectives have differed greatly from stated objectives. In many cases, domestic prices have adjusted too slowly to international prices, increasing the costs of maintaining the schemes. Their success in providing price stability over long periods has been poor.

Tradable crops are those for which there are clear border prices and for which, in the absence of government intervention, movements in domestic market prices closely follow movements in border prices. Stabilization of domestic producer prices for tradable crops may be achieved either through variable taxation or by the creation of marketing boards. In the first approach, stabilization is achieved through progressive tax rates, i.e., producers pay higher rates of taxation when prices are high. In buffer fund schemes, proceeds from a progressive export taxation are added to a buffer fund that is to be paid out as subsidies when required. For the buffer fund to be in balance in the long term, the long-run price must be accurately estimated. If tax evasion is common, it may be easier for a government to stabilize producer prices by setting up marketing boards to act as monopsony buyers. Marketing boards can reduce price risk by offering forward delivery contracts to farmers at the start of the crop year. The marketing board would then offset its contracted price risk by trading on organized futures exchanges.

The principle behind the agricultural product stabilization funds is that in periods of decline in commodity prices, the government draws on reserves to pay

subsidies to producers. However, experience with commodity stabilization funds in some developing countries shows that receipts are seldom sufficient to sustain payments in times of prolonged downturns in commodity prices, and thus funds ensure only against short-term declines. Moreover, when commodity prices are not stationary, the moving average of past prices is an unreliable estimate of the long-run price, and the scheme is likely to fail. One way to adjust the rules of a scheme is to shorten the moving-average period, thus preventing fiscal exhaustion. However, this procedure lowers the extent to which prices are stabilized. Another way to delay the exhaustion of the funds would be to allow a maximum of 50 percent of the fund to be paid out as subsidies in any one year. Again, there would be a tradeoff in that the fund would become weaker in stabilizing producer prices.

Using a moving average of past prices is a standard way to estimate long-run price levels.² In forming a moving average, it is desirable to make adjustments both for exchange rate changes as an important source of commodity price fluctuations and for changes in purchasing power. Either under a variable export tax scheme or under monopsony purchasing, domestic prices should be based on futures quotations so as to avoid large expenditures.

Successful moving average stabilization schemes can reduce price variability and thereby reduce revenue uncertainty. However, it is possible, through hedging, to reduce uncertainty without significantly affecting price variability. The producers sell some or all of their planned production forward at a price settled when the contract is made but with payment made on delivery. Because forward and future prices of storable commodities tend to move in line with cash prices, hedging by selling forward does not reduce interyear revenue variability, but it can substantially reduce the uncertainty associated with those revenues.

Small farmers in a developing country such as Egypt do not have access to organized forward or futures markets, which requires actions on the part of some intermediary. A marketing board could, at the time of planting, announce a price at which the board is committed to purchase at harvest. This price would be based on the current futures quotation for the month in which the board would be able to deliver the quantities it purchases from the farmers. The board then could sell futures corresponding to this delivery month to offset its risk with the farmers. Reform of the domestic marketing system and changes in the legal code will be necessary for such a scheme to be viable. A futures-based, forward-pricing scheme would be attractive in situations where planting decisions for annual crops can be affected by the reductions in price uncertainty. In Egypt, cotton is a crop for which such a scheme could be beneficial.

Floor Price Guarantees

Floor price guarantees are variants of forward-pricing schemes. In these schemes, the marketing board offers farmers a guaranteed price floor rather than a fixed price. Floor price guarantees and forward-price schemes

differ with respect to producer price uncertainty. A forward-price contract substantially reduces, but does not eliminate, the price risk faced by farmers, and thus farmers' decisions are still influenced by price risk; suitable floor guarantees will enable farmers to plan without fear of jeopardizing their financial viability and thus will allow them to calculate more precisely the profitability of alternative production plans.

Tariff-Based Schemes for Stabilization of Import Prices

Introducing stabilization by imposing import tariffs is an approach that attempts to avoid problems associated with commodity price fluctuations. Transmission of price fluctuations in the international market to the domestic economy would be determined by the level of tariffs. The government would search for a tariff structure that neither increases nor decreases the long-run average producer price and that, at the same time, protects producers against extreme price fluctuations. The tariff structure should also be transparent and not distorting of intersectoral production shares, so as to afford protection equitably across commodities.

The two extremes of tariff-based schemes are the variable-tariff scheme and the fixed-tariff scheme. The first adjusts to fluctuations in international prices so that domestic producers and consumers face no price risk; in contrast, a fixed tariff provides no insulation against external shocks from the international market, so that changes in world prices are reflected in the domestic market. A variety of tariff structures lie between these two extremes; one may be preferred if it allows international market changes to be reflected in the domestic market, while still providing some protection against sharp price movement.

In the case of import tariffs, domestic prices are set a fixed amount above the world price. Such tariffs are relatively easy to administer and are legal from the viewpoint of the GATT regulations. However, they are not able to insulate the domestic agricultural sector from unstable domestic prices associated with sharp movements in the exchange rate.

Variable tariffs schemes include reference-price schemes, minimum-price schemes, and price-band schemes. In a reference-price scheme, domestic price is linked to the world price and guaranteed in each period to producers and consumers. Algebraically,

$$\begin{aligned} P^d &= ER (P^r) \\ T &= P^d - ER (P^w) \text{ or } T = ER (P^r - P^w) \\ GR &= T(M) \end{aligned}$$

where

P^d is the domestic price,
 ER is the exchange rate,

- P' is the moving average of the world price,
 T is the fixed tariff,
 P^w is the world price,
 GR is the government revenue, and
 M is quantity imported.

This tariff structure lowers the price variability facing producers and consumers. Risk is transferred to the government in the form of unstable tariff revenues. A five-year moving average of domestic prices is frequently used as the reference price.

A price-band scheme could act to avoid the sharp variations in prices and real incomes that result from liberalizing trade and that cause social and political instability. A price band is defined as a pre-established range of price variation within which markets would be free to function (Braverman et al. 1992). Aspects of operation of price bands for traded goods can be summarized as follows:

1. In the case of an imported commodity such as wheat, if world prices fall, the government may impose an import tax to protect producers as well as to protect the price policy.

2. In the case of an imported commodity such as maize, if world market prices increase to very high levels, the government may grant an import subsidy to avoid undesirable effects on domestic users such as poultry producers.

3. Symmetrically, in the case of an exported commodity such as cotton, if the world price falls, the government may grant a subsidy to exporters.

4. In the case of an exported commodity such as cotton, if world market prices increase, the government may tax exports.

5. The levels of prices that trigger interventions are pre-announced and known by all agents in the market, so that no *ad hoc* decision is made with respect to how, when, and at what price government will intervene in the market.

6. Within these price limits, the market is free to operate. In other words, the proposed price band system of trade-based stabilization will hold domestic prices of tradable crops within a pre-established range.

7. Import and export taxes are used only as stabilizing devices, not as a means of either taxing agricultural income or protecting domestic producers.

The upper and lower intervention prices for each commodity would be expressed as a ratio of basic reference prices, which might be a 36-month moving average of past prices. The parties involved in the determination of price bands are the industrial sector, farmers and the government, which all have contradictory interests. The industrial sector would push for lower price levels, for the imposition of export taxes and for import subsidies. Farmers would push for higher support prices and for higher price levels through the imposition of import taxes and export subsidies. The government would push towards wider bands in

order to have a “balanced” fiscal policy fund. There would be a process of negotiations over the upper and lower intervention prices, which should be based on a clear statement of the availability of funds in the fiscal budget for the program.

Modern Risk-Reducing Policies

Risk management techniques can be divided into two groups: traditional tools and modern techniques. As far as commodity price risks are concerned, traditional risk management mechanisms include stabilizing international or domestic prices of commodities and export diversification. A second group includes a number of market-based instruments (Claessens and Duncan 1993).

Modern risk management techniques have developed over the past 20 years in response to increasingly volatile commodity prices. The importance of these techniques has been widely recognized in industrialized countries, but, in the developing world, their application has been limited, partly by barriers to the introduction of risk management techniques. Yet, many corporations and governments, in developing as well as developed countries, could benefit from hedging risks. Risk-reducing policies can complement medium-term structural adjustment programs.

Hedging does not, however, mean consistently higher export prices or lower import prices. It is a tradeoff of predictable prices against future price movements that may mean windfall gains or losses. Further, risk-reducing policies in a developing country can be effective only in concert with sound overall economic management practices, including the ability to project, record, and manage balance-of-payments and external financing flows. If risk management tools are used inappropriately, they can be costly.

Building up a feasible strategy for risk management in terms of commodity price risk using a market-based approach would involve the following steps: (1) identification and analysis of risks, (2) assessment of legal and institutional aspects, and (3) design of the policy.

The first step, identification and analysis of risks, determines how the impacts of international price changes are distributed among various parties in the domestic economy. The parties involved include financial intermediaries, exporting or importing firms, final producers or consumers, other intermediaries, and the government. Risk management mechanisms affect the distribution of price changes through domestic regulations, accounting practices, taxes, tariffs, subsidies, quotas, domestic price stabilization schemes, and the market structure of competition. It is important to quantify the exposure of the different parties. To measure exposure, data on price movement will have to be collected.

In the second step, assessment of legal and institutional aspects, legal impediments to the use of risk management instruments are explored. The

existence of legally binding domestic fixed-price contracts, which are practical means of hedging, will also need to be investigated. For example, if the absence of domestic fixed-price contracts arises from incomplete linkage to international markets, a first step in hedging strategy might be to encourage an intermediary to hedge externally in the international markets. Also, a suitable accounting framework for hedging is needed.

Measures to enhance a liberalized domestic marketing system should allow expansion of the use of risk-management instruments by the private sector. It is important first to determine the role of the private sector in risk management for the benefit of the country; the role of government should then be analyzed.

The following topics should be addressed in the third step of policy design:

1. the exposure of the country to external price fluctuations;
2. the institutional structure governing the impact of external risks on fiscal and export revenues or fiscal and import expenditures, profits, etc.;
3. the parties who bear risks from external price fluctuations;
4. the risk-management tools actually in use;
5. the potential benefits from risk management;
6. local legislation or regulations impeding hedging and other risk-management instruments;
7. the level of understanding of price exposure and the benefits and means of hedging in the private sector and in the government;
8. the major obstacles to risk management in terms of communication facilities and commercial barriers;
9. the implications of price uncertainty for the general budget, i.e., the government fiscal exposure;
10. the objectives that the government would like to achieve by using the different risk-management instruments;
11. the existence of conflict between government needs and private sector needs regarding risk management;
12. the current role of the central bank in risk management and necessary changes for the implementation of a risk-management program;
13. regulatory requirements to accommodate the implementation of a risk-management program; and
14. the needs for technical assistance and training in both the private sector and the government, to enable them to manage price risks, along with the costs of the services to be provided.

The policy paper should consider the possibility of establishing, if necessary, a unit for risk management in the public sector, such as the Ministry of Economy or the Ministry of Supply. A task force may be set up to alter legal, accounting and institutional frameworks, organize technical training and educational seminars, provide technical assistance, and implement a pilot risk-management program.

Stabilization of Consumer Prices

It is generally agreed that the size of the benefits of stabilization depends on the difference between the coefficient of relative risk aversion and the income elasticity of demand for the commodity. The risk reduction benefit is given as: $\text{benefit} = w(p - \eta)\sigma^2$, where w is the share of the commodity in total consumption, p is the representative agent's coefficient of relative risk aversion, η is the income elasticity of demand for the commodity, and σ^2 is the variance of the commodity price. Because food commodities are typically necessities with less-than-unitary income elasticities, and with a reasonable p for risk aversion, benefits will be positive and large if the share of the commodity in total consumption is large. Furthermore, substantial benefit from stabilization can be realized by the poor, who are likely to devote a much larger proportion of their budget to food and have very high risk aversion parameters. Food security concerns suggest that the government might maintain stocks for release in time of shortage or might facilitate imports, but the benefits arise predominately from the avoidance of very high prices, not from the reduction of variability over the entire range of the price distribution and not by moving away from market prices. However, it may be worthwhile to subsidize food commodities during periods when prices become very high if poor consumers depend heavily on those commodities.

Domestic Price and Trade Policies under Liberalized Agricultural Markets

Egypt is now committed to policies that allow price changes and trends in international commodity markets to be reflected in domestic markets. By more closely linking domestic prices to international prices, as a result of reform policies and the GATT, Egyptian producers and consumers will be exposed to world prices that fluctuate widely. Price fluctuations will represent a dramatic change from the situation under the previous price regime, in which agricultural prices were generally stable and were known when production decisions were made. The only source of risk to producer revenues under such a regime was from the uncertainty of crop yields. Because of fears of both microeconomic and macroeconomic consequences as well as social and political effects, the government of Egypt may wish to insulate domestic markets from extremely high or low international prices by introducing commodity-price stabilization schemes.

Commodity price instability has its microeconomic effects on the welfare and economic decisions of individual producers and consumers. The majority of Egyptian small farmers are characterized by high risk aversion and poor investment incentives as a result of the institutional structures that developed under past agricultural policies. Because the government fixed farm prices for major crops for more than thirty years, Egyptian farmers and even government

officials have had little experience in managing market price risks. For noncontrolled crops, i.e., horticultural crops, livestock products and some other field crops, farmers managed price risks on the farm through crop diversification or by modifying use of agricultural inputs. Also, because price uncertainty was removed through administrative prices, third party, off-farm risk-management options and instruments failed to develop in Egypt; moreover, no use was made of international futures and options markets. Price instability affects farmers' willingness to invest. Given higher real interest rates caused by elimination of subsidies on loans and decreased availability of agricultural credit, farmers are expected to be less willing to invest in the face of commodity price risk. Moreover, private agents are expected to be more reluctant to lend to farmers, especially small farmers, given that the perceived default probability is increased by commodity price risks. In effect, price stability will remove some of the risk associated with long-term investment in agriculture. Furthermore, if Egyptian farmers are highly risk averse, the welfare benefits of reducing price and income variability are likely to be substantial.

Price stability is also very important on the consumers' side, for a variety of reasons. For a large proportion of the population, food constitutes a major component of the household budget, and higher food prices can reduce purchases significantly. The political consequences of sharp increases in food prices were made very clear by a number of events, the most violent of which were the riots of January 17-18, 1980, in response to the sudden increase in retail prices of some food items, especially bread.

Specific characteristics of the Egyptian economy make it rather vulnerable to external risks: heavy dependence on primary commodity exports, heavy reliance on imported food and outside aid, large debt burdens, and relatively poor infrastructure. Egypt is particularly vulnerable to commodity price changes because of the large share of primary commodities in total exports as well as the large share of essential foods in its imports.

Over the past five years, although Egypt has reduced its dependence on wheat imports (from 75 percent to 50 percent), its dependence on imports of some other basic foods such as vegetable oil has increased, and Egypt's exposure to price risks remains significant. For example, a \$1 movement in the price of wheat still implies a change of about \$5 million in Egypt's foreign exchange expenditures.

Because market failure and price instability may reduce private investment in the agricultural sector, commercialization and the achievement of an efficient, responsive agricultural sector require the development of an appropriate institutional framework that will encourage responses both by groups and by the government to complement individual actions. In this regard, agricultural cooperatives could be of great assistance, especially in the field of marketing agricultural products.

Egypt particularly needs to stabilize prices of commodities that are basic staple foods and that represent large portions of the food basket for the poor. It

is crucial that the government pursue this goal in a way that avoids intensive government control and ownership of crops. A price stabilization system should be transparent and predictable, operating by well-known rules; such a system could be achieved through variable border taxes and possibly subsidies, but not through direct public procurement and trade.

Price stabilization in Egypt is thus justified from the point of view of food security. Food security is an import dimension of welfare and requires ability by the poor to successfully engage in consumption smoothing. The policy instrument to use for this purpose depends on the sources of income the poor have and the institutional mechanism they use for gaining access to food. Net buyers require interventions to stabilize prices, which can be achieved through specific international trade controls (variable levies), buffer funds, price controls and rationing, and use of futures markets. For net sellers, the need is to stabilize income rather than to stabilize the prices of what they produce. Income stabilization requires emphasis on diversification and crop insurance schemes. Providing access to credit for consumption smoothing is an effective mechanism for allowing the poor to assume greater risks in income generation and thus to achieve both efficiency and welfare gains. Policies and programs such as food subsidies and social funds may also be introduced to compensate for the welfare effects of unexpected external shocks.

Conclusions

Both Egypt's domestic policy reforms and the GATT agreement have significant implications for the Egyptian economy in general and domestic markets in particular. Egypt is committed, in the context of the reform program and the GATT, to policies that allow price changes in international commodity markets to be reflected in the Egyptian markets. Therefore, Egyptian producers and consumers will be exposed to prices that fluctuate widely. Because of fears of both microeconomic and macroeconomic consequences as well as social and political effects, the Government of Egypt may wish to insulate domestic markets from extremely high or low international prices by introducing commodity price-stabilization schemes. Some degree of price stability will remove part of the risk associated with long-term investments in agriculture. Furthermore, if Egyptian farmers are highly risk averse, the welfare benefits of reducing price and income variability are expected to be substantial.

Price stability is also very important on the consumers' side, because for a large proportion of the population, food constitutes a major component of the household budget and higher food prices can reduce purchases significantly. Sharp increases in food prices would have serious political consequences. Therefore, Egypt must stabilize prices, particularly for commodities that are basic, staple foods and that constitute a large portion of the poor's food basket. Further, it is crucial that the government pursue this goal in a manner that avoids intensive

government control and ownership of crops. The price stabilization system should be transparent and predictable and should be operated by well-known rules.

The policy instrument to use for food price stabilization to enable the poor to successfully engage in consumption smoothing depends on the sources of income the poor have and the institutional mechanism they use to obtain access to food. For net buyers, this will require interventions to stabilize prices, which can be achieved through specific international trade controls (such as variable levies), buffer stocks, price fixing and rationing, and use of futures markets. For net sellers, the need is to stabilize income rather than to stabilize the prices of what they produce. Income stabilization is best done by crop diversification and insurance schemes. Access to credit for consumption smoothing is an effective means of allowing the poor to assume greater risks in income generation and thus to achieve gains in both efficiency and welfare. Policies and programs such as food subsidies and social funds should also be introduced to compensate for welfare effects of unexpected external shocks.

Stock programs that would, as a risk-reducing scheme, stabilize but not raise prices could reduce risk under liberalized agricultural markets in Egypt. Implementation of such a program would also allow pursuit of other goals such as food security and provision of buffers against risks in world prices of imported agricultural commodities.

Egypt's liberalized agricultural markets for major crops are characterized to a large extent by fragmentation: low levels and magnitudes of price transmission that lead to high transport and information costs that indicate market failure. In Egypt, the commercialization of agriculture is hindered largely by inadequate information and incomplete capital and credit markets. Market failure and price instability may reduce private investment in the agricultural sector.

As far as price transmission is concerned, the success of market liberalization can be judged by its contribution to the reduction of local distribution costs and the strengthening of the mechanism of transmission of price signals among local markets. Improvement in the degree of integration, in terms of both magnitude of market interdependence and speed of price transmission, among local markets is critical to ensuring broad-based ramifications of the changes in incentives that are expected to come about with the reform process. Analysis of these indicators for the period 1975-1992 revealed the following:

- In spite of the dramatic changes in production and marketing regulations since 1986, reforms have not destabilized foodgrain prices.
- The private sector has succeeded in gradually expanding its participation in the distribution process, which was previously controlled mostly by the government, without destabilizing local foodgrain prices.
- The degree of segmentation among agricultural commodity markets appears to have decreased during the reform period for rural wheat and maize markets, although not for rice markets. Markets for the first two crops were

liberalized much earlier, which brought a decrease in the number of segmented markets.

- Urban markets, particularly wheat but to a lesser extent maize, exhibit a much higher degree of market segmentation. The most segmented markets are the major centers of Cairo, Alexandria, and Port Said, which exhibit price dynamics entirely disconnected from the rest of the country.
- Nominal protection coefficients for wheat and rice have been around unity during the reform period, except for one or two years. This means that price distortions have been minimized. Producer prices increased gradually, especially in the period 1987-92, when the markets were liberalized.

With respect to the effect of international trade liberalization on future world prices, reducing subsidies to agriculture in the industrialized countries would lower domestic farm prices in many of those countries but would increase world prices for most commodities. The greatest rise in world prices would be for dairy products, followed by sugar. This reflects the high levels of assistance to these commodities in most industrial market economies and the importance of these economies in the world sugar and dairy markets. World prices for wheat, rice, coarse grains and ruminant meat (beef, mutton, and lamb) would also increase significantly for the same reasons. World prices for oilseeds and oilseed products will increase little, because domestic prices of those commodities are not supported in the industrialized market economies.

The Egyptian economy is specifically characterized by some features that make it rather vulnerable to external risks: heavy dependence on primary commodity exports (agricultural commodities and oil), heavy reliance on imported food and outside aid, large debt burdens, and poor infrastructure. Given both the large share of primary commodities in Egypt's total exports as well as the large share of essential foods in its imports, Egypt is particularly vulnerable to world commodity price fluctuations.

Although Egypt has reduced (from 75 percent to 50 percent) its dependence on wheat imports over the reform period, 1987-92, its dependence on some other basic food imports such as vegetable oil has increased, and Egypt's exposure to risk remains significant.

Domestic price-stabilization schemes aim to minimize the impacts of international price fluctuations by stabilizing either domestic prices or import expenditures (or export revenues). These schemes include buffer fund and marketing boards, floor price guarantees, variable tariffs, and food security and distributional schemes.

Providing farmers the opportunity to share or trade at least a portion of risky marketing with other groups in society can improve efficiency and farmers' welfare. Risk-management or price-stabilization strategies that might be improved without substantial government intervention include insurance (risk sharing), forward markets (risk trading) and stock management (risk reduction). Forward

markets include futures, forward contracts, and options that are market-based instruments for domestic market stabilization. For such risk-reducing policies to be effective requires sound overall economic management.

Public policies should be adopted to develop a market information system to communicate market signals quickly and accurately to all participants in the agricultural commodity markets (input suppliers, farmers, traders, processors, exporters and consumers). A market news service should be developed to perform functions including gathering, analysis, interpretation and dissemination of news. Appropriate training programs are needed to complement this effort. Producers and traders regularly engaged in market transactions usually develop informal methods of obtaining up-to-date information on market conditions; however, government dissemination of market information can be of assistance in giving small producers information on current market conditions. For commercial growers, what may be of more value are situation and outlook forecasts of factors likely to influence future prices. The government might usefully evaluate the effectiveness of its current market information and intelligence services with a view to ensuring that they are credible and effective.

Notes

1. $NPC = P_p/P^b$, where P_p is the domestic producer price and P^b is the border-price equivalent; $NPC < 1$ implies a tax on producers, $NPC > 1$ implies a subsidy for producers.

2. In the most simple form of a nonstationary price, the appropriate estimator of the long-run price turns out to be an infinite average with exponentially decreasing weights (for example, 1, $\frac{1}{2}$ and $\frac{1}{4}$). This gives a long-run price, η , defined by

$$\eta_t = (1-\gamma) \sum_{i=0}^{\infty} \gamma^i P_{t-1-i}$$

An n -year moving average scheme may be justified as an approximation to this exponentially weighted estimate by setting the number of years in the moving average as

$n = \frac{1+\gamma}{1-\gamma}$. Thus a value of $\gamma = \frac{1}{2}$ is roughly equivalent to a three-year moving average

and a value of $\gamma = \frac{2}{3}$ suggests a five-year moving average.

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10

Agricultural Processing, Marketing and Trade in the Reform Era

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As pointed out in Chapter 1, the world economic and political environment has undergone dramatic changes in the past decade. A broad consensus has formed that the great social and economic experiment with central planning and related socialist development doctrines was a failure. This chapter briefly reviews the principles that previously guided economic development in Egypt and many other developing countries and contrasts them to the policy orientation that has emerged since the mid-1980s. It then reviews the organization of marketing and processing in the major crop subsectors. It concludes with recommendations to improve performance and stimulate private investment and business activity in the marketing and processing industries.

The Old and New Development Models

The earlier development strategy was based on a belief that, because productivity is generally higher in manufacturing than in agriculture, priority should be given to industrialization. The policy instruments for achieving the strategy were:

- taxation of the agricultural surplus;
- protection of import-substituting manufacturing industries;
- maintenance of relatively low industrial costs through cheap food and low wages;
- highly overvalued exchange rates and trade policies designed to protect domestic industry against foreign competition and to transfer resources from agriculture to consumers and industrial producers.

Research studies in the seventies and eighties have made it clear that those policies resulted in high rates of taxation of the agricultural sector and low rates of overall economic growth (Schiff and Valdés 1992).

The strategy was accompanied by a set of policies rooted in a revolutionary reaction to perceived exploitation in the countryside and a belief that the benefits of development would be more equitably distributed through state ownership of production enterprises. Many believed that private middlemen should be eliminated or replaced by state companies or "cooperatives." Thus, side by side with the land reform, a number of controls on state ownership and state production and subsidies were introduced. Over time, in response to pressures and evolving conditions, changes were made that created a patchwork of uncoordinated market interventions. Prices were still used in some cases to allocate resources but with great distortions created by the interventionist policies. Private businessmen found niches where their companies could survive and sometimes thrive, especially if the owners could obtain special dispensations based on social or political ties or through offering favors to government employees or state company managers.

The result was underdeveloped and badly distorted marketing channels. The production bias, coupled with distrust of middlemen, had the effect of stunting the normal development of the marketing system. Farmers were expected to sell directly to consumers or to state processing monopolies. Those processing monopolies were expected to deliver no-frill products directly to private retailers or to state or cooperating retail outlets. The system prevented the normal development of the classical cost-reducing functions of intermediaries (especially wholesalers), i.e., sorting, accumulation of supplies, building up of assortments of goods and distribution of those goods to retailers, using low-cost order and physical handling systems (Stern and El Ansary 1982).

The new model of economic development toward which Egypt has moved is based on open and competitive markets that are coordinated by freely negotiated prices between private buyers and sellers. The liberalization strategy of this new policy includes eliminating import tariffs, export taxes and controls, exchange controls, interest rate subsidies, and all forms of producer and consumer subsidies. Its commitment to privatize state-owned companies in most industries recognizes the advantages of private-sector business operations.

In this new economic environment, profitability becomes the major objective of farmers and businesses throughout the economy. Competitive forces are relied on to assure equitable distribution of the benefits of development. Suddenly farmers and other businessmen must learn how to efficiently allocate scarce resources to achieve acceptable incomes. As the market economy spreads, producers will find it advantageous to utilize the services of intermediaries to perform the functions of marketing more efficiently. They will find it mandatory to learn what end users want in terms of product characteristics, quality,

packaging and price. They must learn how to meet those requirements to maximize sales and profits. Marketing textbooks summarize the required business marketing strategy with four P's: product, price, placement and promotion.

Under this new model, government institutions and employees have a completely different role; instead of direct market intervention, the government's function is to encourage innovation, efficiency and fair competition among private firms. This includes the creation of a legal and regulatory environment conducive to economic efficiency and competition as well as the provision of those services and goods that private firms find unprofitable to provide for themselves, e.g., basic education and vocational training; development and transfer of innovative technologies; and production, price, trade and consumption data and other economic information.

Lessons from Rapidly Growing Economies

A recent study documented how eight East Asian countries have achieved extremely high and sustained rates of economic growth with equitable distribution of the benefits (World Bank 1993). The average rate of growth per capita for that group of countries (Japan, the Republic of Korea, Hong Kong, Singapore, Thailand, Indonesia, Malaysia and Taiwan, China) was about 5.5 percent per year from 1965 to 1990. Moreover, all of those countries have reduced income inequality over the period.

The study concluded that high rates of private domestic investment and rapidly growing human capital were the principal engines of growth. Their governments have provided a stable macroeconomic environment in the framework of a price coordinated economy, a reliable legal framework to promote domestic and international competition, an emphasis on promotion of exports, and an absence of price controls and other price-distorting policies. Agricultural policies stressed productivity change through technological innovation and did not tax the rural economy excessively.

On the other hand, these countries pursued some economic policies that were inconsistent with the neo-classical model. They implemented mild financial repression (keeping interest rates low but positive), directed credit, selective industrial promotion and export-promotion trade policies.

In 1973, Chile embarked on a similar development path. Economic growth results have been similar, although the record in reducing income inequalities has been less impressive. While most of the East Asian economies heavily promoted industrial exports, Chile has focused heavily on agricultural exports. The fundamental reasons for Chile's economic success are much the same as for the success of the East Asian countries.

Among the high-performance economies, perhaps the most appropriate model for Egypt is Chile because of its success in using high-value agricultural exports

as an engine of growth. Egypt also has potential to rapidly expand exports of horticultural products as well as other agricultural products, especially cotton and rice.

The high-growth countries ensured that policy incentives were in place to encourage businesses to focus on large and profitable export markets. Although Egypt has been moving toward similar policies, its economy was much more centrally planned than that of any of the other countries mentioned. Moreover, the rate of liberalization has been much more rapid in the agricultural sector than in other parts of the Egyptian economy.

Agribusiness in the New Development Model

The rapid move toward more open economies around the world has had the effect of accelerating the process of globalization of agricultural markets. The new GATT agreement has given impetus to that process, as have regional trade agreements such as the North American Free Trade Agreement. The Asia-Pacific Economic Cooperation agreement commits the eight high-performing East Asian economies, as well as China, the United States, Mexico, Chile and several other countries, to the removal of all trade barriers by 2010. The European Union, a reluctant participant in the process of liberalization of international trade policy, is being forced to consider ways to stay abreast of the process or risk being left behind. It is important to recognize, however, that even with the current trade restrictions embodied in the increasingly outdated European common agricultural policy, market opportunities abound for horticultural products from Mediterranean Basin countries such as Egypt (National Agricultural Research Project 1994; Kelly Harrison Associates, Inc. 1994).

The liberalization of world markets presents a great opportunity for Egypt. But that opportunity can be exploited only if Egypt continues and accelerates the process of restructuring its economy along the lines that have proved so successful in East Asia and Chile. A major part of that restructuring must include the development of agribusinesses, applying modern technologies and management principles, so as to be competitive in the world market. In addition, Egypt's large internal market is a greater source of demand than was the case in most of the countries mentioned previously; Egypt has 50 million consumers who spend an average of 50 percent of their incomes on food and an additional amount on clothing. The cost of those consumer goods in Egypt are relatively high as a result of inefficiencies in state-owned food and fiber processing monopolies (Chemonics 1993; Winrock International 1993; University of Arkansas 1994) and because of non-innovative intermediaries (New Lands Study 1994). Thus opportunities abound for internal as well as external market liberalization.

A Food and Fiber System Approach

The food and fiber system approach focuses on the interactions and interdependency of system participants acting as a coordinated group, rather than concentrating on farmers, traders and individuals performing separate production and marketing functions.

The degree and effectiveness of coordination significantly affects the productivity of the entire system. Constraints and bottlenecks at any level of the system may lower overall system productivity. Conversely, productivity increases in one part of the system have the potential not only to increase the efficiency of participants at that stage but also to improve the productivity of the whole food system. The systems approach stresses how better coordination among participants at different levels of the food and fiber system and alternative institutional arrangements can improve productivity.

The system participants that produce, transform and distribute the full range of agricultural commodities include input manufacturers, input suppliers, agricultural producers, first handlers, wholesale traders, importers and exporters, processors, retail firms, institutional buyers, consumers, agricultural policy-makers, and managers of state enterprises. Critical factors that shape the opportunities and behavior of food system participants are laws and regulations, credit agencies and policies, agricultural production and market information, formal and informal rules governing property rights and contracts, and agricultural sector policies. Macroeconomic and international trade policies and conditions also profoundly affect the food system overall as well as the profit opportunities and incentives of participants in the system.

Agribusiness

Farmers and the firms that provide inputs to farmers, as well as those firms that buy, process, market and sell commodities in the food and fiber system, are all called agribusinesses. Using that definition, agribusiness is the largest single component in the Egyptian economy. It employs the vast majority of Egyptian workers. At one time, agribusiness was responsible for a significant percentage of the country's exports. The government policies from 1950 to 1986, however, put the food and fiber system at a competitive disadvantage that resulted in a dramatic decline in agribusiness exports. Agribusinesses may be privately or publicly owned. However, most publicly owned agribusiness companies in Egypt, as in other countries, have poor performance records.

Agro-Industry

The term "agro-industry" is used to refer to a specific subset of agribusiness firms. An agro-industry has been defined as "an enterprise that processes materials of plant or animal origin. Processing involves transformation and preservation through physical or chemical alteration, storage, packaging,

and distribution” (Brown 1994). The concept of transformation and preservation through physical or chemical alteration is crucial in this definition.

Channel Captain

The literature on industrial marketing has recognized the importance of close vertical coordination or integration of production and marketing activities needed to deliver goods that optimally satisfy consumer demands. The organizer of a coordinated production and marketing chain has been called the “channel captain.” The international automobile industry well illustrates this concept of channel captain. In that industry, multinational automobile companies design the products perceived to satisfy consumer wants and then make arrangements with thousands of independent producers to deliver individual component parts to large-scale, strategically located and highly efficient assembly plants. The company coordinates efficient delivery of the final product through thousands of dealers all around the globe.

United Fruit Company was probably the first multinational company to apply the principle of channel captain to agricultural products. Early in this century it arranged for marketing, in the U.S. and other industrialized countries, of bananas from tropical production sites. Dole, Standard Fruit, Geest and many other banana companies copied and modified that model. In more recent years the concept of channel captain has become commonplace in U.S. and world markets for poultry, textiles, fresh and processed fruits and vegetables, and other products.

Under the channel captain system, producers, marketing firms, service industries and transportation companies become strategic partners with their channel captain, each recognizing the need of participants in the channel to a reasonable profit for their contributions to the process. Channel captains and their strategic partners must compete with other channel captains and their partners for national and world markets. In addition to specialization and division of labor, economies of scale, and location economies, channel captains are able to capture the benefits of external economies often lost to individual firms and consumers in atomistically competitive marketing channels. Retail chain store food companies apply the channel captain concept by arranging for strategic partners, such as food processors, fresh produce suppliers, and others, to deliver products to their wholesale distribution centers for re-assortment and efficient delivery to the channel captains’ own or affiliated retail stores. McDonald’s, Pizza Hut, Kentucky Fried Chicken and other companies have quite successfully applied the channel captain concept to fast food restaurants in countries all over the world, Egypt included. In some cases they combine the channel captain concept with franchising to achieve quality control and efficient management.

The Egyptian Food and Fiber System in the Global Economy

To compete successfully in today's international market, businesses must be prepared to adopt the quality standards set in more advanced economies and to do so at competitive prices. Moreover, with the liberalization of imports, the same adjustment is increasingly necessary within domestic markets. For example, the qualities and prices of Egyptian bananas and other fruits have clearly changed in response to the increased availability of competing imported products.

The channel captain concept is rapidly spreading in Egyptian agribusiness. Large scale citrus and potato exporters are increasingly producing their own supplies or contracting with growers to satisfy foreign buyers. The same phenomenon is observed in the emerging export system for grapes, green beans, artichokes and other fresh products. Tomato and potato processors are applying the concept, as are McDonalds, Pizza Hut and Kentucky Fried Chicken. Application of the concept will undoubtedly soon spread to other products (e.g., poultry, rice, cotton, vegetable oils) and into retail food chains and consumer goods distribution in Egypt. It is also interesting to note how rapidly fertilizer and pesticide dealers are adopting the market-oriented approach that characterizes those industries internationally.

Egyptian policy reforms since 1986 have significantly affected the economic environment in which agribusinesses operate. To a large extent, agribusinesses are now free to determine what, when and how to produce and where to market their products. Decisions are largely driven by profitability. While many agro-industrial companies are still state owned, there are no laws to prevent private companies from competing. The process of privatizing some of those state companies is, however, just beginning. The major commodity subsystems in the rapidly changing Egyptian environment are analyzed in the following sections of this chapter.

The Cotton Subsector

Cotton, long one of Egypt's most important crops, has been a major source of foreign exchange earnings and a major source of income for Egyptian farmers. Cotton is a key element in the crop rotation requirements for large numbers of Egyptian farmers. With the recent termination of planting and cropping controls, it is not clear whether farmers (as profit-motivated agribusinessmen) will use the same rotations. Most Egyptian production is extra long and long staple varieties (often referred to as extra fine cotton varieties). Production declined dramatically from 1980 to 1989, primarily as a result of low farm prices; yields dropped from over 1 ton to .68 tons per feddan during that period. Lint cotton exports trended downward from about 1970 to 1992.

The Cotton Marketing System

Marketing flows for cotton are depicted in Figure 10.1. Through 1994, the entire marketing and processing system was almost totally dominated by the state-owned enterprises. The only private companies in the system were in knitting and garment production.

Decisions affecting the whole subsector have been guided by the priorities of a strong industrial textile industry and by a policy favoring industrial development. State-owned textile industry expansion was pursued at the great expense of farmers and with a loss of competitiveness in international markets. The state-owned textile companies expanded under the direction of government ministries and with the protection of subsidies, trade restrictions, preferential exchange rates and easy access to public credit favoring capital-intensive investment and unrestrained indebtedness. In that environment, the management culture became highly centralized and bureaucratic, with little incentive for innovation and practically no attention to international market signals.

Coordination of product flows has been poor and prices highly arbitrary under the system of state control. Most yarn from the state-owned spinning mills has been allocated to state owned companies, making it difficult for private companies to obtain stable supplies for weaving and knitting operations. Similarly, prices for raw cotton have been fixed by the state. The recent reforms to free cotton prices and permit private cotton trade will dramatically change that part of the industry.

The Cotton Textile Industry

As already noted, most cotton processing and textile enterprises in Egypt are state-owned. Under its liberalization and privatization policy, the government of Egypt has now organized the state factories under four different holding companies. Each holding company has at least one affiliated company specialized in each of the following activities: trading, ginning and manufacturing. Eight of the 25 manufacturing companies have minority private ownership because, at the time of nationalization, the equity held by some shareholders was not confiscated.

About half of the 25 textile manufacturing companies are large, vertically integrated enterprises. All are engaged in spinning and weaving. Many are also engaged in knitting, dyeing, finishing and producing ready-made garments. A key feature of these companies is excess capacity in spinning, the result of a decision to expand and modernize textile spinning in Egypt, using easy access to public bank credit. The result was over-investment in the most capital-intensive portion of the textile industry.

Privately owned and managed companies dominate the knitting and garment production segments of the industry. A large number of small firms carry out cottage industry production. Their operations have been heavily and often detrimentally influenced by the actions of public sector companies upstream.

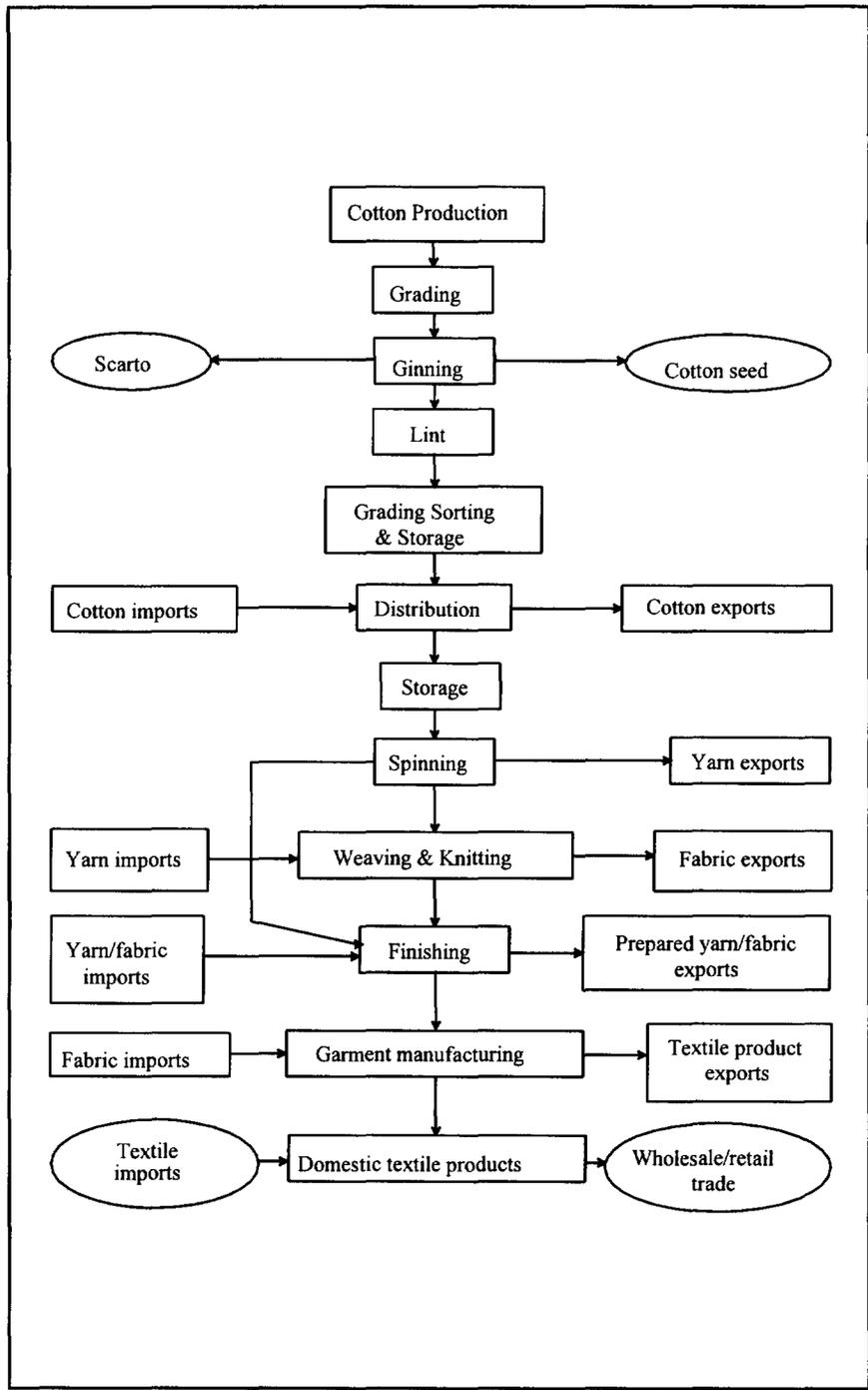


Figure 10.1 Cotton marketing system

Cotton Exports

State ownership of the industry, coupled with the policies already described, has been responsible for a dramatic decline in raw cotton exports. Meanwhile, raw cotton imports have grown rapidly to a level exceeding exports (Figure 10.2).

Studies indicate that Egypt has international comparative economic advantage in the production of extra fine cotton (World Bank 1992). It is also likely that Egyptian textile products can be competitive in the international marketplace, but only if the industry is privately managed (Figure 10.3).

Developing the Marketing System

Government-dominated management and erroneous assumptions about world markets and global competition have relegated Egypt to a small specialized segment of the fiber/textile industry that requires a combination of efficiency, innovative excellence and quality control to succeed. The industry has failed in its efforts because of low levels of productivity, poor utilization of

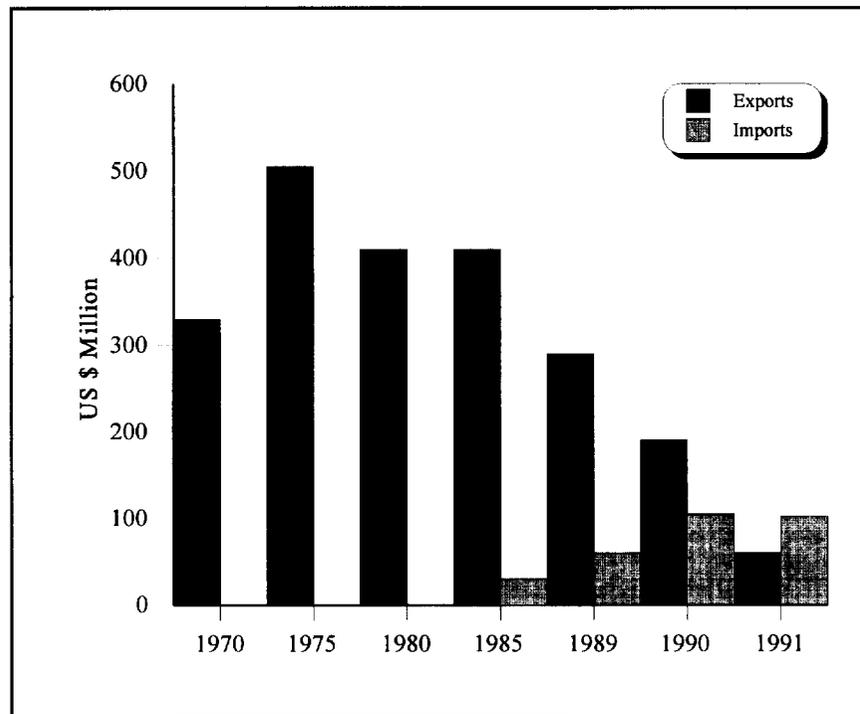


Figure 10.2 Lint cotton exports and imports. (Source: Department of Agricultural Economics and Statistics, Ministry of Agriculture and Land Reclamation, Cairo)

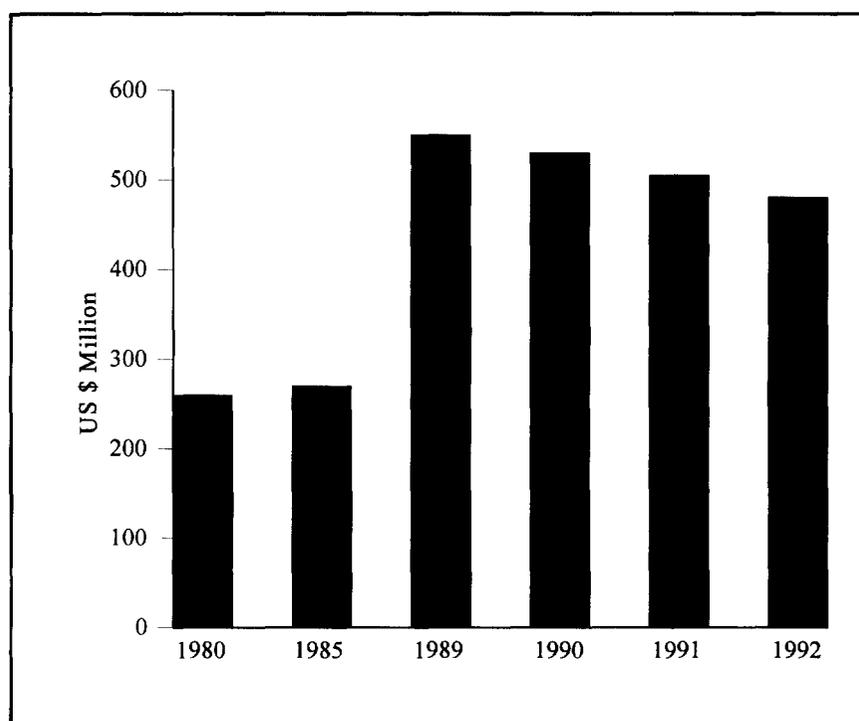


Figure 10.3 Cotton textile exports. (Source: Department of Agricultural Economics and Statistics, Ministry of Agriculture and Land Reclamation, Cairo)

available technological knowledge, lack of understanding of world markets, and low levels of management creativity and innovation. Recent policy changes freeing prices, eliminating subsidies and beginning the process of privatization are an excellent start toward correcting those errors.

Complete privatization of all businesses in the industry should be the objective. It is doubtful that simply selling shares in the companies to current managers and employees will accomplish the goal of converting the enterprises into market-oriented companies capable of making the creative and innovative decisions needed to compete in international markets. Because Egypt is now committed to import liberalization, it will be difficult for firms with existing management to compete even in the domestic market without subsidies.

Because most of the companies are in poor financial condition, and because they are large and complex companies requiring major capital for privatization and rejuvenation, the process of reform will be difficult and time consuming. The strategy recently suggested by a study team is fundamentally sound (Chemonics International 1993). It proposed two phases of liberalization:

Phase I: Liberalization and asset sales. This includes implementing measures with respect to both policies and institutions. It also includes privatizing companies or operating divisions attractive to the private sector, downsizing the spinning segment of the industry and liquidating loss-making companies or operating divisions. Many of their policy recommendations have already been implemented, but institutional changes are only now being studied.

Phase II: Restructuring and divestiture. This involves restructuring and divesting companies that are relatively unattractive to the private sector. It includes implementing management contracts with technical partners or negotiating performance contracts between the GOE and public companies to raise company performance and market value. This phase is yet to be implemented by the GOE.

Donor assistance could help to bring market-oriented, experienced advisors to assist in implementing that strategy as quickly as possible. It could also help the government of Egypt develop an economic intelligence system to provide decision makers with the information needed to make profitable decisions related to the four P's of market-oriented business planning: product characteristics and quality, pricing, promotion and placement. Donor assistance could also help develop a system that would disseminate information on production and marketing technology and related management practices.

Government officials and new company managers will face strong resistance from vested interest groups, especially ministry officials, managers and labor representatives who have benefitted from the old system. They will face charges that the new system will radically reduce industry employment, with ominous implications for political stability. The privatization study estimated that 50,000 to 100,000 employees could be laid off or re-employed in other parts of the industry. If textile firms are turned over to private ownership with innovative management, vertical channels are likely to be restructured according to the channel captain concept. The result should be lower costs through improved technology utilization and management. The industry will more quickly become competitive on international markets, boosting demand and creating new jobs. In an efficient, market-oriented environment, many temporarily displaced employees can be re-employed in labor intensive garment making activities as well as in other parts of the industry. Moreover, if a similar market-oriented privatization strategy is implemented in other parts of the food and fiber system, new jobs can be created as the agribusiness component of the economy moves to exploit its comparative advantages in global markets.

The Rice Subsector

Rice is Egypt's third most important summer crop, after corn and cotton. Most of the production and milling activities are concentrated in the northern delta governorates and, as for other

crops, all production is irrigated. Production of rice, which is a heavy user of water, consumes an estimated 18 percent of all irrigation water. There is no charge for the water at this time, but, except for that subsidy, most other subsidies and government controls were removed before the 1992 crop year. Egyptian consumers prefer the shorter grain Japonica rice variety and pay higher prices for it than for the long grain Philippine rice variety. Consequently, about 85 percent of total production is Japonica rice. As described in Chapter 5, the number of feddans planted to rice and total production remained fairly stable from 1970 through 1991. Policy reforms and significantly higher procurement prices created a dramatic increase in acreage from 460,00 in 1991 to 560,000 feddans in 1994. Yields have been increasing steadily to about 5 tons per feddan, now among the highest in the world.

After removing all restrictions on rice production and trading, the voluntary government procurement price paid by public-sector companies was increased from LE 300 in 1991 to LE 400 per ton in 1992 and 1993. That support price was dropped to LE 350 in 1994. The market price was considerably above that level (about LE 700 per ton in 1994). As a result, a significantly lower percentage of the crop was sold to government mills in 1994.

The Marketing System

Current rice marketing channels are depicted in Figure 10.4. The amount of paddy being handled by the private traders and private mills has gone up substantially since 1991. During the 1993-94 season, the rice holding company for public-sector milling purchased only about 9 percent of the total paddy production. Public rice mills have had difficulty supplying export orders (University of Arkansas 1994).

Rice Milling

The total rice milling capacity is estimated at 4.2 million metric tons per year. Over half of that capacity (2.7 million MT) is held by 3,000 small privately owned village stone mills. Those village mills are low technology and inefficient, but their milling costs have been lower than those of the 52 larger and more technologically advanced public-sector mills, which have about 1.3 million MT in milling capacity. In between those two extremes are the 37 large privately owned mills with a total annual milling capacity of about a quarter of a million tons per year (Foreign Agriculture Service 1994).

Public-sector mills, which are capital-intensive and technologically sophisticated, are considered to have held the rice milling margin extremely high (International Food Policy Research Institute 1994). Several reasons have been given for the high operating costs of public-sector mills: (1) poor quality paddy procured through the network of "cooperatives," (2) extra marketing and transportation costs resulting from procurement through the cooperatives, (3) excessive and unproductive labor and poor management, (4) high overhead and

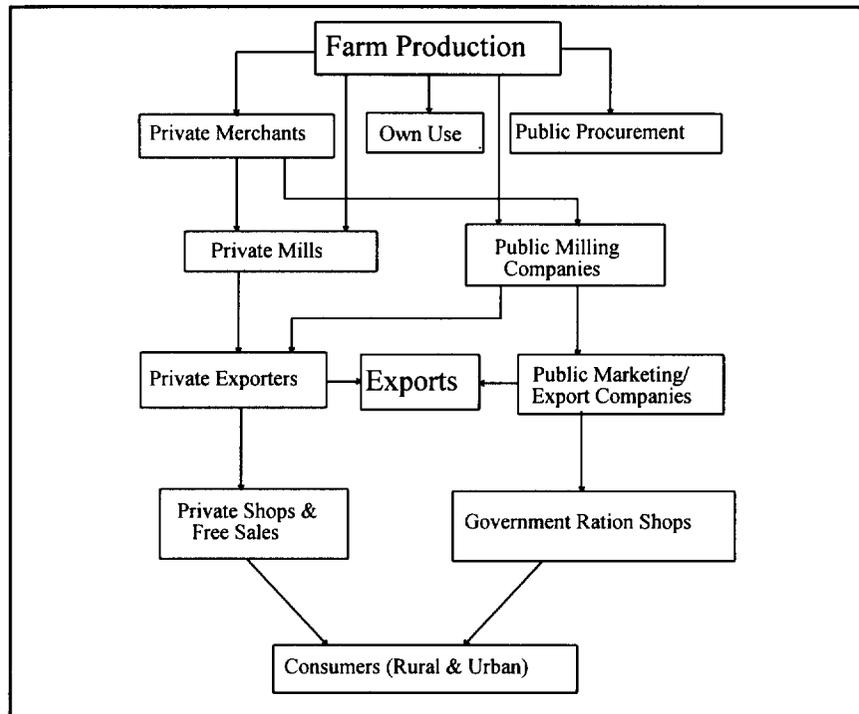


Figure 10.4 Rice marketing system

operating costs associated with the sophisticated technology in those mills, and (5) declining utilization of milling capacity.

Private merchants have quickly established themselves as the dominant buyers of paddy rice. They have also indicated a strong preference for using private mills.

Rice Exports

Although production has increased significantly in the reform period, a large portion of that increased production has been purchased by Egyptian consumers. Domestic rice consumption has almost doubled since 1989, stimulated by rising availability and lower real prices at the retail level. Nevertheless, rice is Egypt's third largest export commodity after cotton and citrus (Figure 10.5).

Public-sector mills are still the major source of export-quality rice. Private exporters, who can either purchase milled rice or have their own paddy custom milled at private or public mills, have become more important since the lifting of

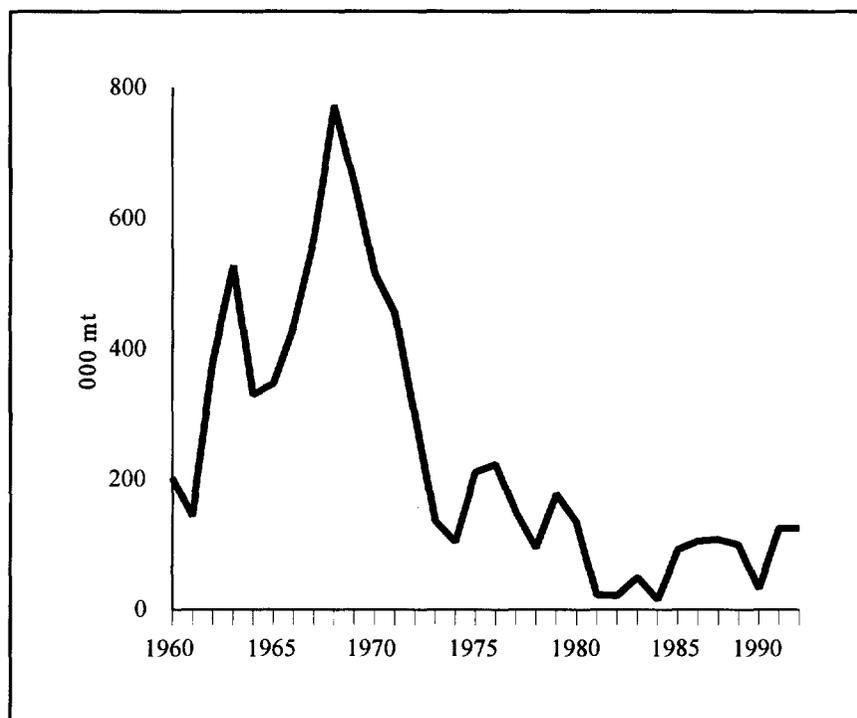


Figure 10.5 Rice exports. (Source: Department of Agricultural Economics and Statistics, Ministry of Agriculture and Land Reclamation, Cairo)

the government exporting monopoly. It is estimated that at least 40 percent of rice exports are now handled by private traders, who tend to concentrate their sales in nearby African and Middle Eastern countries rather than the export markets served by the public trading companies.

Developing the Rice Marketing System

The government of Egypt has initiated a policy to privatize its rice mills. The rapid shift toward dominance of the private sector in trading, milling and exporting appears to be putting strong competitive pressure on the government procurement and milling components of the system. It appears that the current public-sector approach may not remain viable. The collection of paddy rice through the cooperatives seems to be particularly inefficient.

There is an opportunity for rice exporters to take on the role of channel captain, coordinating the entire process from procurement through exporting. On the basis of export market opportunities, they can contract for high quality paddy,

arrange for efficient transport to the nearest and least-cost mill, negotiate milling volume discounts, impose milling quality controls, arrange efficient transport to the nearest and most efficient port, and contract for efficient sea freight to market destinations. Over time, some of those exporters are likely to vertically integrate into the ownership of rice mills. The benefits of that market structure will come in the form of cost reductions in assembly, transportation, storage, milling and marketing; significant economies of scale and economies of close coordination can be achieved in all those activities. As long as there are several such vertically integrated coordinated exporting companies, competition can be robust and the economy can benefit from reduction in costs as Egyptian rice exporters become more competitive and exports rise. If a vertically coordinated, high-volume, low-margin domestic food wholesaling/retailing system existed at this time, the same pattern could be expected to evolve relatively quickly in the processing and marketing of domestically consumed rice.

The Wheat Subsector

Wheat is by far the dominant staple food in Egypt; over 30 percent of the caloric intake is from wheat flour products, primarily bread. The government of Egypt has subsidized bread consumption for decades as a way to raise nutritional levels and to benefit low-income families. Annual per capita bread consumption of 152 kilograms is one of the highest in the world. Wheat production has long been important in Egypt. As recently as early in this century, Egypt was a major wheat exporter. Under the prevailing policies after 1960, however, massive wheat imports became necessary. Since 1986, agricultural policy reforms have created the economic incentives for Egyptian farmers to produce record quantities of wheat for seven consecutive years.

While area planted has been increasing steadily under economic liberalization, most of the increased production has been the result of higher yields (see Chapter 5). Successful government efforts to encourage adoption of higher-yielding varieties and lower-cost inputs from the privatized distribution system are the major factors behind those dramatically improved yields. Wheat imports, which had increased steadily since 1960, dropped significantly in 1990 and have remained stable since (Figure 10.6).

The Wheat Marketing System

The marketing system for domestic wheat is quite different from that for imported wheat (Figure 10.7). Wheat is produced as an irrigated winter crop on small farms. Rice and wheat marketing channels are quite similar. Much of the production is converted to flour in small private village mills, and the flour is sold to local bakeries or returned to farmers for home consumption. Public-sector companies purchase a portion of the local wheat supply at voluntary procurement prices announced before the production season begins. That portion

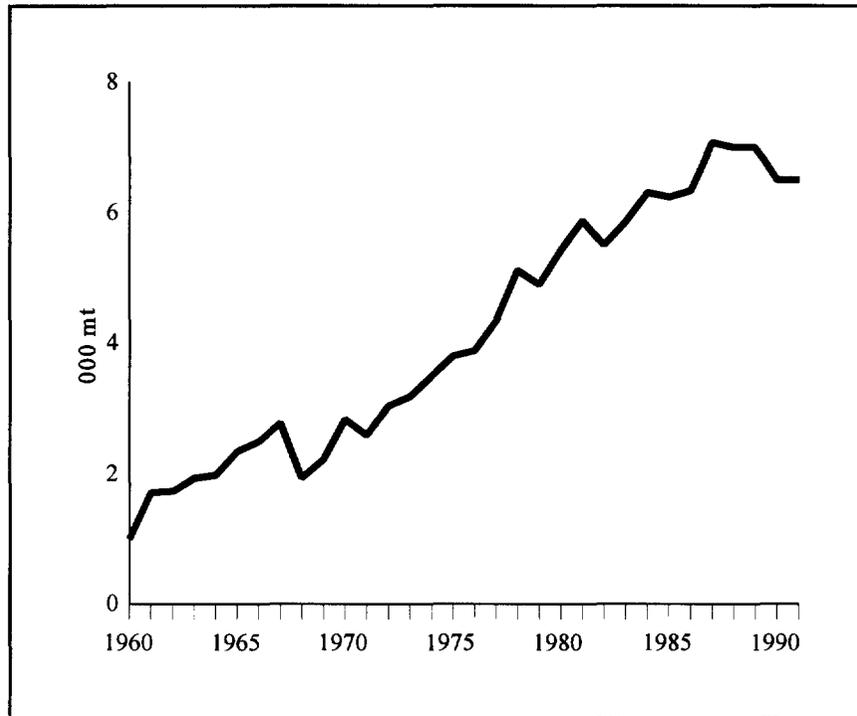


Figure 10.6 Wheat imports. (Source: Department of Agricultural Economics and Statistics, Ministry of Agriculture and Land Reclamation, Cairo)

of the wheat supply is delivered to public-sector mills for grinding and then to bakeries for production of baladi and other types of breads and pasta products. The amount of domestically produced wheat ground in privately owned mills, other than the small village mills, is still quite small. Until recently wheat imports were made only by the public sector. The private sector is now permitted to import wheat, all of which is ground in public-sector mills on a contract basis. The flour from imported wheat is sold to public- and private-sector bakeries. Baladi and shami breads are produced from wheat flour milled at an 82 percent extraction rate. Bakeries producing baladi and shami bread are able to obtain that flour at a highly subsidized price (about one-third of the market price) as long as they sell the bread at government-specified prices. Breads, pastries and pastas produced from other types of flour are sold at market-determined prices.

Flour Milling

The public sector owns most of the flour milling capacity, including 64 stone mills and 68 cylinder mills with a total daily capacity of about

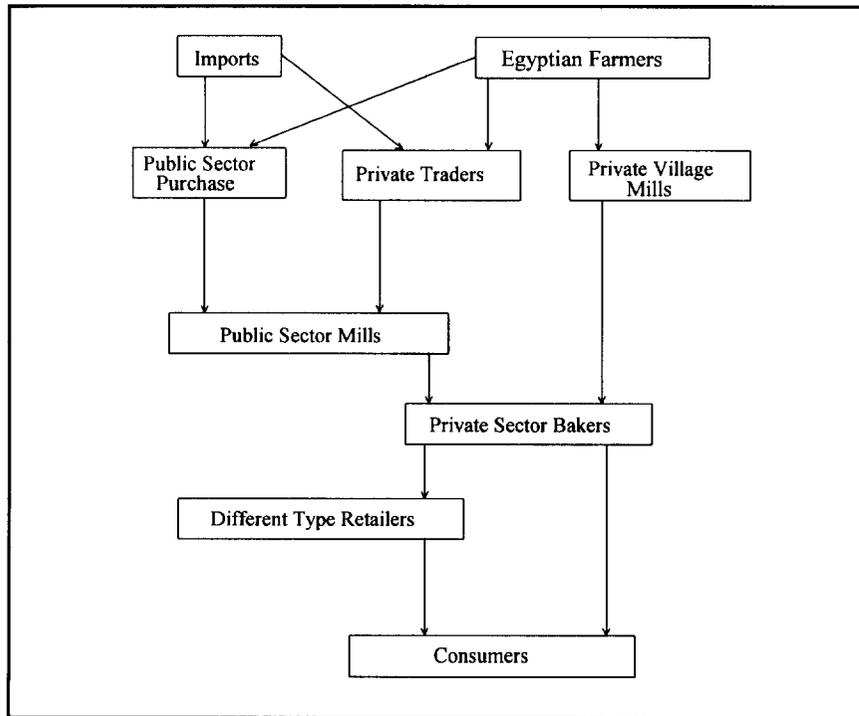


Figure 10.7 Wheat marketing system

16,000 metric tons. About 35 privately owned village stone mills have a combined capacity of 1,600 metric tons per day.

In September 1993, the public-sector mills signed contracts with seven private-sector companies. For both imported and domestically procured wheat, the public-sector mills agreed to unload, handle, transport, mill and deliver the flour to warehouses or bakeries designated by the private-sector companies. Since February 1994, public-sector mills are also tendering for imported wheat and purchasing local wheat for milling on their own account. It is reported that public-sector mills may not have renewed expiring contracts with the private-sector companies, because it is more profitable to procure, mill and sell for their own account. Many of the private companies are said to be considering building their own import handling facilities and storage and milling capacity. At the same time, the government has indicated it plans to offer shares of some public-sector mills for sale.

Developing the Wheat Marketing System

The wheat subsector is still heavily dominated by public-sector involvement in the handling, storage and milling components. It is not clear when or if private businessmen will be allowed to take control of the existing facilities. Nor is it clear when or if private investors will want to pay the prices requested by government for those facilities. The other option is for private investors to build new facilities. It must be recognized that either case represents a good deal of risk and will require management capacity that may not yet exist in the private sector in Egypt. At best, the process of privatization is likely to take several years. As private-sector companies move into ownership and management of processing and handling facilities, and assuming that vigorous competition evolves among several private groups, the handling, storage, transportation, milling and distribution of wheat products is likely to become more efficient. The major sources of that efficiency will be scale, location and transportation economies, as well as management improvements.

The Corn Subsector

Corn is the major summer crop in Egypt, and white corn was at one time a major part of the Egyptian diet. Low-cost and subsidized wheat gradually encouraged consumers to switch to bread as the dietary staple, so that only about 20 percent of corn supplies are now used for human consumption.

Corn is considered to be one of the most profitable crops by Egyptian farmers. Most production is lower-yielding white corn, but yellow corn plantings have been increasing with the encouragement of government and aggressive marketing of hybrid seeds by international seed companies. The area planted to corn has been stable since 1960, while yields have nearly tripled, from 2.2 to nearly 6.3 metric tons per hectare. Yet that average yield is still considered low, given the excellent growing conditions in Egypt.

Demand for corn has been increasing rapidly, primarily because of the rising consumption of animal products (meat, milk, eggs, chicken meat). Domestic production has not been able to keep pace with that rising demand, which has created a steady increase in imports (Figure 10.8). Imports declined in 1987 in response to the 1986 price liberalization policies, rose back to 1986 levels in 1990, dropped again in 1992 and have been trending upward since. The rise in poultry and egg production to 75 to 80 percent of installed capacity has created particularly strong demand for yellow corn.

The Corn Marketing System

Most corn production (about 3 million metric tons) is kept on farms and used as cattle feed in combination with berseem clover, which is produced as a winter forage crop following corn. An estimated 1.1 million tons

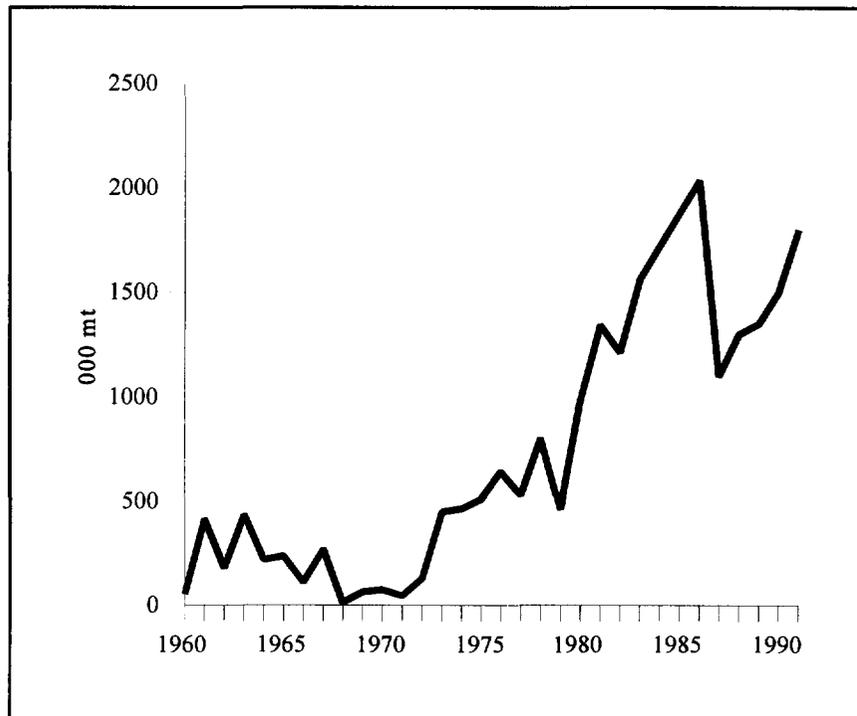


Figure 10.8 Corn imports. (Source: Department of Agricultural Economics and Statistics, Ministry of Agriculture and Land Reclamation, Cairo)

is used for direct human consumption, mostly in nearby villages, and a small amount is sold for production of corn starch and corn syrup. Very small quantities of domestically produced corn are sold to commercial feed manufacturers, because most Egyptian production is mainly white corn whereas poultry feeders want yellow corn for their mixed feeds. As a result, yellow corn has been selling at a premium of about LE 50 per ton in Egypt, in contrast to most other countries, where white corn sells at a premium.

Imported yellow corn is used almost exclusively by feed manufacturers, mostly for poultry feed. About 90 percent of corn imports are made by the private sector. Many of the port handling and storage facilities are still government owned. Private sector companies are increasing their participation in the physical handling functions (Figure 10.9).

Corn Processing

The processing of corn for human or industrial uses is relatively unimportant in Egypt. Corn starch and corn syrup are the major

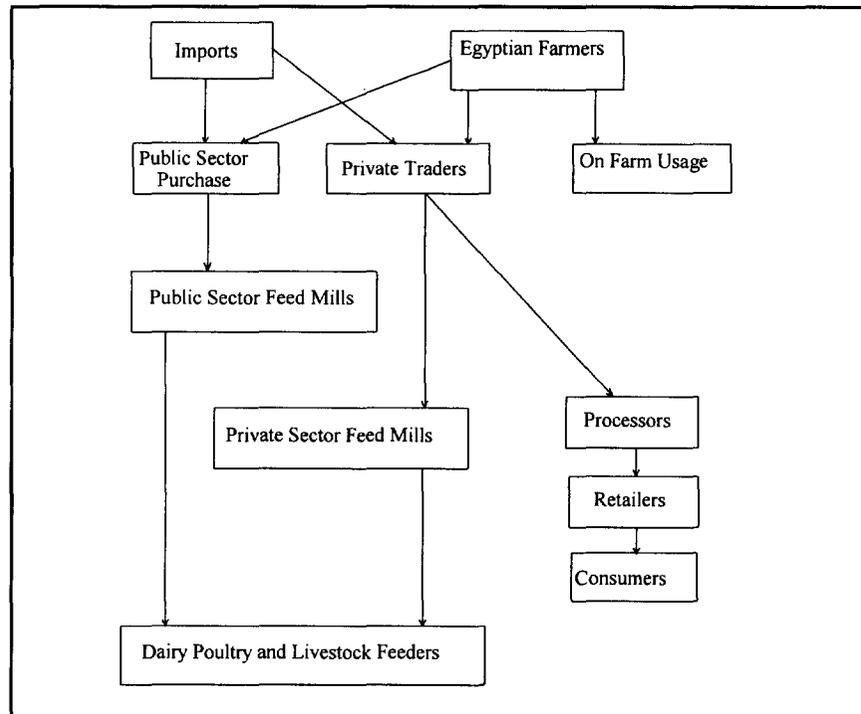


Figure 10.9 Corn marketing system

processed corn products; there are no facilities for the production of corn oil and related products or for the production of corn sweeteners.

Developing the Corn Marketing System

The domestic corn subsector is primarily in private hands, with prices determined by market forces except for a voluntary procurement price fixed by the government for sale to public-sector feed mills. The Egyptian government has wisely begun encouraging farmers to switch to higher-yielding yellow hybrid seeds, with lower unit costs of production. The corn/berseem rotation can compete economically with cotton and other crops for land. While eventual liberalization of the cotton industry could improve profitability for that industry, with concomitant incentives to expand cotton production, that process is likely to proceed slowly, leaving corn as a more profitable alternative at least until cotton is fully reformed.

The privatization of feed manufacturing would clearly be a significant stimulus to the corn subsector. As that process slowly unfolds, private firms in

the corn marketing system will have ample time for the profit analysis required as the basis of decisions on investment in facilities, technology and management in grain handling, storage, processing and distribution. Private companies are already handling a good share of the importation and marketing activities. Private-sector investment in corn handling, storage and transportation facilities is already under way. The collective focus of the private sector on efficiency of operations (a prerequisite for profit maximization) will lift the overall efficiency and effectiveness of the corn subsector. Additional corn processing facilities will appear when private investors are able to identify attractive and stable profit opportunities.

The Fruit and Vegetable Subsector

Fruit and vegetable cropping patterns have not been directly controlled by the government, but cropping controls for cotton, rice, wheat and other products indirectly distorted the allocation of resources to horticultural crops. In addition, subsidized inputs, retail price controls, state export trading and processing monopolies prior to 1986 had distorting effects on production of horticultural crops.

Production

Fruits and vegetables are produced throughout the farming areas of Egypt, with most of the production going into domestic consumption. However, Egypt is an exporter of citrus, potatoes, onions and garlic and has also exported other horticultural products.

Tomatoes are the most important vegetable crop. After agricultural price liberalization in 1986, production of tomatoes and of all vegetables dropped for two years before stabilizing. That dramatic decline in production was also caused by yellow leaf curl virus infections spread by the whitefly, a problem that has been controlled through concerted efforts of the ministry of agriculture in cooperation with tomato growers.

Oranges are the most important fruit crop in Egypt. While orange production has continued on a moderate upward trend, total fruit production has trended upward even faster, especially since 1986. Grapes and deciduous fruits have been the fastest-growing fruit crops. The liberalization of new land acquisition by private investors in the eighties brought on major investments in fruit production in the new lands.

The Marketing System for Fruits and Vegetables

For most fruits and vegetables, the first buyer is some type of wholesaler, most often from a large city, Cairo or Alexandria. Sales arrangements are usually one of the following types: (1) sales to wholesalers before harvest, with harvesting done by the buyer, (2) sales to wholesalers for

cash at the farm gate, (3) sales to exporters or their agents, either before or after harvest. The vast majority of transactions in the channel are between private individuals or companies (Figure 10.10). While major food processors are still state companies, most exports are now handled by private firms.

There are two major state-owned fruit and vegetable processors. In addition, there are several small-scale private processors, including tomato and potato processing joint ventures with multinational companies. Numerous private fresh fruit and vegetable exporters should also be considered processors because of the importance and complexity of proper postharvest grading, selection, packaging, fast cooling and transportation.

Fruit and Vegetables Exports

Fruit and vegetable exports started to recover from the old economic policies in 1988. Prior to 1986, fresh fruit and vegetable exports were handled mostly by state trading companies, with principal sales arrangements based on barter or counter trade with East European countries and the Soviet

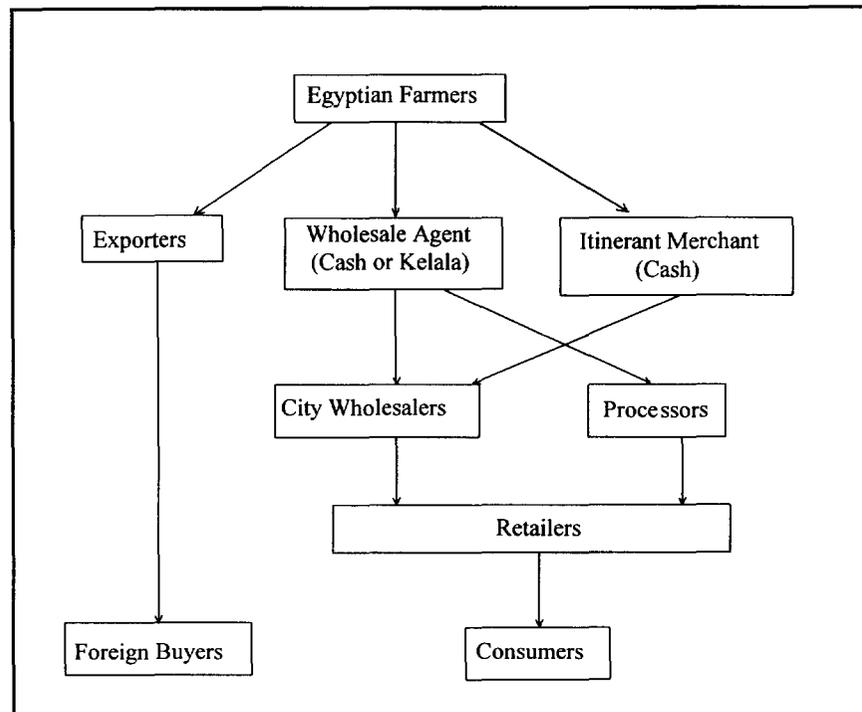


Figure 10.10 Fruit and vegetable marketing system

Union. The private sector has gradually taken over the main exporting function and has been developing new commercial markets. In terms of tonnage, potatoes are the major vegetable export, with the largest sales to the United Kingdom (Figure 10.11).

Oranges are by far the most important fruit export (Figure 10.12). The major markets in recent years have been the Gulf States. Major plantings of seedless table grape varieties (about 200,000 feddans) and identification of a lucrative market window in Western Europe have made it likely that grape exports will grow rapidly during the next few years.

Recent studies have indicated that Egypt has comparative advantage in the export of high-value horticultural crops (World Bank 1992). Other studies have concluded that highly profitable seasonal market windows are available to Egyptian exporters to EU countries. For several crops (seedless grapes, green beans, asparagus, garlic, sweet peppers, tomatoes and mangoes), the key to success in tapping those markets is to deliver high quality products, properly

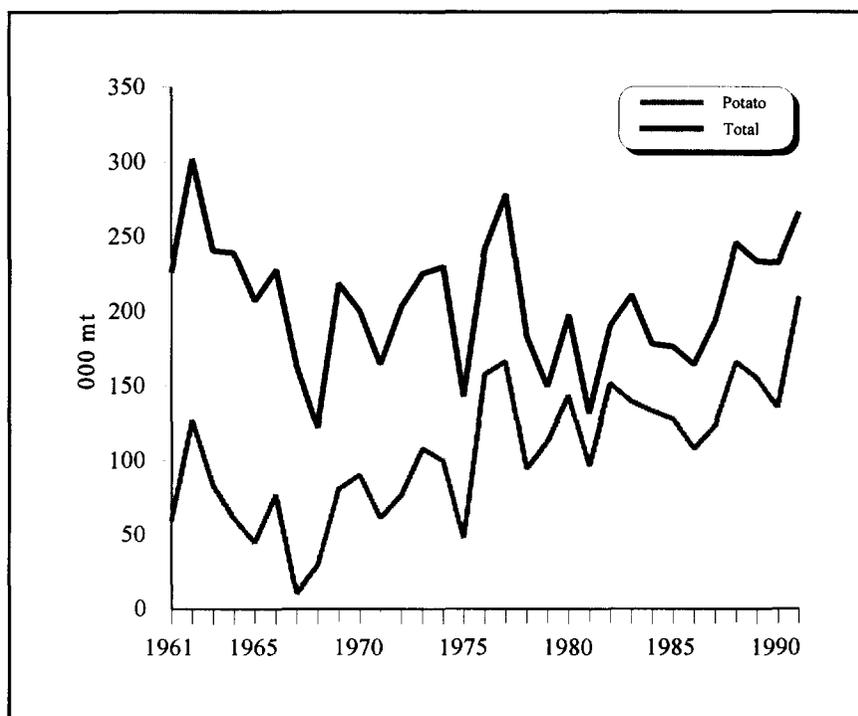


Figure 10.11 Vegetable exports. (Source: Department of Agricultural Economics and Statistics, Ministry of Agriculture and Land Reclamation, Cairo)

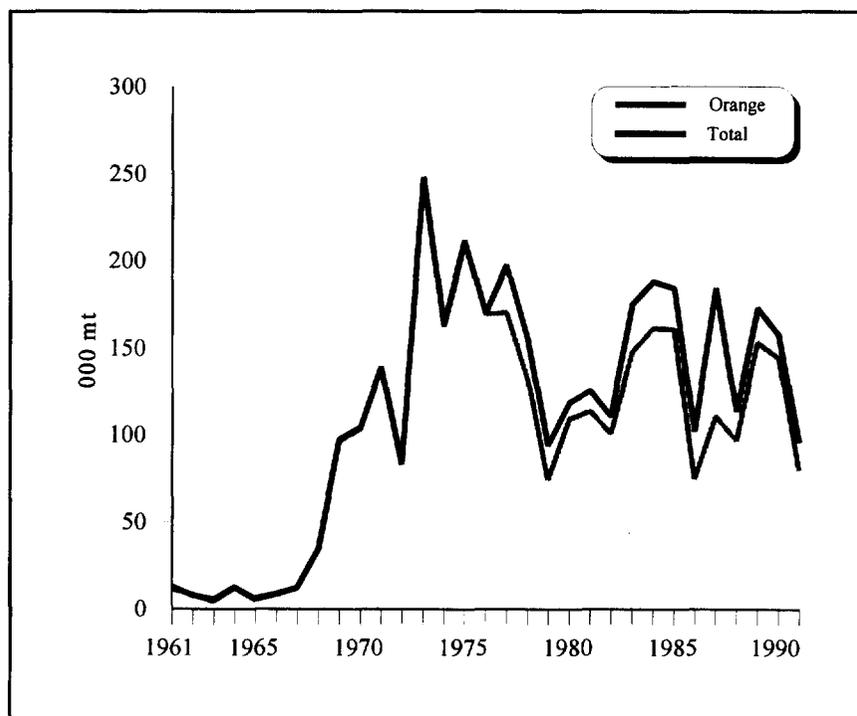


Figure 10.12 Fruit exports. (Source: Department of Agricultural Economics and Statistics, Ministry of Agriculture and Land Reclamation, Cairo)

packaged and cooled, using low-cost ocean transportation (National Agricultural Research Project 1994; Kelly Harrison Associates, Inc. 1994).

Developing the Fruit and Vegetable Marketing System

Egyptian exporting and processing companies are emerging with the characteristics of successful fruit and vegetable exporters and processors in other parts of the world. The key is long-term commitment and investment in a carefully planned market-oriented business. As channel captains, the exporters and processors must carefully control every stage in the production and marketing process to assure delivery of the high-quality and high-value product that international buyers demand. Marketing really begins when the grower decides what and when to plant. Competitive marketing requires attention to every production and postharvest detail until the product reaches the final consumer.

Food Wholesaling and Retailing

Historical evidence in many countries—the United States, Europe, Korea, Mexico and others—suggests that the economic development process brings with it a predictable evolutionary pattern of food marketing. In a primitive economy of subsistence agriculture, there is no need for intermediaries. As production specialization and exchange become more common, farmers may take surplus products to a central location for direct sale to local buyers. Villages tend to grow up around those trading sites. With further crop and livestock specialization and the evolution of large cities, specialized middlemen provide the service of purchasing products in rural areas for delivery to retailers in the urban areas and for transfer from one rural area to another. As a result of the adoption of labor-saving technologies in both industry and agriculture, this stage of economic development is most often characterized by large excesses of labor in both rural and urban areas. That unemployed labor gravitates to the buying and street selling of food products and selected non-food consumer goods as a way to survive. Excess labor moves in and out of the activity depending on periodic availability of alternative employment. Development economists have identified this phenomenon as part of the “informal economy” that is often not captured in national employment and income statistics. Marketing channels may include several layers of small-scale middlemen, each earning a low profit margin. As urbanization advances, some of the more astute traders (usually called wholesalers) take on the role of coordinator between rural merchants and urban retailers. Because of intense competition, limited capital, low levels of formal education and reluctance to delegate responsibilities to non-family members, those traders usually specialize in the trading of only a narrow range of food products. For the same reasons, food retailers, even those with established stores, tend to be very small businesses serving a small number of consumers, with relatively few products. The entire food marketing channel is therefore characterized by primitive and sometimes unsanitary handling practices.

Evolution of Wide-Assortment Retailers and Wholesalers

When upper-income consumers become frustrated with traditional food markets, a new type of food retailer, usually the supermarket, emerges. Owners are motivated by a belief that they can profitably deliver a wide assortment of food and non-food items of higher quality in a more pleasant and significantly more hygienic environment. An entrepreneur who is successful may open additional stores in other high-income areas. Egypt has recently reached this stage of evolution in its food distribution system. The United States reached this stage in about 1915, England and other European countries after World War II, and Korea in the 1970s.

In the next stage of development, owners of several stores recognize the profitability of vertically integrating into food wholesaling, usually because of frustration with the inefficiency of the existing supply channels, the poor quality

of products, high physical losses and unsanitary handling of perishable products by traditional wholesalers. The owner of several retail stores may first open a warehouse to receive and temporarily store non-perishable and processed goods that can be purchased in large volumes directly from producers or manufacturers at lower prices than those offered by traditional wholesalers. He may simultaneously initiate efforts to purchase perishable products directly from larger producers or food processors, with direct delivery to his stores. This vertical integration usually results in significantly lower procurement and handling costs, spurring the entrepreneur to open additional stores and expand his wholesale procurement operation as needed.

These vertically integrated food distribution systems are called retail food chains in the United States and multiple store operations in England. The chain store system grew rapidly in the United States from 1915 to 1930, and companies such as A&P and Krogers owned thousands of stores. Their buyers were able to purchase in huge volumes at significantly lower prices, efficiently delivering products to strategically located warehouses, where orders from individual company stores were processed, permitting efficient delivery of a wide assortment of products to each retail outlet. Small, independent retailers and their traditional wholesale suppliers found they could not compete with that vertically integrated system, and many went out of business. Others decided to adjust by organizing cooperative wholesaling operations. The result was two alternative forms of vertical integrations, retailer-owned cooperative supply systems and voluntary chains organized by wholesalers. In the first case, innovative retailers agreed to organize cooperative businesses for the purpose of collective buying in large volumes at lower prices and to operate the necessary warehousing and delivery services. Voluntary chain store operations evolved from the wholesaler side of the equation. As traditional wholesalers felt the competitive pressures of corporate chain store operations in their traditional market areas, many decided to offer a kind of franchise to independent retailers. They invited more progressive and larger scale store owners to join in the creation of a common store name, offered to purchase in large volumes at lower prices, agreed to deliver a wide assortment of products with significantly lower wholesale margins, and even offered store design and advertising assistance. From 1940 to 1965, thousands of independent food stores disappeared all over the United States, being replaced by larger scale supermarkets or convenience stores supplied from vertically integrated procurement and delivery systems rather than traditional independent wholesalers.

The driving economic forces in the evolution of vertically integrated food distribution systems are specialization and division of labor; routinization and standardization of work activities; economies of scale in procurement, handling and transportation, and reduction of physical losses for perishable products by eliminating middlemen and improving product handling practices. Retail food chains become the channel captains for organizing more efficient food production and distribution systems. Observers generally agree that the increased efficiency

of vertically integrated food distribution systems benefits both consumers and producers: Consumers benefit from lower cost and improved quality foods, and farmers and processors benefit from increased demand as consumers save on basic food items, which permits them to buy larger quantities at lower prices or to diversify into a wider assortment of food products. The entire process increases employment and enhances consumer welfare.

Egypt appears to be on the verge of moving into the chain store stage of food distribution, probably within this decade. Several operators now own multiple stores in larger cities. It seems that none have yet moved to create vertically integrated supply operations, but experience in other countries shows that the phenomenon can be expected within a few years. In a freely competitive market, the innovation will not emerge until economic conditions reach the point where the vertically integrated system is more profitable than the traditional system. Government can play a beneficial role by facilitating access to the technological and managerial knowledge required by innovators who are ready to develop new vertically integrated systems of food distribution.

Restructuring the Food and Fiber System

Egypt, like many other centrally planned economies, badly distorted the organization of, and allocation of productive resources in, its food and fiber system. Adjustment will necessarily be long and painful. It is clear from this review that most investment decisions in public-sector companies were not carefully evaluated from the standpoint of efficiency and profitability. Because they were essentially political decisions rather than business or economic decisions, investments were made in facilities without a clear analysis of the market for the products to be produced. The selection of technology or size of plant was apparently not based on clear understanding of the economic consequence. Decisions on location of assembly, storage, processing and distribution facilities, all of which are crucial to economic efficiency, were not objectively evaluated against profitability criteria. Moreover, because of government intervention, subsidies, restrictions and controls, private sector investors, who must try to evaluate their investment against profitability criteria, were inevitably led to make business decisions that were equally inefficient as those in the public sector.

Now that the government is liberalizing its food and fiber policies, the marketing system is undergoing significant and inevitable restructuring. As a result, some businesses and facilities are essentially without economic value, even though the original investments may have been large. An erroneously located, poorly designed facility of inefficient size, with inappropriate technology or designed to produce a mix of products with little market demand, can be doomed to perpetual losses in a market economy no matter how well it is managed. And the salvage value of its assets will probably be quite low because of the cost of

dismantling, moving and redeploying the assets. Most of the commodity subsectors reviewed in this chapter are plagued with these problems, although cotton and rice are the worst examples.

From a purely business efficiency standpoint, it is easy to conclude that all public-sector companies in the food and fiber system should be privatized as quickly as possible. It is also easy to conclude that the privatization decision should be based on an objective evaluation of the potential for the assets to generate a profit in the market economy. If the assets cannot generate a profit in the existing or in some restructured configuration, then the companies should be bankrupted and the assets sold at salvage value.

The privatization process has been initiated under Law 203, and a few companies have been privatized. However, very few companies have yet been privatized in the subsectors reviewed in this chapter. Given the painful and costly restructuring that must accompany the privatization process, and given the potential employment effects in some companies, the privatization policy will continue to face opposition and criticism. However, the evolution toward a more efficient food and fiber system will have significant benefits in the long run, in terms of expanded exports, reduced imports, income generation, employment and food prices.

Meanwhile, price liberalization and policy reforms have already produced numerous changes in several of the commodity subsystems reviewed here. Conditions are in place for the evolution of more efficient and better coordinated agro-industrial and marketing processes in most of the commodity subsectors analyzed. Competition is emerging among channel captains using vertical integration or contract coordination in domestic and export rice and in fruit and vegetable exports. The same can be expected as privatization proceeds in the cotton industry. Corn and wheat marketing, as well as domestic marketing of fruits and vegetables, are likely to continue to be characterized by spot pricing mechanisms, at least for the next several years.

Domestic consumer goods retailing continues to be dominated by small, independent and inefficient retail establishments. Commodity wholesaling is characterized by small numbers of large specialized commodity traders, whose profit is largely guaranteed by the disorganization and inefficiency of the existing system (National Agricultural Research Project 1994; University of Arkansas 1994). Experience in more developed market economies suggests that improvements in system efficiency, reductions in marketing cost, and lower consumer prices in domestic commodity markets are likely to be constrained until investors begin to see the profit potential in developing vertically integrated, high-volume, low-margin food wholesaling and retailing chain operations. Several actions that can be taken to facilitate the evolution of efficient commodity subsystems are summarized below.

Policy and Regulatory Issues

There are numerous macroeconomic, trade and agricultural sector policies that must continually be monitored and better adjusted to the realities of a market economy. A recent study suggested many changes that would benefit Egyptian agribusiness (Abt Associates, Inc. 1994).

Decision-Making Information

The subsector studies on which this chapter is based all concluded that Egyptian agribusinesses urgently need easy access to decision-making information on domestic production, imports, existing stocks, consumption patterns and prices. In most cases, agribusinesses need the same kind of information on international markets, at least for their major export markets or import supply markets. That information should be timely, accurate, credible and available to all market participants.

Production and Postharvest Technology and Management

Under the current and projected market liberalization policies, Egyptian agribusinesses, including farmers, can improve efficiency by adopting known international agribusiness technologies and management practices. The transfer of that know-how can be accomplished by a combination of direct and guided observation of advanced practices in other countries, practical training programs, demonstration by foreign agribusiness investors and extension education programs.

Food Distribution Technology and Management

Vertical integration is likely to improve the efficiency of food wholesaling and retailing in the Egyptian food system. The adoption of known international organizational, technological and managerial innovations by private entrepreneurs should be encouraged. The transfer of that knowledge can be accomplished by the same combination of educational programs described in the preceding section.

Capital Requirements

The emerging private agribusinesses will require large amounts of both equity and debt capital as they re-design commodity systems using the internationally known production and postharvest technologies required to compete in global markets. Improved credit and equity capital markets are needed to supply the investment and working capital needs of agribusiness intermediaries, processors and exporters.

Privatization

Privatization of public-sector agribusiness companies needs to be completed as expeditiously as possible. While private ownership is less

important and less fundamental than market-oriented management, managers who have worked only in a state-owned business enterprise, under highly bureaucratic conditions and with little market orientation, are ill-equipped to manage agribusinesses effectively in the emerging globally competitive market in which Egypt now aspires to participate. Privately owned companies are much more likely to meet the competitive market challenge than public enterprises, whose management must respond to political pressures and overcome bureaucratic burdens and constraints.

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11

Financial Reforms and Rural Credit: The PBDAC's Evolving Role

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Recent reforms in Egypt are creating a new and challenging environment for the Principal Bank for Development and Agricultural Credit (PBDAC).¹ It is no longer, as it once was, a passive arm of central planning where loans and inputs are targeted to achieve goals, nor is it a vertical intermediary between government/donors and farmers. In the new economic environment, the PBDAC must aggressively intermediate horizontally—among individual depositors and borrowers—and must also provide new services and seek new opportunities. In the discussion that follows we argue that the Bank should, in addition, consider broadening its role from only supporting agriculture to providing financial services to most people in rural areas, thus contributing more to overall rural development.² Before discussing the challenges and opportunities recent economic reforms present to the PBDAC, it may be useful to review briefly the Bank's history and to summarize the recent policy changes, especially in financial markets and in agriculture, that most affect it.

Background on the PBDAC

The rural financial system in Egypt has evolved substantially in this century. Prior to 1931, no formal agricultural lending institution existed, and rural borrowers relied on mortgage or commercial banks, agricultural cooperatives, large farmers, merchants and informal money-lenders. In 1931, the Agricultural Credit Bank (Credit Agricole d' Egypte) was formed and capitalized, and its loans were guaranteed by the government, largely in response to a worldwide depression (Noor 1992). The mission of the Bank was to supply short-term loans, to eliminate the confiscation of farm land held as

collateral by foreigners, to moderate farm price fluctuations, and to provide concessionary loans to farm cooperatives.

Following the stresses and strains of World War II, the Bank in 1948 was renamed the Agricultural Credit and Cooperative Bank and was recapitalized using government and cooperative funds. As suggested by the name change, agricultural cooperatives became more influential in the Bank's operations after its reorganization. Following the 1952 Revolution, the Bank was again refocused to support land reform and central planning. This support included extending subsidized loans, widespread lending in kind, and loan targeting for crops that were included in the system of mandatory delivery quotas.

In 1964, after the nationalization of most private industries and financial institutions, the Bank's name was again changed, to The General Organization for Agricultural and Cooperative Credit (GOACC). With this change, the Governorate Banks for Agricultural and Cooperative Credit became share-holders in the GOACC, and banking activities were mingled with the activities of the agricultural cooperatives. This led to conflict between bank managers and cooperative leaders, a decline in farmer confidence in both the Bank and the cooperatives, and severe loan recovery problems.

Overdue and bad loans forced the government into still another restructuring of the Bank in 1976. Law 117 of that year changed the Bank's name to the Principal Bank for Development and Agricultural Credit, placed it under the direct management of the Minister of Agriculture, and substantially diluted the influence of cooperatives on the operations of the Bank.³ The Law made the PBDAC the sole formal agricultural lender, gave it a monopoly over the sale of most modern farm inputs, and established approximately 800 village banks, along with about 4,300 *mandoubias* (retail outlets) that were used mainly for in-kind lending of farm inputs. The intent of the Law was to increase the density of village banking so that most farmers would be within 5 kilometers of a bank or one of its *mandoubias*. Law 117 gave the PBDAC the lead role in agricultural development and substantially broadened its activities beyond financial intermediation. The Bank added to its roster a large number of additional employees who manned the *mandoubias*, opened warehouses for farm inputs and agricultural products, expanded lending to cover virtually all agricultural activities, received mandatory crop delivery quotas from farmers, and managed the import and sale of most modern farm inputs. The Bank also collected fees for services provided to farmers by the Ministry of Agriculture and Land Reclamation.

To better serve smaller farms, in 1979 the PBDAC initiated a Small Farmer Production Project (SFPP) funded by the U.S. Agency for International Development (USAID). The program was similar to other supervised credit programs sponsored by the USAID, particularly in Latin America. It involved providing technical assistance along with loans, basing lending more on creditworthiness and less on collateral, charging higher interest rates, simplifying lending procedures, establishing consolidated farming areas to encourage use of

new technology, using insurance to manage risk, and building several dozen new village banks in the three Governorates where the project operated—Qalyubia, Sharkia, and Assuit. Overall, the SFPP involved more than 80,000 farmers.

Macroeconomic and agricultural policy reform, which began in 1987, substantially increased prices of inputs and some farm products and forced the PBDAC to alter its procedures. The alterations included shifting to more cash lending instead of lending in kind, charging higher rates of interest on loans, and extending bankwide some of the lessons learned from SFPP. These changes were reinforced by an Agricultural Production and Credit Project (APCP), also initiated in 1988 and supported by the USAID. The APCP's objectives were to assist the Ministry of Agriculture and Land Reclamation with agricultural reforms and to help the PBDAC with internal reforms. Overall, these reforms have transformed the PBDAC from a bank with heavy involvement in a variety of activities to one with a much narrower specialized role in financial intermediation.

In recent years, the PBDAC has supplied about 90 percent of the value of formal agricultural loans in the country, with commercial banks supplying the remainder. Because of its dense network of branches and village banks and the historical ties between credit and modern input sales, the PBDAC lends to a large proportion of all farmers. A study done several years ago in the Fayoum, Menoufia, and Dakahlia Governorates showed that nearly 80 percent of the rural households were PBDAC borrowers (Siddik et al. 1994, p. 77), an extremely high loan-penetration ratio compared with the situation in most other countries. As shown in Table 11.1, in real terms, the volume of lending by the PBDAC has declined in the past few years, while the real value of deposits mobilized has increased significantly. Although available evidence is not conclusive, we

Table 11.1 PBDAC loans, deposits and profits, 1984-85 to 1993-94

Years	Loans	Deposits	Profits Before Taxes	Wholesale Price Index ^a
	(current LE million)			
1984-85	1,134	574	113	40
1985-86	1,591	707	126	47
1986-87	2,328	905	143	53
1987-88	2,287	1,052	168	67
1988-89	2,726	1,201	190	86
1989-90	3,277	1,455	245	100
1990-91	3,936	1,641	205	118
1991-92	4,604	1,866	95	132
1992-93	4,506	2,292	85	144
1993-94	4,583	2,949	36	153

Sources: Siddik Aly, Malik and Zeller 1994; unpublished PBDAC financial reports; and International Monetary Fund, *International Financial Statistics*, Washington, D.C., various issues.

^a1990 = 100.

speculate from this fragmentary information that the market for traditional agricultural credit at market prices is essentially saturated in Egypt.

Policy Reforms and the PBDAC

Recent reforms in Egypt are placing stress on the PBDAC in three ways: externally through changes in financial markets, externally through agricultural policy reforms, and internally through adjustments imposed on the bank by the external changes.

Reforms in Financial Markets

In planned economies, financial markets play a passive role in resource allocation, largely by managing subsidies aimed at offsetting other economic distortions and by mobilizing deposits (McKinnon, 1991). The main action in resource allocation occurs through turning the terms of trade against agriculture to siphon off resources through the price system and through using fiscal policy to increase the transfer of resources between sectors of the economy. In a decentralized, market-driven economy, financial markets play a much larger and more sophisticated role in resource allocation (Shaw 1973). This occurs at two levels. The first exists between sectors of the economy, as financial markets may mobilize deposits from one sector—typically rural areas—and transfer part of these claims on resources to other segments of the economy that yield higher marginal returns than are available to rural savers (Gurley and Shaw 1967). The second level of resource reallocation exists among individual borrowers and depositors, as the funds that are surplus to some firms or households—depositors—are reallocated via loans to units that have higher return investment possibilities—borrowers. Rural financial markets, including banks such as the PBDAC, must be efficient in both mobilizing deposits and extending loans to fulfill their critical resource-allocation role. No other mechanism can efficiently substitute for financial intermediation in performing this role in a market economy.

Recent financial reforms in Egypt allow the PBDAC to take the lead in resource reallocation, both within rural areas and between rural and urban sectors of the economy. To perform this new role, the PBDAC will be forced to alter its traditional activities substantially. For example, it can no longer draw on concessionary lines of credit from other banks and so must now pay market rates both on loans from within the banking system and on savers' deposits. Combined with a decrease in government support for the PBDAC, these changes have substantially increased the costs of the PBDAC's loanable funds and have forced the Bank to rely more heavily on deposits, thus enhancing the efficiency of resource allocation among rural firms and households.

Deregulation of interest rates and other prices also exposes the Bank to more risk from price variations. Its margins are rapidly squeezed, for example, if it is

slow to adjust downward the rates paid on deposits while meeting competitive declining rates on loans. If the Bank is hesitant in making its pricing adjustments, it can quickly lose business as well as profits. Interest rate variability also forces the Bank to manage and match the term structure of its assets and liabilities, something it has not worried about in the past.

Financial reforms are stimulating competition for the PBDAC. Commercial banks are increasingly lending relatively large amounts to borrowers who are involved in farming or agribusiness, some of whom were the PBDAC's traditional clients. In other cases, commercial banks and the postal savings system are providing attractive deposit facilities in towns and villages, where the PBDAC once had little formal competition. In many more cases, the expansion of private markets in rural areas has spawned various forms of informal finance that are substituting for PBDAC lending. This is particularly true for modern inputs, as thousands of new fertilizer merchants sell their goods on credit to farmers who previously were clients of the PBDAC.

The Bank is in an increasingly ambivalent position because of the recent reforms in financial markets. On the one hand, it is forced to act like a commercial bank: It must mobilize most of the funds it lends, it receives fewer and fewer subsidies, it sinks or swims on its profits and it is forced to compete for customers in free markets. On the other hand, it is treated as a pseudo-bank by the Ministry of Finance and the Central Bank: It is generally not allowed to accept current accounts, it cannot deal in foreign currencies and it is exempt from reserve requirements that apply to commercial banks. At the same time, the Ministry of Agriculture and Land Reclamation and to some extent the PBDAC itself continue to think of the Bank as essentially a division of the Ministry.

Reforms in Agriculture and in Rural Areas

In addition to the stresses and strains on the PBDAC caused by financial market reforms, the Bank is forced to adjust to changes in economic conditions among its clients. Because the terms of trade have recently shifted in favor of agriculture, many farmers now have more net farm income. In addition, substantial amounts of remittances flow into most villages from Egyptians living abroad. These changes in economic conditions allow an increasing number of farmers to finance their own operations (Adams 1991). Relatively high interest rates on loans from the PBDAC and other banks encourage this shift to self-financing. The higher interest rates on deposits also draw into the PBDAC some funds that previously circulated in informal markets.

Agricultural reforms also impose more loan-recovery risk on the PBDAC. This increased risk stems from three factors. First, higher interest rates on loans may slightly lessen the ability of some farmers to repay loans. Second, relatively free farm prices cause more product-price variability that is difficult for both borrowers and the PBDAC to predict, and this may amplify loan recovery problems and thereby force the Bank to be more conservative in its lending.

Third, and even more important, with free markets the PBDAC has less control over loan recovery than it did when it monopolized the sale of modern farm inputs and when many farm products moved through government channels. The PBDAC can no longer penalize farmers who default on loans by denying them access to critical farm inputs (Nasser 1987). Likewise, the PBDAC can no longer rely on forced collection of loans through withholding of payments from its or the cooperative's monopoly in product markets.

The shift in terms of trade and the privatization of farm markets have likewise stimulated non-farm rural businesses (Davies et al. 1992). The increased purchasing power in rural areas is visible in new construction, in expansion of transportation services and associated support shops, in numerous small manufacturing facilities, and in the increase of retail stores in villages. Many of the new or expanding rural firms are agribusinesses, provide part-time employment for farmers and their families, or furnish support services for farmers. Although many of these non-farm businesses rely on their own funds for finance, and a small number may borrow from commercial banks, many are potential PBDAC clients, for both loans and deposits. Recognizing these new opportunities, the PBDAC recently established marketing units to provide financial services to non-traditional clients.

The privatization of agricultural input and product markets has been accompanied by a substantial expansion in informal lending.⁴ For example, numerous new fertilizer merchants sell their goods on credit to compete. As business volumes have increased in other product and input markets, similar informal credit arrangements have emerged to facilitate sales. In addition, enhanced farm income and increases in non-farm earnings and remittances have fostered expansion in informal finance. Although this informal finance is a primary competitor to the PBDAC, the magnitude of informal finance suggests opportunities for the Bank to supply financial services to non-traditional clients in rural areas. Most of these potential clients are currently participants in informal finance.

Internal Reforms in the PBDAC

Privatization of input sales is the reform that has had the greatest impact on the PBDAC. The loss of revenue from sales of fertilizer and other farm inputs sharply reduced the Bank's profits, lessened reasons for farmers to borrow from it, left the Bank with substantial redundancy in staff and facilities, undermined its corporate culture, lessened the desirability of the location of many of its facilities and imposed new skill requirements on its staff. As can be seen in Table 11.1, PBDAC profits in 1993-94 were only a fraction of the profits it had earned four or five years previously. If the PBDAC were forced to pay for the training and equipment provided by donors and to apply a realistic depreciation figure to its physical facilities, its profits would be highly negative.

In 1989-90, approximately a third of the Bank's total profits came from sale

of modern farm inputs. By 1994, these sales contributed a rapidly declining amount to the Bank's bottom line. This meant that the PBDAC had fewer profits that could be paid to the Ministry of Finance, had fewer surpluses to augment its capitalization or invest in its facilities, and had less to distribute in employee incentives.

Staff redundancy was a major factor in the decline in profits. Over the past several years, some redundant employees have returned to work with farm cooperatives and some have retired, but the redundancy problem remains severe. Redundancy extends to facilities as well as employees; 4,300 input warehouses and retail outlets essentially stand idle.

Many of the village banks and branch banks, especially those with the newest buildings, are located on the edges of town where, although they were convenient for the sale of farm inputs, they are not ideally located for commercial bank facilities. Being located at some distance from the commercial center of large villages makes it difficult for the PBDAC to compete for deposits and for the business of non-traditional clients, a problem heightened by the decreased client traffic in some PBDAC offices because of the shift to cash lending and privatization of fertilizer distribution.

Under a planned economy the PBDAC was a highly centralized organization, with many of the decisions and much of the authority concentrated in Cairo. Employees were rewarded for following directions and for meeting targets. The PBDAC's corporate culture placed little emphasis on reducing transaction costs for the bank or for clients, providing high quality services to customers, developing new and more attractive financial services or seeking new clients. In the new economic environment, the PBDAC's traditional clients are subject to the vagaries of market forces; they are no longer compelled to cluster around it and other government agencies to obtain inputs, sell their products or receive subsidies. Farmers' transactions are now much more diffused than previously, and this forces the PBDAC to decentralize its activities to follow its changing marketing opportunities. One change is fundamental: a switch from telling farmers what to do and treating them as beneficiaries to asking farmers how the Bank can best support their activities and treating borrowers and savers as valued clients. This shift can be done only by a bank that is organizationally flatter and more flexible than the PBDAC has been in the past.

Some of the PBDAC's physical facilities are similar to the country's famous pyramids. These ancient and magnificent examples of human effort and creativity were appropriate structures, and their locations were proper, given the religious beliefs at the time. Building the pyramids in the desert, on the edges of populated areas and along the West side of the Nile was functional. Likewise, it was rational for the PBDAC to use a hodgepodge of inherited Ministry and cooperative buildings to perform its centrally planned functions that involved input distribution. It was also rational for the PBDAC to locate the new facilities it built during the past 15 years on the edges of towns, where it was easy for farmers to

purchase inputs. As long as the Bank monopolized the sale of modern inputs and was the dispenser of subsidies in the form of cheap credit, it was not forced to dress up its facilities to make them bank-like to attract customers. As a result of this, many of the village banks and branches are in run-down buildings that are often far removed from the center of towns, where bank facilities are commonly located.

This location-and-amenity problem became serious when the PBDAC divested its input business and became a specialized financial intermediary. Unattractive facilities do not engender the confidence needed to induce people to trust their savings to the Bank. Also, because deposit transactions tend to be small compared to loans, the transaction costs imposed on savers are a much more important determinant of their behavior than are borrowers' transaction costs. A borrower who wishes to apply for a relatively large loan may be willing to walk to a bank on the edge of town to effect the transaction during the bank's short working hours. However, depositors of small amounts want their banking facilities close to where they live, work or shop. This preference largely explains why most informal finance, especially those forms that involve savings, women, and non-farm firms, are concentrated in commercial centers.

Similarly, economic reforms are straining the technical skills of the PBDAC's management and staff. In the past, most of the leadership of the Bank, appropriately, had expertise in agriculture. Few of the leaders currently in the Bank have professional training in banking or bank experience outside the PBDAC. The policy of promoting mostly from within the organization also fosters inbreeding. Although the PBDAC will continue to require a large number of employees with agricultural competence to support a sizable amount of agricultural lending, its postreform mission will increasingly call for more managers with modern banking skills.

Challenges and Opportunities

The external changes affect the PBDAC as a two-edged sword: They are creating stress and forcing the Bank out of a comfort zone into the unknown, and at the same time they are spawning what could be additional opportunities if the Bank is clever enough to recognize these opportunities as such and nimble enough to grasp them.

Challenges

The PBDAC faces a number of major challenges. These include dealing with excess capacity in staff and facilities, reducing transaction costs, enhancing employee and management banking skills, upgrading and relocating many branch and village offices, switching to credit-worthy lending, changing the image of the Bank to a more client-friendly one, and implementing its recently revised mission statement.

Continuing to employ large numbers of individuals—possibly as many as one-third of its total staff—who contribute little to the economic activities of the Bank reduces profits, forces the Bank to charge large spreads and weakens employee morale. The PBDAC's surplus employees can be maintained only at the expense of the interest paid or received by generally poorer borrowers and savers, or at the expense of the financial vitality of the Bank. The sustainability of the Bank, in the absence of subsidies, hinges importantly on dealing quickly and effectively with redundancy. Clearly, laying off large numbers of employees is politically sensitive, buying them out is expensive, and waiting for attrition to resolve the problem is costly and time consuming. From 1992 through 1994, staff reductions via all methods amounted to 5,500, a substantial start on this painful process.

Two general strategies might be used to deal with redundancy. One is to accelerate the rate of reduction in number of employees, and the other is to seek new clients and to market new financial products so that retrained employees could be more fully used. As will be discussed, the PBDAC appears to have ample latitude to do the latter, but it will almost certainly have to do a good deal of the former as well if it is to become efficient and profitable.

The PBDAC will also benefit from reducing its transaction costs, thus operating on smaller spreads. Everywhere, computers are being used to sharply reduce bank transaction costs. During the past few years, the PBDAC has made substantial progress in computerizing its transactions, especially in the head office, in the Governorate Banks and in the branches. Still, only a handful of the 800-plus village banks are computerized. The Bank is only partially able to generate timely profit-and-loss statements by unit, up-to-date loan recovery figures and other statistics that are useful in managing a modern bank. Relatively large amounts of data that are useful only in a planned economy are still collected and processed, especially information on loan types and data on achievement of performance targets. Data processing is further warped by a complicated employee incentive system that is based largely on employees meeting targets in various types of activities, an echo of the now-abandoned attempts to influence borrower behavior through loan targeting. The combination of redundancy and elevated transaction costs threaten the survival of the Bank. The courageous steps taken by the PBDAC several years ago to discontinue input distribution now haunts the Bank in the form of sharply lower operating profits.

The PBDAC has many employees who have excellent technical skills and practical experience in agriculture, and who also know rural areas. Some of its administrators own farms, which makes them knowledgeable about the problems and opportunities in agriculture. Very few of the Bank's leaders, however, have training in accounting, data processing, financial management, commercial banking operations and modern management. Reforms are forcing the Bank to specialize in financial services. Providing these services requires managers who are knowledgeable about the design and marketing of new bank services, how to manage cash flows and assets efficiently, how to match maturities of assets and

liabilities and do associated pricing, how to design modern employee incentive packages, how to use modern data processing facilities, how to delegate authority, and how to organize appropriate bank supervision and regulation. These fundamental problems cannot be solved by short courses or short-term study tours overseas for current employees. It will require hiring new people with commercial banking skills in relatively high-level positions.

Many of the PBDAC's retail facilities do not look like banks. Many of them are in out-of-the-way places, in buildings that are run-down and poorly lighted; many do not have signs announcing they are banks, and few post the hours when the bank is open. Inside, working conditions for employees are less than ideal, and there are seldom places where clients can be received. To become more like a bank, the PBDAC's facilities need to project the image of a stable and efficient organization, which is done partly through the physical appearance and location of its facilities. Many of the village banks might be moved to locations closer to the commercial centers; other facilities need new lighting and paint; most need tables and chairs in reception areas where customers can be offered a cup of tea, and they should have signs with the PBDAC logo and the hours when the bank is open. Rather than building new facilities, the bank may be able to rent space in central areas where the main purpose is to mobilize deposits and provide loans to nontraditional customers.

Banks in a market-driven economy lend on the basis of creditworthiness, not on the basis of lending targets or the welfare needs of the loan applicant. Such lending forces lenders to use skills that typically atrophy in banks supporting central planning. The primary objective of commercial lending is to recover loans with interest. To determine creditworthiness of a potential borrower, the lender collects and analyzes information on borrowers' activities. This includes answering questions such as the following: Is the borrower likely to generate enough cash flow to repay the loan? Is the proposed loan project economically viable? Can the prospective borrower provide reliable guarantees that will allow the lender to recover the funds lent if the borrower reneges and does not repay the loan?

When lenders are knowledgeable about agriculture, when they make mostly agricultural loans, and when they have various controls that allow them to capture repayment without the consent of the borrower—as was the case a few years ago for the PBDAC—loans can be made without doing the complicated analysis that separates creditworthy from noncreditworthy borrowers. That is no longer the case. Nontraditional lending is forcing PBDAC loan officers to depend on more analysis of creditworthiness, a skill that few PBDAC employees currently have. The newly initiated pilot training program in the PBDAC that stresses credit-worthy lending is a substantial step forward in addressing this problem.

Monopolists need not worry about what customers think of them or their services. Previously, PBDAC employees could be cavalier about how they treated their beneficiaries, who were those who purchased subsidized inputs and received

subsidized loans. In a real sense, the PBDAC was passing out favors to its borrowers; it was lending to support central planning. Reforms have changed this. The PBDAC no longer has a monopoly on either farm inputs or financial services, and it cannot generally use subsidies to attract clients.⁵ It must compete for customers in the rural financial market by providing attractive services at competitive prices. No longer will clients deal with Bank employees who wait in their offices for clients to come to them; nor will clients endure rude treatment, fill out numerous forms, and then accept a financial service that may not be completely suitable. Instead, employees now need to actively seek new customers, design financial services and products that effectively compete with those offered by competitors, price services competitively and, above all, treat customers as valued clients. Egyptians, especially in rural areas, are famous for the hospitality they extend to visitors; it is impossible to have a meeting with someone in a village without being offered at least a cup of tea. PBDAC employees must extend similar hospitality to their customers and become more client friendly.

The PBDAC recently issued a revised mission statement that substantially broadens its potential financial role. Although the Bank will continue to emphasize financial services for farmers, it is also positioning itself to broaden its customer base to include all creditworthy borrowers in rural areas along with all types of depositors. However, it is one thing to issue a new mission statement, and another to reorient a huge organization such as the PBDAC to aggressively seek new nontraditional clients. Implementing the new mission statement will require major adjustments in managerial style, organizational form and, especially, employee training and incentives.

Opportunities

Overemphasis on the problems faced by the PBDAC can mask the Bank's advantages and opportunities. Egypt's dense population and its irrigated agriculture provide a hospitable environment for financial intermediation. The dense population reduces transaction costs for both clients and banks, and irrigated agriculture reduces the risks associated with agricultural production and thus the risks of lending. The PBDAC has banking facilities in virtually all rural communities; in most villages the PBDAC is the only bank in town. It also benefits from the large number of its employees who know their territory and can screen many potential borrowers on the basis of prior knowledge about the individual, much like informal moneylenders. Egypt's well-ordered land record system and excellent loan recovery performance in the recent past, along with the basic honesty of rural people, lessens loan recovery problems.

Reforms in agricultural prices, the nonfarm businesses they have spawned in rural areas, and overall development are causing more rural people and firms to be creditworthy and to have more funds that might be deposited in the PBDAC. The possibilities for horizontal intermediation are much improved over just a few

years ago. It is far easier to make creditworthy loans and to mobilize deposits in a healthy rural economy than in one that is heavily taxed to favor urban residents (World Bank 1992).

The PBDAC has at least four areas in which it might dramatically increase its volume of business: providing of financial services to nonfarm rural firms, deposit mobilization, providing of financial services to women and selling of new financial products such as insurance.

In countries experiencing rapid economic development, the accelerated increase in rural income results from nonfarm activities as well as agricultural production (Liedholm and Parker 1989). Although it is in its initial stages, this type of growth appears to be happening in Egypt. The opportunities for the PBDAC to significantly expand its farm lending will likely be modest and restricted to activities involved in new agricultural exports. If the Bank is to better utilize its excess capacity and enhance profits, it should also look to non-farm enterprises in rural areas for growth in lending, deposits and nontraditional financial services.

Recent studies show that, although rural people in Egypt may be poor, a surprisingly large amount of money circulates in informal finance (Baydas et al. 1995). Saving is the main motivation for participating in two forms of such financial activity, giving funds to moneykeepers and participating in self-help financial groups called *gam'iyas* in Egypt (Hajaj 1993; Van den Akker 1987; Van Nieuwenhuijzen et al. 1985). The PBDAC can mobilize a much larger proportion of these funds if it offers attractive deposit instruments. The recent experience in Indonesia shows that government-owned banks can be reformed and provide excellent deposit services to millions of rural people in relatively short periods of time (Patten and Rosengard 1991). Aggressive deposit mobilization by the PBDAC might allow it to mobilize most of the funds it lends, or more, and in so doing provide financial services to a much larger proportion of the rural population. In Indonesia, the rural banking system services six times as many depositors as borrowers and is currently mobilizing far more than it lends. Something similar is possible in the near future in Egypt. The PBDAC's recent efforts to mobilize more deposits are bearing fruit and these efforts should be expanded and reinforced by adjustments in employee incentives.

Recent studies are also showing that many rural women regularly participate in informal finance, mainly to save (Sterns 1992; Weidemann and Merabet 1992). With some adjustment in its procedures, the PBDAC could quickly attract hundreds of thousands of new deposit accounts from women.

Relatively few people in rural areas purchase formal insurance, most have a difficult time effecting money transfers, and still others have only awkward ways of managing foreign exchange received from abroad. Since the PBDAC is not authorized to provide current account services to the general public, most of the nonfarm firms in rural areas are unable to use checks to make payment. All of

these activities represent potential services that might be provided by the PBDAC, if its basic legislation were modified to permit it to expand the services it can offer.

Conclusions

The PBDAC is at a fork in the road. It can travel the familiar fork and continue to be a traditional agricultural credit bank that is tied to the Ministry of Agriculture and Land Reclamation, that relies heavily on donor assistance, and that acts as a channel for subsidies. If it selects this road, it will be a much smaller and more dependent organization in the future.

If, instead of selecting the familiar road, the PBDAC chooses the unfamiliar one and anticipates the new and non-traditional opportunities along the path less traveled, it could productively use at least a part of its excess capacity and play a lead role in boosting rural development. If experience in other developing countries is a guide, Egypt can help alleviate poverty in rural areas by sustaining a healthy agriculture, but even more importantly, it can help by accelerating the growth of nonfarm rural enterprises and by providing poor people better opportunities to save. To seize these opportunities, the PBDAC must look to the future rather than to the past. This will require continued bold and imaginative leadership. Legal changes as well as encouragement and support from the Ministry of Finance, the Ministry of Agriculture and Land Reclamation, the Central Bank, and international donors also will be required to allow the PBDAC to explore the new path.

Notes

1. PBDAC is used to designate the head office in Cairo and its branches, the 17 Governorate Banks and their branches, and associated village banks.

2. We acknowledge helpful comments on this chapter by David Alverson, Bill Averill, Lehman Fletcher and Anwar Youssef. The opinions expressed are ours and do not represent our employers' views.

3. For more details on agricultural cooperatives, see Moharrum 1983 and Rochin and Grossman 1987.

4. See a forthcoming study by the Management Consulting Center, Cairo, for further details on informal finance.

5. The PBDAC still lends some subsidized funds provided by Egypt's Social Fund for Development and by the International Fund for Agricultural Development (IFAD).

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IV

Reconciling Agricultural Liberalization with Macroeconomic Policies and Food Security

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12

Impacts of Macroeconomic and Trade Policies on a Market-Oriented Agriculture

SHERMAN ROBINSON
CLEMEN G. GEHLHAR

Egypt is currently engaged in major macroeconomic and market reforms, comparable to those undertaken in the early 1980s by Turkey and in the mid-1980s by Mexico. Starting in 1991, Egypt embarked on a fundamental macroeconomic reform associated with a World Bank/IMF structural adjustment program. The basic goal was to improve efficiency by lowering price distortions and relying on market forces to determine resource allocation. One important component of the reform is domestic price liberalization in the agricultural, manufacturing, and energy sectors; another is foreign trade liberalization through reduction of tariff and non-tariff barriers to both imports and exports (El-Laithy 1994, pp. 3-4).

Egypt is unique among developing countries in its almost complete dependence on irrigation; its dependence on water from a single source, the Nile river; and its limited capacity to expand the arable land base. The current reform efforts seek to put the Egyptian economy on a new growth path. Further growth in GDP and population, however, will strain Egypt's essentially fixed agricultural resource base. This chapter seeks to determine the magnitude of these strains and suggest appropriate policies for achieving optimal land and water use in the reform environment. It is based on an economy-wide, multisector, computable general equilibrium (CGE) model of the Egyptian economy that focuses on agriculture, with special treatment of land and water. The analysis with the model starts from the situation at the end of the 1980s and only partially considers the liberalization of agricultural policies that has occurred since that time.

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Egyptian Agriculture

Irrigated agriculture has been a pillar of the Egyptian economy since the time of the pharaohs. At 0.13 feddan per capita, however, Egypt's cultivable land area is among the lowest in the world.¹ The potential for increasing the cultivable land base is limited by both the continuing loss of agricultural lands to urbanization and the constraint on water available for irrigation.² With rapid population growth in the past 40 years, the strain on the land base is becoming serious (Gardner and Parker 1985; Ikram 1980). In Egypt, ". . . any future growth in agricultural production will need to come from more efficient utilization of the existing land and water resources of the country" (World Bank 1993, p. 6).

Agricultural land in Egypt has been used intensively and has been highly productive. Currently, cotton, wheat, rice, maize and berseem together account for 80 percent of the cropped area. Wheat is a principal winter crop, cotton and rice are important summer cash crops, and maize is a major food and feed crop. Sugar production is geared toward helping meet the rising local demand resulting from a growing population. Major shifts in cropping patterns took place from 1970 to 1990.³ The structure of production and resource use in 1987 is given in Table 12.1. Most important was the significant 8 percent decline in area devoted to cotton and the increase in area devoted to fruits, winter vegetables and summer vegetables, by 165 percent, 94 percent and 32 percent, respectively (Goueli and El-Miniawy 1993). Sugar cane yields have recently increased after decades of decline (Gardner and Parker 1985).

The policy environment affecting Egyptian agriculture includes both sector-

Table 12.1 Sectoral information in the base model, 1987

Sector	Sectoral taxes/ subsidies		Employment share	GDP	Export/ output	Import/ supply
	(ad valorem rate)	Tariffs				
Cotton	-15.0	-67.0	6.2	4.5	5.0	0.0
Vegetables	0.0	0.0	7.3	6.1	3.2	0.0
Rice	-32.0	025.0	4.9	2.7	1.1	0.0
Sugar	-13.0	-57.6	1.2	0.8	0.0	25.5
Grains	-19.1	-17.6	16.2	12.0	0.0	13.1
Other agriculture	0.0	0.0	1.8	2.3	0.8	0.0
Oil	-10.4	5.0	0.9	5.7	49.7	14.7
Industry	5.3	22.0	11.0	20.3	3.9	26.8
Services	-3.5	0.0	47.2	39.5	12.7	6.4
Electricity	-3.5	0.0	0.8	1.4	0.0	0.0
Construction	-0.7	0.0	2.5	4.8	0.0	0.0
Total/Average	-8.4	-12.8	100.0	100.0	6.9	7.9

Sources: Wenner, M. G., G. Gardner and S. Rosen (in press) for agricultural indirect taxes, tariffs and export subsidies.

Lofgren 1993c for other data.

Note: Negative numbers in the tariffs column are export taxes.

specific interventions and macroeconomic and trade policies that affect agricultural prices through their effects on the real exchange rate. Sector-specific interventions have included: (a) delivery quotas for certain crops (wheat and rice); (b) fixed producer/procurement prices for food and export crops; and (c) agricultural input subsidies, both explicit and through pricing of some inputs (water) below marginal cost (Dethier 1989). Table 12.1 provides data on the sectoral structure of production, trade, resource use, taxes and subsidies in 1987. The distorted incentive system is clearly evident, with high and sectorally variegated taxes, subsidies and tariffs. The importance of trade is also clearly evident. Table 12.2 shows water and land use. The heaviest users of water are grains, rice and vegetables, while the most water-intensive crops are sugar and rice. Other agriculture uses a significant amount of land, but is the least water intensive and uses the lowest share of total water.

In 1986, the Agricultural Policy Reform Program began dismantling some of the worst distorting policies in the sector. By December 1992, area and production quotas and marketing restrictions on all crops had been eliminated, except for cotton and sugarcane. The exchange rate subsidy for imported agricultural inputs was eliminated in 1991, and all other input subsidies have been reduced. The plan to eliminate all input subsidies in sugarcane and cotton markets by 1993 is yet to be implemented (Goueli and El Miniawy 1993).

Until 1991, Egypt had a multiple exchange rate system. Agricultural exports and imports were valued at an official exchange rate that artificially cheapened wheat imports and hurt producers of export crops (cotton, rice and vegetables) as well as producers of major import competing crops (cereals other than wheat). The implicit taxation on cotton (and, to a lesser extent, on wheat and other crops) from the overvalued exchange rate added to the taxation caused by sector-specific policies.⁴ As a result of this pattern of taxation, farmers have moved away from cotton to less-regulated crops, such as vegetables and fruits. The Egyptian government devalued the Egyptian pound in 1979 and 1987 to reduce the overvaluation of the official exchange rate (Goueli and El Miniawy 1993).

Table 12.2 Water and land use in the base model, 1987

Sector	Share of water use (%)	Share of land use (%)	Water intensity (cu m/td)	Water use per value added (cu m/VA)
Cotton	9.0	8.2	3.2	2.0
Vegetables	16.5	14.8	3.3	2.4
Rice	25.5	8.6	8.8	8.2
Sugar	9.2	2.3	12.0	9.9
Grains	34.5	54.2	1.9	2.5
Other agriculture	5.3	12.0	1.3	2.0
Total/Average	100.0	100.0	5.1	4.5

Source: World Bank 1993.

The Egyptian Land-Water Economy-Wide CGE Model

The Egyptian model is an economy-wide, computable general equilibrium (CGE) model that disaggregates the agricultural sector and provides special treatment of land and water. We provide a summary description of the model here. Full documentation is available in a separate paper.⁵ This land/water or LW-CGE model is in the tradition of trade-focused CGE models that have been applied to a number of developing countries to explore issues of structural adjustment.⁶ It also draws from earlier CGE models of Egypt, especially those focused on agriculture, and on an earlier regional agricultural model of the San Joaquin Valley in California that focused on water use. Although some CGE models have focused on agriculture (Dethier 1985; Lofgren 1993a), they are highly aggregated and have not focused on water use.⁷ Neither has there been any study that specifically addressed impacts of macroeconomic and sectoral reforms on land and water allocation in the agricultural sector.

Technology, Markets and Welfare

The LW-CGE model combines an activity-analysis, programming representation of agricultural technology (including inequality constraints) with a neoclassical representation of the technology of the non-agricultural sectors. While the programming specification of the agricultural sectors in this version is quite simple, the model is capable of being linked to more elaborate agricultural sector models in the future.⁸ There are six agricultural sectors (cotton, fruits and vegetables, rice, sugar, grains, and other), each using land, water, capital, labor and intermediate inputs. There are five non-agricultural sectors (oil, industry, services, electricity and construction), each using capital, labor and intermediate inputs.

Figure 12.1 shows the nested structure of the sectoral production functions. At the top level, sectoral output is a linear function of real value added and intermediate inputs. Intermediate inputs are demanded with fixed input-output coefficients. Real value added is a constant elasticity of substitution (CES) function of labor, capital and (in the agricultural sectors) a land/water aggregate. The land/water aggregate, in turn, is a linear aggregation of water (H_2O , in cubic meters) and raw land (FED , or feddan).

While this nested structure provides flexibility in specifying production technology, it still represents an overly simple specification of agricultural technology. For example, the model specifies a single land type that can be freely allocated across different crops. There is no regional disaggregation. Similarly, capital and labor are assumed to be freely allocable across agricultural sectors, and there is no consideration of livestock. Even with relatively low substitution elasticities and many fixed coefficients, this specification probably overstates the flexibility of the agricultural sector with regard to changing the cropping pattern and moving around factors of production. The LW-CGE model should be seen as a stylized empirical model that incorporates important general-equilibrium

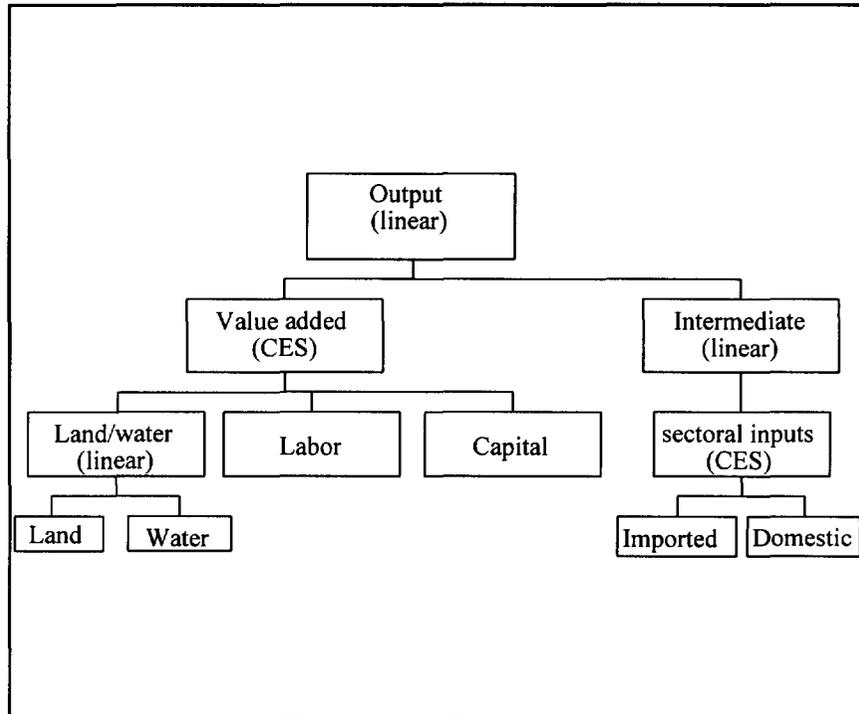


Figure 12.1 Sectoral production functions

effects but that needs to be complemented with more detailed analysis of agricultural subsectors.

Table 12.3 provides a listing of the equations of a simplified version of the LW-CGE model. This simplified presentation focuses on production technology and ignores international trade, income distribution and macro aggregates such as savings, investment, the balance of trade and the government deficit. Equations 1-5 give the production structure, following the nesting in Figure 12.1. Equations 6-13 define cost prices and the various first-order conditions for profit maximization. Equations 14 and 15 map from factor income to product demand, while equations 16-20 provide market clearing conditions. Finally, equations 21-26 bring together a number of revenue-expenditure identities arising from the homogeneity of the various underlying functions. These identities are implied by the other equations, given homogeneity, and hence are not independent equations. The simple model has $(13 \cdot I + I_j + 5)$ endogenous variables and, assuming all constraints are binding, $(13 \cdot I + I_j + 6)$ equations. The model, however, satisfies Walras' Law and therefore has only $(13 \cdot I + I_j + 5)$ independent equations.

Table 12.3 Equations of a simplified LW-CGE model

Production		
1	$X_i = \text{LIN}_i(V_i, INT_i)$	Linear production function.
2	$V_i = \text{CES}_i(K_i, L_i, LND_i)$	CES value added function.
3	$X_{ij} = \text{LIN}_{ij}(INT_j)$	Intermediate inputs.
4	$FED_i = \text{LIN}_i(LND_i)$	Land input.
5	$H2O_i = \text{LIN}_i(LND_i)$	Water input.
Prices and Factor Demand		
6	$(1 - t_i^X) \cdot P_i^X = \text{LIN}_i(P_i^V, P_i^{INT})$	Output cost price.
7	$P_i^{INT} = \text{LIN}_i(P_j, j)$	Intermediate input cost price.
8	$P_i^V = \text{CES}_i(W^K, W^L, W_i^{LND})$	Value added cost price.
9	$W_i^{LND} = \text{LIN}_i(W^{FED}, W^{H2O})$	Land/water cost price.
10	$W_i^{LND} = \frac{\partial V_i}{\partial LND_i} P_i^V$	Demand for land/water.
11	$W^K = \frac{\partial V_i}{\partial K_i} P_i^V$	Demand for capital.
12	$W^L = \frac{\partial V_i}{\partial L_i} P_i^V$	Demand for labor.
13	$\bar{P} = \prod_i (P_i^X)^{\beta_i}$	Numeraire cost of living index.
Income and Final Demand		
14	$Y = \sum_i (P_i^V \cdot V_i + t_i^X \cdot P_i^X \cdot X_i)$	Aggregate income.
15	$P_i^X \cdot C_i = \beta_i \cdot Y$	Consumption demand.
Supply-Demand Balances		
16	$X_i = C_i + \sum_j X_{ij}$	Product supply-demand.
17	$\bar{FED} \geq \sum_i FED_i$	Land supply-demand.
18	$\bar{H2O} \geq \sum_i H2O_i$	Water supply-demand.
19	$\bar{L} = \sum_i L_i$	Labor supply-demand.
20	$\bar{K} = \sum_i K_i$	Capital supply-demand.

Identities		
21	$(1 - t_i^x) \cdot P_i^x \cdot X_i = P_i^v \cdot V_i + P_i^{INT} \cdot INT_i$	Sales/income.
22	$P_i^v \cdot V_i = W^K \cdot K_i + W^L \cdot L_i + W_i^{LND} \cdot LND_i$	Value-added/factor payments.
23	$P_i^{INT} \cdot INT_i = \sum_j P_{ji}^x \cdot X_{ji}$	Intermediate input expenditure.
24	$W_i^{LND} \cdot LND_i = W^{FED} \cdot FED_i + W^{H2O} \cdot H2O_i$	Land/water payments.
25	$\sum_i P_i^x \cdot C_i = Y$	Income/expenditure.
26	$Y = W^K \cdot \bar{K} + W^L \cdot \bar{L} + \sum_i W_i^{LND} \cdot LND_i + \sum_i t_i^x \cdot P_i^x$	Income/factor payments.

Variables and Parameters

Variables		Parameters	
X_i	Output	t_i^x	Indirect tax rate (or subsidy, if negative)
V_i	Real value added	β_i	Consumption expenditure shares
INT_i	Aggregate intermediate input use	\bar{FED}	Aggregate supply of land subfactor
K_i	Capital input	$\bar{H2O}$	Aggregate supply of water subfactor
L_i	Labor input	\bar{L}	Aggregate supply of labor
LND_i	Aggregate land/water input	\bar{K}	Aggregate supply of capital
X_{ji}	Intermediate input from sector j to sector i	<i>Notation</i>	
FED_i	Land subfactor input into land/water aggregate	LIN	Linear function
$H2O_i$	Water subfactor input into land/water aggregate	CES	Constant elasticity of substitution function
P_i^x	Output market price		
P_i^v	Value added price		
P_i^{INT}	Aggregate intermediate input price		
W^K	Rental rate of capital		
W^L	Wage of labor		
W_i^{LND}	Rental rate of sectoral land/water aggregate		
W^{FED}	Rental rate of land subfactor		
W^{H2O}	Price of water subfactor		
Y	Aggregate income		
C_i	Consumption demand		

Except for the land/water aggregate (LND), the model has a standard neoclassical specification. The CES functions for real value added yield well-behaved first-order conditions for profit maximization (Equations 10-12), conditions that will generally yield a solution with all factor prices strictly positive. The land/water aggregate, however, is a linear function of water and land ($H2O$ and FED), with separate supply constraints (Equations 17 and 18). Given that there are six agricultural sectors with quite different water and land coefficients, it is certainly possible to have both constraints binding. If either the water or land constraint is especially binding, however, it is possible that the constraint on the other will not be binding. For example, the water constraint might be so binding that it is impossible to find a crop mix that utilizes all the land, and the land constraint equation will then be satisfied as a strict inequality. If the land or water constraint is not binding (Equations 17 and 18), the corresponding market price of land or water (W^{FED} and W^{H2O} in Equation 9) should be zero in equilibrium. The solution prices in the CGE model should

display the same kind of complementary slackness as the shadow price system in a programming model.

A neoclassical CGE simulation model will generally have a unique solution that satisfies all the nonlinear first-order conditions with all prices strictly positive and all constraints satisfied as equalities. No maximand is needed, since the model includes explicit supply and demand equations for all goods and factors. In the LW-CGE model, the first-order conditions for the land and water constraints are summarized in the linear cost functions in Equation 9. There is a problem, however, in that an infinite number of solutions satisfy the cost function (Equation 9) and the two inequality constraints (Equations 17 and 18). Without an explicit maximand, there is nothing in the cost equations to prevent the model economy from operating within the production possibility frontier for agriculture. In the usual CGE simulation model, this possibility is eliminated by expressing the resource constraints as strict equalities.

Given the inequalities for the land and water constraints, two approaches can be used to solve the model. First, the model can be seen as a nonlinear mixed complementarity problem (MCP) in which the land and water prices, W^{FED} and W^{H2O} , are “complementary” to the land and water supply-demand inequalities. Complementarity simply means that the product of the non-negative price times the corresponding excess-supply inequality must equal zero, as noted earlier. Imposing the two complementary slackness conditions explicitly guarantees that the model operates on the production possibility frontier while also satisfying the market equilibrium pricing equations. Recently developed MCP solvers work well on this particular model.⁹

The second approach to solving the LW-CGE model is to introduce an explicit maximand and treat the model as a nonlinear programming problem. Since the CGE model is designed to simulate the operation of a market economy, it is important to specify a maximand that generates a solution that can be seen as simulating a market outcome. However, we explicitly specify in Equation 9 that the price of the land/water aggregate must equal the cost of the water and land used—a condition that is true in a competitive equilibrium in which there are no excess profits. In general, any solution that is on the production possibility frontier and satisfies Equation 9 with non-negative prices can be seen as a market outcome. Factor wages would equal marginal revenue products for land and water in all agricultural sectors, which characterize a profit-maximizing market equilibrium.

Given that the LW-CGE model has a single consumer, the obvious choice of maximand is consumer welfare. In a competitive economy with no distortions, maximizing consumer welfare will generate a profit-maximizing and utility-maximizing market equilibrium, and is equivalent to maximizing the sum of consumers’ and producers’ surplus in the economy.¹⁰ In addition, the various supply-demand balance constraints will then have shadow prices that measure the welfare gains caused by relaxing the constraints. If there are distortions in the

market price system—for example, from sectoral tariffs, taxes, and subsidies—the model will generate a market solution, and any differences between the simulated market prices and the shadow prices, given the maximand, measure the welfare costs associated with the distortions.

In this model, we have chosen as numeraire (Equation 13) the cost of living index associated with the utility function that underlies the expenditure functions (Equation 15). In this case, the variable Y , which measures aggregate income and expenditure, is a direct measure of utility. Given the numeraire, Y corresponds to expenditure in the indirect utility function. Changes in Y are a direct measure of “equivalent variation,” which is a standard measure of welfare change.¹¹ In addition, for this choice of maximand, if there are no distortions in the model economy, the shadow prices associated with the supply-demand balance equations should exactly equal the endogenous market-clearing prices at the simulated market equilibrium.¹²

Factor Markets, Prices and Distortions

While the LW-CGE model solves for market rental rates for land and water (FED and $H2O$) at the bottom of the production nest, it is not necessary to interpret these rates as occurring in an actual market. In fact, Egypt does not charge for water use, so there is currently no market for water.¹³ However, we do assume that, at the next level, the solution for the rental rate for the land/water aggregate does reflect a market valuation. In effect, we are assuming that, when a farmer uses land to grow a particular crop, he is entitled to the needed water, and the market return to his land reflects that entitlement.

The model separately prices land and water and so decomposes the rental value of the land/water aggregate into components reflecting pure land rent and the value of the water entitlement. The model solution generates information about the counter-factual “what if” question: If Egypt were to institute a market for water and charge for water used in agriculture, what would be the market-clearing price? It is also interesting to compare the simulated market price of water with its shadow price. Although they will be equal if there are no market distortions, the Egyptian economy in fact is characterized by a variety of distortions. The difference between the shadow and simulated market prices of water indicate the difference between the social value of water at the margin and the demand price for water in the distorted market environment.¹⁴

The simplified model presented in Table 12.3 includes only one tax variable, a sectoral *ad valorem* indirect tax rate. This rate can be negative, reflecting a sectoral production subsidy. The indirect tax/subsidy puts a wedge between the sectoral price paid by demanders (P^X) and the price received by producers (Equation 6). The resulting tax revenue (or subsidy cost) is simply transferred in a lump sum to (or from) consumers (Equation 14). The full model includes an additional distorting tax instrument: *ad valorem* sectoral tariffs on imports. Indirect taxes, subsidies, and tariffs differ widely across sectors in Egypt (Table

12.3) and hence significantly distort producer and consumer incentives relative to what would occur in an undistorted competitive market solution.

The simplified model has a single labor type, and capital is also assumed to be intersectorally mobile. In the full model, both the labor and capital markets are segmented, separating rural and urban markets. Rural labor and capital work only in the six agricultural sectors, while urban labor and capital work in the nonagricultural sectors. Wages and capital rentals are determined through separate rural and urban supply-demand equations.¹⁵

While richer, the full model still has a number of very strong simplifying assumptions. The model is neoclassical in the sense that there is no overt unemployment. Underemployment is indicated by a low market wage, and there is no transitory unemployment or adjustment costs. Water is assumed to be costless to distribute and can be freely allocated to different crops. We do not consider any losses in water distribution, so the water usage numbers reflect "consumptive use" rather than supply. Nonagricultural water use is not modeled at all. Land is also assumed to be freely allocable across different crops. There is no differentiation of land by quality, no explicit representation of multiple cropping and no regional differentiation. All these simplifications can be relaxed in a more elaborate model of Egyptian agriculture such as that of Hazell et al. (1994), and one of our future research goals is to integrate such a model with the CGE model.

International Trade and Macro Closure

The simplified model does not include international trade, aggregate investment, or government demand. The full model includes all three. The trade specification follows closely the standard treatment in trade-focused CGE models.¹⁶ Imports and domestically produced goods with the same sectoral classification are assumed to be imperfect substitutes in use, with a constant elasticity of substitution. What is demanded is a composite good, which is a CES aggregation of imports and domestically produced goods. Exports are also differentiated from goods sold on the domestic market. Sectoral output is "transformed" between export and domestic markets according to a constant elasticity of transformation (CET) function. The resulting model incorporates a great deal of product differentiation as well as a degree of realistic insulation of domestic prices from changes in world prices.

Egypt is assumed to be a small country, so that world prices of its exports and imports are not affected by the volume of trade. The model includes the balance of trade, which is assumed fixed. The model solves endogenously for an exchange rate that equilibrates the demands for domestic and traded goods, given the fixed balance of trade. The equilibrating variable is the real exchange rate, which is the relative price of tradables (both exports and imports) and domestically produced goods sold on the domestic market.

Given the balance of trade, real government expenditure and real investment,

some macro mechanism is required in the model to generate adequate government revenue and aggregate savings to finance the three deficits (the balance of trade, government deficit and savings-investment gap). The macro closure of the model is very simple. The balance of trade is fixed exogenously in terms of world prices, although its value in domestic prices depends on the exchange rate, which is determined endogenously. The balance of trade in domestic currency is assumed to be financed from (or, if negative, be a source of) aggregate savings. Government tax rates are all set exogenously, so that government revenue is determined endogenously. The government deficit (or surplus) is assumed to be a drain on (or an addition to) aggregate savings. The equilibrating macro variable is the aggregate private savings rate, which is assumed to adjust to achieve savings-investment balance. The macro mechanisms by which this equilibrium savings rate might be achieved are not explicitly modeled.¹⁷

Given the macro closure, with fixed aggregate real investment and real government expenditure on goods and services, any change in sectoral taxes, subsidies or tariffs will be offset by a lump-sum transfer to or from households. Policy reform experiments, in which distorting *ad valorem* taxes, subsidies and tariffs are eliminated, yield gains in allocative efficiency. Because these taxes and subsidies are implicitly replaced by efficient lump-sum taxes or transfers, the model does not consider efficiency costs of alternatives to *ad valorem* taxes and subsidies. The results should be viewed as providing an upper-boundary estimate of the efficiency gains from policy reform.

Empirical Results

We ran two different series of experiments with the LW-CGE model to explore a variety of issues regarding the impact of reforms on Egyptian agriculture. In the first series, we explored the general-equilibrium impact of eliminating distortions due to the tax, subsidy and tariff system, both agricultural and nonagricultural. The focus was on the welfare and structural implications of major, pervasive reform of Egyptian industrial and agricultural policy. In the second series, we estimated the demand curve for water by agriculture. In these experiments, we progressively reduced the aggregate supply of water and traced out the impact on the price of water and on the structure of agricultural production and water use.

Policy Reform Experiments

In this series of experiments, we explored the implications of removing all policies that distort sectoral production and demand incentives. The experiments are described in Table 12.4. The first experiment removed all nonagricultural indirect taxes/subsidies and tariffs in the nonagricultural sectors. It represented industrial reform alone. The remaining five experimen-

Table 12.4 Description of policy reform experiments

Experiment	Description
1	Reduce indirect taxes/subsidies and tariffs to zero in all non-agricultural sectors.
2	Exp 1 plus reduce indirect taxes/subsidies and tariffs in agricultural sectors by 20%.
3	Exp 1 plus reduce indirect taxes/subsidies and tariffs in agricultural sectors by 40%.
4	Exp 1 plus reduce indirect taxes/subsidies and tariffs in agricultural sectors by 60%.
5	Exp 1 plus reduce indirect taxes/subsidies and tariffs in agricultural sectors by 80%.
6	Exp 1 plus reduce indirect taxes/subsidies and tariffs in agricultural sectors by 100%.

sively eliminated indirect taxes/subsidies in the agricultural sectors, in equal steps of 20 percent each.

The results for a number of economywide variables are given in Table 12.5. Note first the impact of policy reform on aggregate welfare. As discussed previously, the change in aggregate consumption measures the increase in welfare as the equivalent variation (presented as a ratio to the base level of welfare) due to the experiment. In the Egyptian case, there are significant potential gains from policy reform. Complete removal of distorting policies (experiment 6) increases GDP by 4.8 percent and aggregate welfare by 5.9 percent; these are very large numbers, considering they represent only static efficiency gains.

Policy regimes in many developing countries discriminate against agriculture.¹⁸ We measured the policy bias using the value-added terms of trade, which is the ratio of value added (including *ad valorem* and subsidies) per unit of output in agriculture to that in the non-agricultural sectors. In experiment 1, which removes all distorting nonagricultural policies, the value-added terms of trade declines slightly (by 3 percent). The implication is that these policies, on net, tax the nonagricultural sectors relative to agriculture. In experiments 2-6, the terms-of-trade ratio increases significantly, indicating that the agricultural policies provide a large net tax on agriculture. The policy bias against agriculture is also indicated by the fact that all the policy reform experiments lead to large increases in the returns to factors in agriculture relative to those in the nonagricultural sectors. Rural wages go up, which should also significantly lessen migration pressure.¹⁹

In general, an important impact of import protection is to appreciate the real exchange rate, providing an incentive bias against exports. In experiment 1, the removal of non-agricultural tariffs led to a 2.7 percent depreciation, which indicates a small incentive bias against exports from these policies. In Egypt, however, there were significant export taxes in agriculture in 1987 (Table 12.1), so the bias against exports was explicit and sector specific. The removal of these export taxes in experiments 2-6 led to a dramatic increase in exports and a significant appreciation of the equilibrium real exchange rate. The numbers are quite large, indicating that agricultural policies were significantly distorting

incentives in the rest of the economy through macro links, especially the real exchange rate.

Table 12.5 indicates that the return to the land/water aggregate falls monotonically as agricultural policy distortions are eliminated, falling 6.9 percent relative to the base with complete liberalization. As the policy bias against agriculture is eliminated, changes in the return to the land/water aggregate come from changes in the intensity of factor demand, or Stolper-Samuelson effects.²⁰ The change in sectoral production structure in agriculture arising from complete liberalization (experiment 6) is shown in Figure 12.2. Production of grains, rice, and fruits and vegetables, which are subsidized, fall significantly. Cotton, which is heavily taxed, expands significantly. Other agriculture and sugar expand slightly. The elimination of distortions leads farmers to switch into crops that are more capital and/or labor intensive, and less land/water intensive (e.g., cotton). While there is a shift away from land/water intensive crops, there is also a shift toward more water-intensive versus land-intensive crops (e.g., sugar and cotton versus grains). The net effect is an increase in the demand for water with liberalization.²¹

These changes in the cropping structure significantly affect the relative returns to the underlying subfactors, land and water. Figure 12.3 and 12.4 show the market and shadow prices of water and land with policy liberalization. At the

Table 12.5 Macro results, policy liberalization experiments

Variable	Policy Liberalization Experiments						
	Base	EXP1	EXP2	EXP3	EXP4	EXP5	EXP6
	(Value)	----- (Percent change from base) -----					
1. GDP (billion LE)	42.1	0.5	2.5	2.6	3.6	4.3	4.8
2. Consumption	25.93	0.6	2.2	3.7	5.0	5.7	5.9
3. Exports	5.99	8.3	12.1	19.9	30.7	43.0	55.4
4. Imports	9.76	5.1	7.5	12.2	18.9	26.4	34.0
5. Agricultural VA	1.00	-3.0	0.2	5.6	12.6	20.3	27.9
Terms of Trade							
6. Exchange rate	1.00	2.7	-1.1	-5.7	-10.6	-15.3	-19.4
7. Rural wage	1.10	3.5	6.0	10.9	17.4	24.6	31.6
8. Urban wage	2.36	4.1	2.8	1.1	-0.8	-2.9	-5.0
9. Land/water aggregate rental tax	1.00	2.8	1.9	0.3	-1.6	-4.1	-6.9
10. Capital rental index							
a. rural	1.00	3.4	6.0	10.8	17.4	24.6	31.5
b. urban	1.00	15.1	12.1	8.4	4.6	1.0	-2.3

Notes:

1. For description of experiments, see Table 12.4.
2. Changes in aggregate consumption represent changes in welfare (equivalent variation) relative to base value.
3. All macro aggregates and wages are in real terms.
4. Agricultural VA (Value Added) Terms of Trade is VA /unit output in agriculture divided by VA /unit output in nonagriculture. VA terms of trade includes indirect taxes and subsidies per unit of output.
5. Exchange rate is in units of LE/unit of foreign exchange. A rise in the index represents a depreciation.

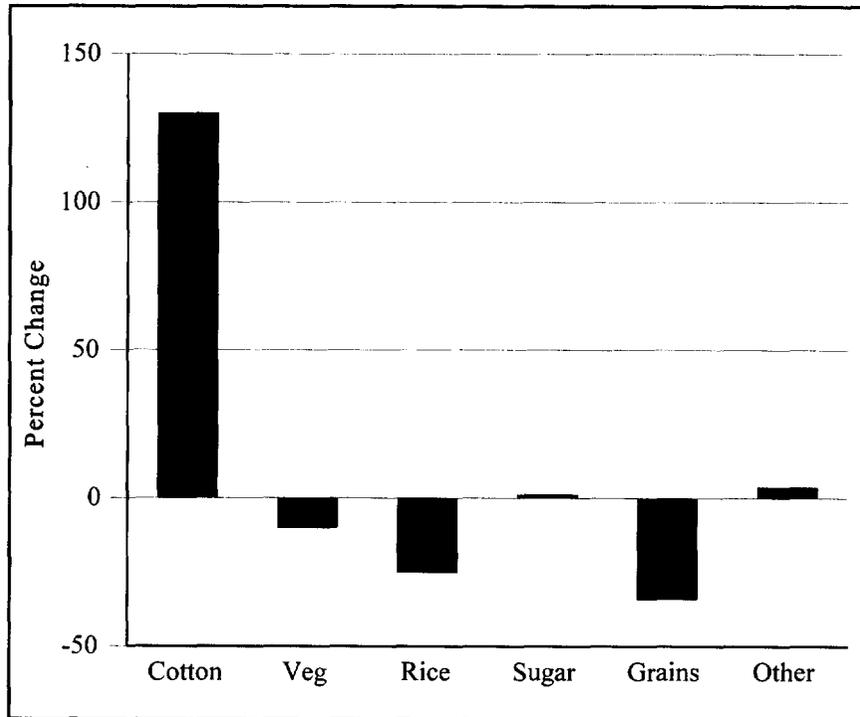


Figure 12.2 Change in output with complete liberalization

base solution, the simulated market price of water is almost zero, while that of land is quite high. With complete liberalization, the market price of water rises, while that of land falls. The shadow price of water, however, is significantly positive in the base solution, while the shadow price of land is much lower than the market price.

The implication of these results is that the existing set of Egyptian policies biases production in favor of agricultural sectors that are less water intensive. While water is clearly valuable, with a high shadow price, if Egypt were to introduce a water market with the existing set of output tax and subsidy policies, the market-clearing price would be near zero! Alternatively, given the existing tax and subsidy system, farmers have no incentive to cheat in order to acquire additional water. Water demand equals supply, even when the water is provided free.

With policy liberalization, however, the market price of water rises. In contrast, the shadow price rises only slightly, indicating that the social value of water changes little. As theory predicts, the market price exactly equals the

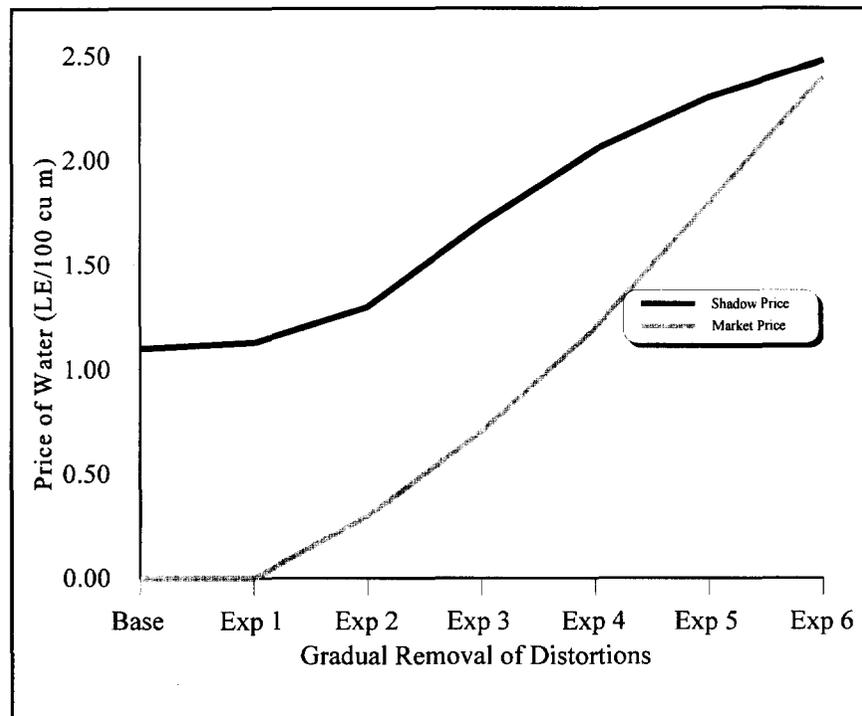


Figure 12.3 Policy liberalization effects on market and shadow prices of water

shadow price when all distortions are eliminated (Figure 12.3). The implication of this steep rise in the market price is that policy liberalization will create significant strains on the existing system of water allocation. In an undistorted market, farmers will value water highly. With policy reform, any water distribution system that relies on quantitative allocations at zero cost to the recipients will engender incentives for cheating and corruption.

The market for raw land, with no associated water rights, appears to be the inverse of the water market. The market land rent starts high in the base and falls dramatically with agricultural policy liberalization. As with water, the shadow price changes much less. Again, as theory predicts, the market rent equals the shadow rent with full policy liberalization (Figure 12.4).

Demand Curve for Water

To explore the importance of water availability to Egyptian agriculture, we did a series of experiments to trace out the demand curve for water. In this series of five experiments, we progressively lowered the aggregate

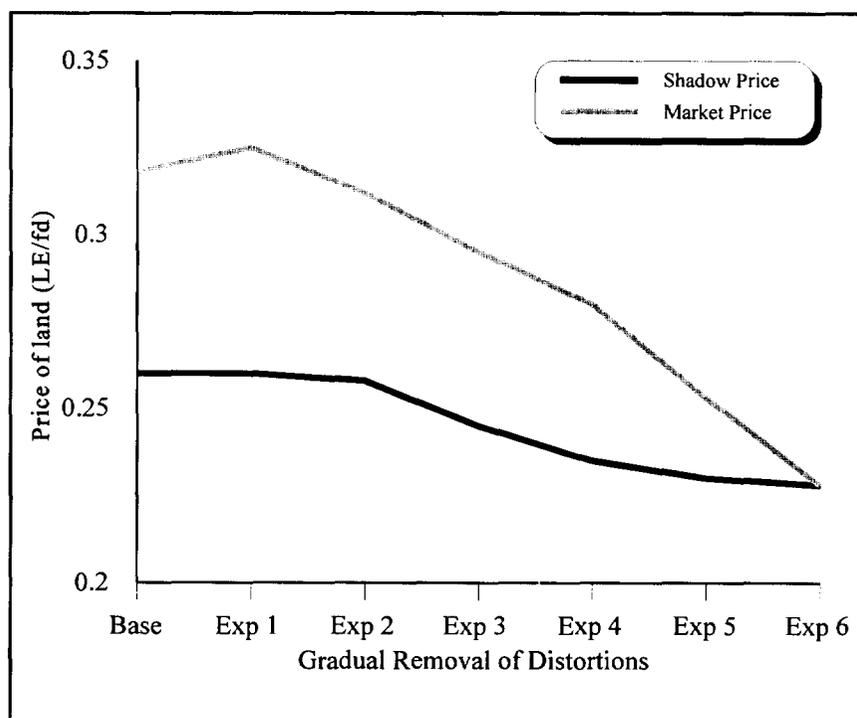


Figure 12.4 Policy liberalization effects on market and shadow prices of land

supply of water in 5 percent steps, stopping when the aggregate water supply was reduced by 25 percent. The results are presented in Figure 12.5, which shows the resulting demand curve for water, plotting both the shadow price and the simulated market price against total demand.²²

These are general-equilibrium demand curves in that, as the aggregate supply of water is changed, the economy is allowed to adjust fully, with changes in supply, demand and prices across all sectors and factors. The market and shadow demand curves are quite steep, with an arc price elasticity that ranges from 0.1 to 0.4. As the aggregate water supply is reduced, the existing system of taxes and subsidies in the policy-distorted base leads to a cropping pattern that seeks to maintain production in sections of high water use, generating an inelastic demand for water.

As the aggregate water supply is reduced, the land constraint ceases to be binding and land is taken out of production. When the land constraint ceases to be binding, both the market and shadow prices go to zero. Figure 12.6 shows the relationship between aggregate water and land use as the supply of water is

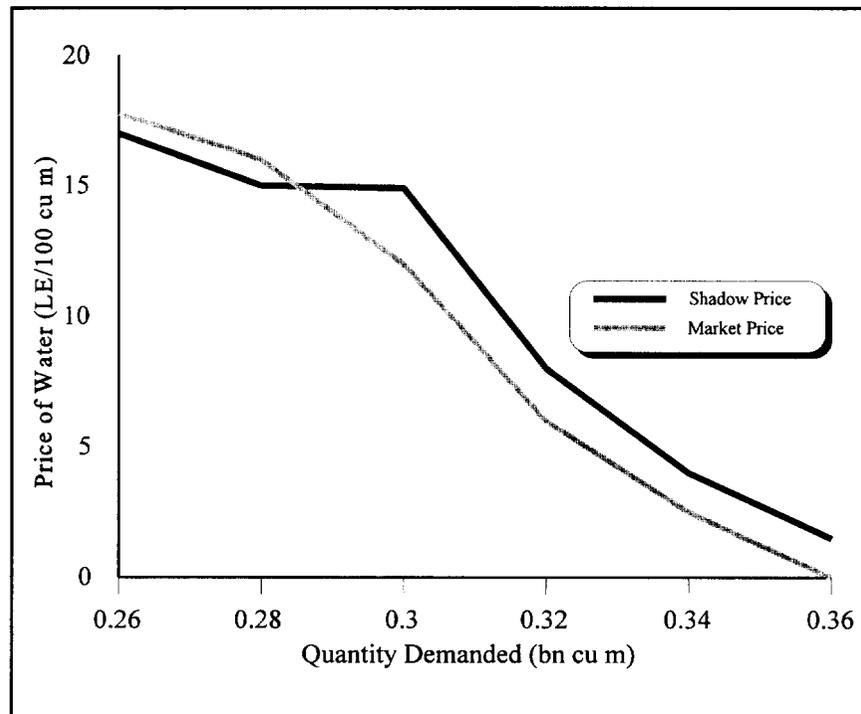


Figure 12.5 Private and social demand for water

reduced. After a 15 percent reduction in aggregate water supply, land starts to be taken out of production. With a 25 percent reduction in water use, land use is reduced 14 percent. As the land constraint ceases to bind, the value of the land/water aggregate depends solely on the fact that land use carries with it the right to use water—all the value is attributable to water.

Figure 12.7 indicates the change in agricultural production with a 25 percent reduction in total water use. The most water-intensive sectors, rice and sugar, are cut the most, followed by vegetables. Grains and cotton are only slightly affected, while other agriculture, which has the lowest water intensity, actually expands. A comparison of Figure 12.2 and 12.7, however, indicates that policy liberalization has a greater effect on the structure of agricultural production than does a change in water supply. The policy regime in effect in 1987 led to major distortions in the structure of production, especially in grains and cotton, which are the sectors least affected by reductions in the total water supply.

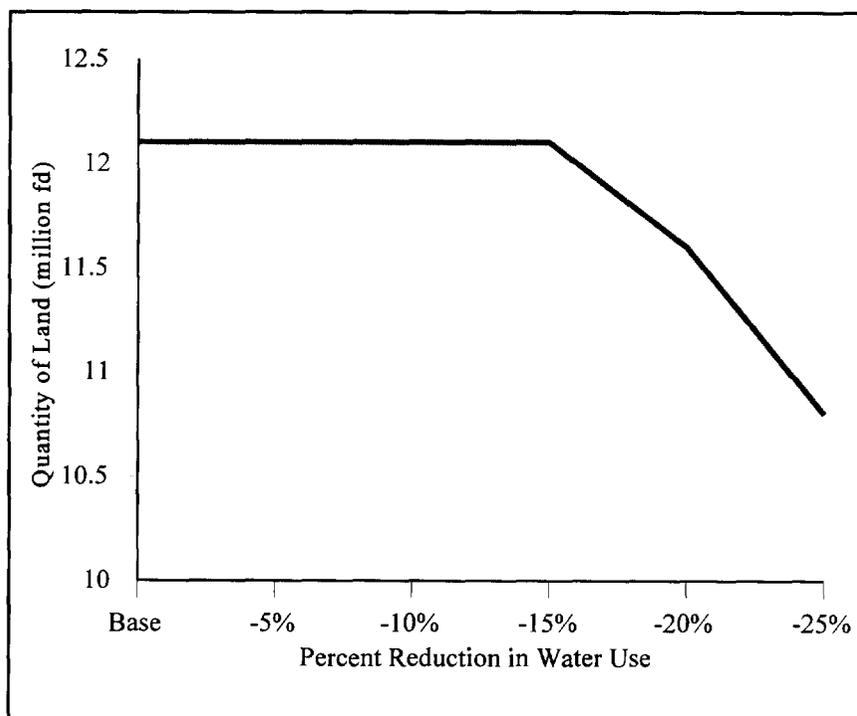


Figure 12.6 Aggregate land use, water reduction experiments

Conclusions

A number of conclusions can be drawn from the results of the experiments done with the Egyptian LW-CGE model. First, in 1986-88, the existing tax and subsidy system in Egypt was very distorted, and there were significant potential welfare gains from policy reform. Second, under the 1986-88 policy regime, land, not water, was the binding constraint to farmers. Then as now, farmers were not charged for water and received adequate supplies given their cropping pattern. The model results indicate that, given the system of output taxes and subsidies in 1986-88, this situation was essentially an equilibrium; even if Egypt had introduced markets for water, the equilibrium market price would have been close to zero. Third, elimination of distorting *ad valorem* taxes and subsidies increases the demand for water and hence increases the market price of water that would prevail if there were an open water market. In this environment, policy reform on the output side would strain the existing system of water distribution, since farmers would find water to be

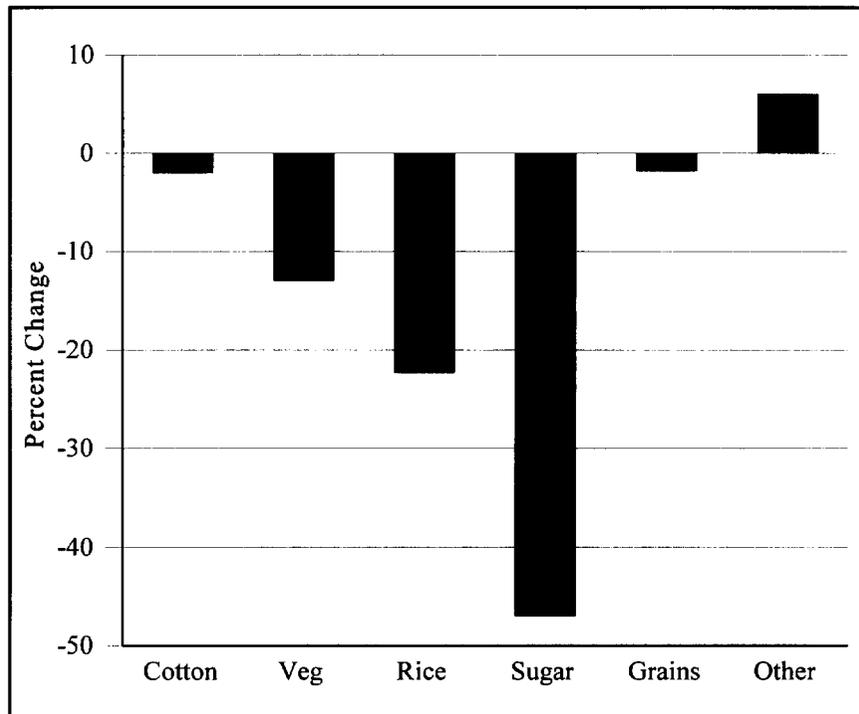


Figure 12.7 Change in agricultural output with 25 percent reduction in water

both unpriced and scarce. Fourth, the analysis of the demand curve for water indicates that the demand for water is quite inelastic.

The model results indicate that, if it is necessary to reduce water consumption or to manage water distribution in an environment in which agriculture is growing but the water supply remains fixed, then the value of water to farmers will increase greatly. If there is to be successful reform of distorting policies on the output side, or if Egypt must deal with increasing water scarcity, then it is necessary to devise a means to ensure the efficient allocation of water in an environment in which its potential market value is great. Any administrative allocation system will therefore have to operate in an environment in which there are significant incentives for cheating and corruption.

Finally, the results indicate that, while there are significant potential welfare gains from policy liberalization, there is also a great deal of structural adjustment that must occur. Reform will lead to major changes in the structure of agricultural production. Removing the bias against agriculture inherent in the 1986-88 policy regime would, however, significantly lessen the pressure for rural-urban migra-

tion. While the model results indicate the size of the required adjustment, the comparative-static nature of the analysis prevents any analysis of the time over which the adjustments might occur and of what the costs of adjustment might be over that period. In view of the size of the required structural changes, adjustment costs can be expected to be significant. Further analysis and policy attention are required to manage the adjustment process efficiently in order to achieve the welfare gains with a minimum of economic and social disruption.

Notes

1. A feddan is an Egyptian unit of land area equal to 1.037 acres or 0.420 hectares.
2. The availability of a reliable water supply from the High Aswan Dam is governed by the existing water-sharing agreement with Sudan (World Bank 1993). All the land suitable for the production of most crops has been brought into production, and attempts to reclaim desert land have been largely high-cost, low-productivity operations (Antle 1993, p. 173).
3. Egyptian agriculture joined the "Green Revolution" of the 1960s and 1970s by adopting improved varieties of rice and increasing the use of nitrogenous fertilizers. Insecticides were used to deal with pest problems, especially in cotton.
4. Bautista and Gehlhar 1994 estimate the overvaluation of the exchange rate used for agriculture as 40 percent in 1971-79 and 12 percent in 1989-92.
5. The model is implemented in the GAMS modeling language. See Brooke, Kendrick and Meeraus 1988. Complete documentation, including a listing of the equations in GAMS, is available in Robinson and Gehlhar 1995.
6. See Robinson 1989 for a survey of CGE models in developing countries. Devarajan, Lewis and Robinson 1990 describe the structure and properties of these trade-focused CGE models.
7. For surveys, see El-Laithy 1994 and Lofgren 1993a. Dethier 1989 provides an early agriculture-focused CGE model of Egypt, while Lofgren 1993a discusses agricultural sector models and presents a quadratic programming model of agriculture in a particular region that endogenizes prices. The San Joaquin Valley model is described in Berck, Robinson and Goldman 1991.
8. Our intent is eventually to link the CGE model with a detailed programming model of Egyptian agriculture developed by Hazell et al. 1994.
9. See Rutherford 1994 for a description of MCCP algorithms, their application to CGE models, and their implementation in the GAMS language.
10. In some agricultural sector models, the maximand is the sum of consumer and producer surplus, given linear approximations to supply and demand curves, which approximates aggregate welfare and so generates a solution whose shadow prices can be viewed as market prices. These models do not include first-order conditions explicitly, and so do not simulate market solutions directly. See, for example, Hazell and Norton 1986. In a nonlinear programming model, it is straightforward to choose aggregate welfare as the maximand, so as to avoid any approximation errors.
11. See Shoven and Whalley 1992, pp. 123-128, for a discussion of different welfare measures and their use in CGE models.

12. For other choices of numeraire, relative solution prices will equal relative shadow prices.

13. The model ignores nonagricultural uses of water and also assumes that there are no distribution costs. Water is a necessary, costless input to agriculture whose aggregate supply is fixed.

14. Given that Egypt does not charge for water used for agriculture, it is also interesting to explore the implications for water demand of different policy reform scenarios in an environment in which water is free. That is, instead of assuming a binding water constraint and letting the model generate a scarcity value for water under different policy scenarios, we can alternatively set the price of water to zero and let the model solve for the demand for water. In Robinson and Gehlhar 1995, we explore the implications of using constrained-water and unconstrained-water variants of the model.

15. In this specification, "rural" is equivalent to "agricultural" and "urban" is equivalent to "nonagricultural." We also specify a version of the model in which we link the two labor markets by adding a migration equation. With migration, labor moves between the two labor markets to maintain a fixed relative wage between agricultural and nonagricultural labor. Experiments with this model variant are reported in Robinson and Gehlhar 1995.

16. See Devarajan, Lewis and Robinson 1994 for a detailed discussion of the treatment of trade in CGE models.

17. This macro closure is called "Johansen closure" after Lief Johansen, who used it in the first CGE model of Norway. For a discussion of different macro closure rules, see Robinson 1989, 1991.

18. See, for example, Bautista and Valdés 1993 for a comparative study of policy regimes in a variety of developing countries, which documents that a policy bias against agriculture is common.

19. This result is confirmed in experiments with a model variant allowing rural-urban migration.

20. The Stolper-Samuelson Theorem states that an increase in the relative price of one commodity raises the real return of the factor used intensively in producing that commodity and lowers the real return of the other factor (Jones and Neary 1984).

21. We also did liberalization experiments in a model variant in which water is unconstrained. Complete liberalization leads to a 4.2 percent increase in the quantity of water demanded.

22. Note that the total demand for water in Figure 12.5 represents "consumptive use" in agriculture and does not account for any distributional losses or nonagricultural use.

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13

Protecting Food Security for the Poor in a Liberalizing Economy

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HEBA EL-LAITHY

Egypt's Economic Reform and Structural Adjustment Program (ERSAP), launched in 1991, seeks a shift from a centrally-planned, inward-oriented economy with a relatively small private sector to a market-based, outward-oriented economy in which the private sector plays a leading role. It was known from the experience of other countries that such reform measures are generally associated with high social costs in terms of unemployment, depressed real incomes and loss of public services. Moreover, these costs are virtually unavoidable during the transition until the reforming economy returns to higher and more efficient growth.

The objectives of this chapter are: (1) to analyze the implications of the ERSAP for food affordability and accessibility by the poor and (2) to provide specific suggestions on how to target the poor by replacing the old food subsidy system with another system that aims at maintaining food security for the poor. The chapter is divided into four sections. The first provides a brief analysis of the food security problem at the national level, which must be understood prior to any pertinent discussion of food security for the poor; the second focuses on food accessibility by poor households under the old food subsidy system, before the ERSAP; the third uses available evidence to analyze the impact of the ERSAP on food affordability by the poor; and the concluding section presents approaches for protecting food security of poor households, both during the transition and afterwards in the liberalized economy.

An Overview of Egypt's Food Security Situation

Egypt's growing dependence on imported food during the pre-reform period has been described in previous chapters. To portray that dependence in more depth, this chapter concentrates on wheat, edible oils, rice and sugar, the four commodities that have accounted for the bulk of the budgetary food subsidies. It covers the period from 1975 through 1993, comprising a full decade before the reform as well as the years since 1986, during which agricultural and macroeconomic reforms have been implemented.

Table 13.1 provides data on production, consumption, import gaps and national self-sufficiency for the four commodities. Rice is the only crop with an exportable surplus, but that surplus was a relatively small 10.5 percent of production in 1992/93. The large increases in rice production during 1989-91 were matched with equally large jumps in consumption. The accelerated production growth in the reform period will have to be maintained if Egypt is to continue substantial exports of rice.

For the other three crops, self-sufficiency is not only less than 100 percent but considerably below that number. It has also been decreasing consistently through the 1970s and 1980s, with improvement witnessed only in recent years of reform. Low self-sufficiency levels for necessary food items such as wheat, which reached a level as low as 17.10 percent in 1984/85 and whose highest value, reached in 1992/93, was only 40 percent, means heavy dependence on imports. This in turn means a heavy and increasing burden on the balance of payments and the use of foreign exchange badly needed for capital imports, as

Table 13.1a Trends of production, consumption and self-sufficiency for wheat

Year	Total production (000 mt)	Percentage change from previous year	Total consumption (000 mt)	Percentage change from previous year	Self-sufficiency ratio	Import gap (000 mt)
75	1672		5370		31.14	3698
76	1716	2.63	5686	5.88	30.18	3970
77	1568	-8.62	6195	8.95	25.31	4627
78	1489	-5.04	6782	9.48	21.96	5293
79	1543	3.63	7019	3.49	21.98	5476
80/81	1473	-4.54	7334	4.49	20.08	5861
81/82	1589	7.88	7727	5.36	20.56	6138
82/83	1654	4.09	7962	3.04	20.77	6309
83/84	1637	-1.03	8648	8.62	18.93	7011
84/85	1488	-9.10	8700	0.60	17.10	7212
85/86	1535	3.16	9283	6.70	16.54	7748
86/87	1582	3.06	8618	-7.16	18.36	7036
87/88	2232	41.09	9345	8.44	23.88	7113
88/89	2328	4.30	9829	5.18	23.69	7501
89/90	2610	12.11	9450	-3.86	27.62	6840
90/91	3500	34.10	9536	0.91	36.70	6036
91/92	3676	5.03	9549	0.14	38.50	5873
92/93	3787	3.02	9446	-1.08	40.09	5659

Source: Department of Agricultural Economics and Statistics, Ministry of Agriculture and Land Reclamation, Cairo.

Table 13.1b Trends of production, consumption and self-sufficiency for edible oil

Year	Total production (000 mt)	Percentage change from previous year	Total consumption (000 mt)	Percentage change from previous year	Self-sufficiency ratio	Import gap (000 mt)
75	95		308		30.84	213
76	85	-10.53	315	2.27	26.98	230
77	90	5.88	328	4.13	27.44	238
78	86	-4.44	385	17.38	22.34	299
79	111	29.07	384	-0.26	28.91	273
80/81	92	-17.12	454	18.23	20.26	362
81/82	97	5.43	485	6.83	20.00	388
82/83	96	-1.03	545	12.37	17.61	449
83/84	114	18.75	557	2.20	20.47	443
84/85	119	4.39	547	-1.80	21.76	428
85/86	116	-2.52	583	6.58	19.90	467
86/87	122	5.17	605	3.77	20.17	483
87/88	114	-6.56	550	-9.09	20.73	436
88/89	98	-14.04	609	10.73	16.09	511
89/90	78	-20.41	585	-3.94	13.33	507
90/91	68	-12.82	474	-18.97	14.35	406
91/92	70	2.94	424	-10.55	16.51	354
92/93	78	11.43	452	6.60	17.26	374

Source: Department of Agricultural Economics and Statistics, Ministry of Agriculture and Land Reclamation, Cairo.

well as increasing vulnerability to changing world prices. Possibly an even more serious dimension of the problem is its political dimension as Egypt becomes heavily dependent on foreign countries for something as crucial to its people's survival as food. That risk is particularly high in the case of food aid, of which

Table 13.1c Trends of production, consumption and self-sufficiency for sugar

Year	Total production (000 mt)	Percentage change from previous year	Total consumption (000 mt)	Percentage change from previous year	Self-sufficiency ratio	Export surplus (000 mt)
75	502		694		72.33	192
76	580	15.54	579	9.37	76.42	179
77	618	6.55	809	6.59	76.39	191
78	593	-4.05	908	12.24	65.31	315
79	624	5.23	846	-6.83	73.76	222
80/81	634	1.60	1110	31.21	57.12	476
81/82	612	-3.47	1233	11.08	49.64	621
82/83	766	25.16	1315	6.65	58.25	549
83/84	700	-8.62	1351	2.75	51.81	651
84/85	830	18.57	1382	2.29	60.06	552
85/86	833	0.36	1346	-2.60	61.89	513
86/87	921	10.56	1421	5.57	64.81	500
87/88	830	-9.88	1435	0.99	57.84	605
88/89	843	1.57	1369	-4.60	61.58	526
89/90	820	-2.73	1304	-4.75	62.88	484
90/91	913	11.34	1367	4.83	66.79	454
91/92	948	3.83	1521	11.27	62.33	573
92/93	988	4.22	1384	-9.01	71.39	396

Source: Department of Agricultural Economics and Statistics, Ministry of Agriculture and Land Reclamation, Cairo.

Table 13.1d Trends of production, consumption and self-sufficiency for rice

Year	Total production (000 mt)	Percentage change from previous year	Total consumption (000 mt)	Percentage change from previous year	Self-sufficiency ratio	Export surplus (000 mt)
75	1471		1388		109.87	132
76	1593	8.37	1335	-0.22	119.33	258
77	1512	-5.08	1299	-2.70	116.40	213
78	1492	-1.32	1316	1.31	113.37	176
79	1545	3.55	1353	2.81	114.19	192
80/81	1548	0.19	1384	2.29	111.85	164
81/82	1452	-6.20	1350	-2.46	107.56	102
82/83	1585	9.16	1487	10.15	106.59	98
83/84	1586	0.06	1504	1.14	105.45	82
84/85	1452	-8.45	1433	-4.72	101.33	19
85/86	1501	3.37	1340	-6.49	112.01	161
86/87	1588	5.80	1492	11.34	106.43	96
87/88	1563	-1.57	1391	-6.77	112.37	172
88/89	1384	-11.45	1276	-8.27	108.46	108
89/90	1745	26.08	1535	20.30	113.68	210
90/91	2057	17.88	1814	18.18	113.40	243
91/92	2239	8.85	1968	8.49	113.77	271
92/93	2539	13.04	2271	15.40	111.80	268

Source: Department of Agricultural Economics and Statistics, Ministry of Agriculture and Land Reclamation, Cairo.

Egypt is a major recipient, where political relations between countries play a major role in the cessation or continuation of aid.

Less than 100 percent and falling self-sufficiency in a crop means that its production growth is not keeping pace with consumption growth. In the case of wheat, the import gap measured in terms of production was 221 percent, 504 percent and 149 percent of total production in 1975, 1985/86 and 1992/93, respectively. The huge initial food gap is actually the main reason why self-sufficiency remained low despite the fact that total production increased by 126 percent and total consumption by only 76 percent between 1975 and 1993.

The case of edible oil is similar to that of wheat, only worse. The import gap measured as a percentage of total production increased from 224 percent in 1975 to 479 percent in 1992/93. Total production of oils actually decreased by 18 percent between 1975 and 1992/93 while total consumption increased by 47 percent over the same period. In 1992/93, edible oil had the lowest self-sufficiency ratio (only 17.26 percent) among the four commodities analyzed. Three years before, in 1989/90, self-sufficiency in oils reached its lowest value (13.33 percent) through the entire period analyzed.

It is noticeable in the cases of both wheat and edible oil that the standard deviation of the yearly rate of growth of production is quite high (13.31 percent for wheat and 12.98 percent for oil).¹ This reflects uncertainty in production, which in turn makes imports of these necessary food items unpredictable from one year to another.² The negative impact of such uncertainty, not to mention the political implications of the dependence on foreign suppliers, on the country's development plans and resource allocation is obvious.

Though sugar also lacks self-sufficiency, the case of sugar is better than that of wheat and edible oil. Self sufficiency in sugar was 71.39 percent in 1992/93, down from 100 percent in earlier years. The lowest level that it reached was 49.64 percent in 1981/82 (which is above the highest value, 40 percent, reached for wheat). The import gap measured as a percentage of total production was 38 percent and 40 percent in 1975 and 1992/93, respectively. Total production increased by 97 percent between 1975 and 1992/93 while consumption increased slightly faster, by 99 percent, during the same period.

Serious efforts to increase the cultivated area and yield per feddan of wheat, sugar, soybeans and sunflower (the latter two sources of edible oil) were initiated in the early 1980s to increase the degree of self-sufficiency and thus improve food security at the national level. Serious attempts were also initiated in the second half of the 1980s to liberalize the entire agriculture sector and solve its technical, pricing, institutional and marketing problems. The impact of these attempts to improve performance in the agricultural sector have indeed led to modest improvements, as seen in Table 13.1. The fact remains, however, that much more remains to be done in the field of agricultural policies if the food security problem at the national level is to be resolved. Producing more food or earning foreign exchange to import it are preconditions for genuine long-term solutions of the food security problem at the level of poor households, which is the main theme of this chapter.

The Food Subsidy System and Food Accessibility by the Poor

The purpose of this section is to assess food accessibility to the poor through the food subsidy system as it existed before the ERSAP began in 1991. It starts with a review of the basic facts of the food subsidy system in Egypt, followed by a description of the characteristics, geographical distribution and consumption patterns of the poor in Egypt. This description of poverty is then matched to the geographical distribution and magnitude of subsidized foods received per capita.

A Primer on the Food Subsidy System

The food subsidy system was part of a larger subsidy system that involved energy, education, housing, transportation and health. The food subsidy system was started as a temporary measure in 1941 to mitigate the inflation and scarcity associated with World War II. In 1966, ration cards were issued. These cards allowed each household to receive specific monthly quotas of a number of goods depending on the size of the family. Initially, the system operated primarily as a quantity-rationing system, with little price subsidy. Heavy subsidization started only in the early 1970s. Moreover, the system initially involved the distribution of only a small number of commodities: bread, sugar,

edible oil and kerosene. It was later extended to include a large number of other commodities. During the last phases of the system, it was restricted to only six commodities: flour, sugar, tea, oil, rice and bread. The first five were distributed through the ration card system in specific quotas, while the bread was sold at subsidized prices in specified outlets in any quantity.

Commodities provided through ration cards were called rationed goods and were sold at heavily subsidized prices until the first half of the 1980s. Additional quantities of the same goods were termed regulated goods and were sold in public stores (*gameyyat*) at prices higher than their rationed versions but at less than their cost to the government, i.e., they were also subsidized.³

The purpose behind the subsidy program as a whole, and the food subsidy program specifically, was that every Egyptian has the right to be shielded by the government against shortages in commodities and increases in the cost of living. Consequently, the ration card system covered 99 percent of the population in 1981/82, with the beneficiaries of the green ration cards—associated with the higher subsidy—accounting for 97 percent of the total (Abdel-Latif and Kamel 1993).

While the universality of the system was certainly beneficial from the welfare point of view, the ambitious program turned out to be too costly as costs to the government increased while consumer prices remained fixed. This was particularly true during the second half of the 1980s following the initial reforms in the exchange rate, which increased the domestic costs of all imported goods. The system also served to benefit the rich more than the poor, because the former group consumed larger quantities than the latter and therefore benefited more from the subsidized prices.

At present, the whole philosophy behind the subsidy system is believed to be wrong, and it is agreed that coverage should be restricted to the poor. However, targeting the poor is not an easy task, nor is it without cost. Some of the issues that have to be taken into consideration when targeting the poor are discussed later in this chapter.

Incidence and Geographical Distribution of Poverty

Poverty measurements generally assume the existence of a predetermined and well-defined standard of consumption or income, called the poverty line, that must be exceeded if a person is not to be considered "poor." Those at or below the specified line are considered to be "in poverty."

There have been several attempts to estimate poverty in Egypt, such as Radwan 1977, Ali 1984 and Korayem 1987. The most recent and most comprehensive estimate is the one provided by El-Laithy and Khier-El-Din 1992 based on the 1990/91 income, expenditure and consumption survey. The absolute poverty line—defined as the cost of the bundle of goods deemed necessary to provide for the yearly basic food and nonfood needs—was fixed at L.E. 3994 for urban areas and L.E. 3399 for rural areas, which corresponded to yearly

household expenditure levels for the year 1990/91. The distinction between urban and rural areas reflected differences in prices and consumption habits.

When the head count ratio was used to measure the incidence of poverty, 35.88 percent of the total urban population was poor while the corresponding percentage for rural areas was 34.10 percent (Table 13.2). For both the urban and the rural population, Upper Egypt is recognized as the poorest region in Egypt. Its share in national poverty exceeds its share of the population. It had the largest percentage of poor individuals (41.87 percent and 36.25 percent for urban and rural populations, respectively). Upper Egypt is followed by Lower Egypt and then by the urban governorates.

The incidence, intensity and severity of poverty were found to vary considerably across governorates. According to the rankings in Table 13.2, from the poorest to the least poor, Fayoum, Sohag and Assuit—all governorates within Upper Egypt—are the poorest governorates. Sohag is the poorest urban governorate, with 53.59 percent of its urban population considered poor. Its counterpart in the rural areas is Menia, where the poor represent 60.13 percent of its rural population.⁴

Table 13.2 The head count poverty ratio by governorate

Governorate	Head Count Poverty Ratio (percent)		Poverty Rank ^a	
	urban	rural	urban	rural
Cairo	29.05		19	
Alexandria	41.05		8	
Port Said	21.31		21	
Suez	45.05		5	
Damitta	31.25	16.08	18	16
Dakhlia	35.70	22.46	12	14
Sharkia	36.88	32.46	11	10
Qalubia	35.32	13.36	14	17
Kafr El Sheikh	37.78	17.22	10	15
Garbia	33.95	24.59	15	12
Menofia	38.69	25.05	9	11
Behera	42.32	22.81	7	13
Ismailia	10.26	4.91	22	18
Giza	32.76	38.73	17	7
Beni-Suef	33.33	48.46	16	4
Fayoum	50.00	45.93	2	5
Menia	48.64	60.13	4	1
Assuit	49.80	53.80	3	2
Sohag	53.59	51.34	1	3
Qena	43.69	39.76	6	6
Aswan	35.65	34.12	13	9
Frontier	32.08	27.49	19	8
Total	35.88	34.10		

Source: Calculated from *The Income, Expenditure and Consumption Survey, CAPMAS 1993*.

^aFrom most poverty to least poverty.

The Main Characteristics of the Poor

In both rural and urban areas, the poor are characterized by large households, as children are seen as future sources of income and support. An inverse relationship is observed between the level of education of the household heads and the incidence of poverty. Extreme poverty is mostly associated with illiteracy of household heads.

As far as employment is concerned, poverty was found to be highest among households with heads "outside the labor force," including widows, the elderly, and sick and disabled persons who depend on direct income transfers. In rural areas, the poor are mostly agricultural workers, landless farmers and small land owners. In urban areas, poverty is associated with agricultural and services occupations. It is also closely associated with government employment as well as with low-skilled and marginal activities in the self-employed category.⁵

Food Consumption Patterns of the Poor in Rural and Urban Areas

Food generally represents the largest share of a poor household's total expenditure. According to the 1990/91 income, expenditure and consumption survey, food accounted for 56.97 percent of the yearly expenditure of a poor household in urban areas, as opposed to 45.38 percent for the non-poor.⁶ The corresponding percentages for rural areas was 64.49 percent for the poor and 55.80 percent for the non-poor.⁷

The consumption patterns of the poor (Table 13.3) show that cereals (bread)

Table 13.3 Percent of daily per-capita protein and calorie intake for the poor and nonpoor

	URBAN			
	Protein Intake		Calorie Intake	
	poor	non-poor	poor	non-poor
Starch & grain	18.95	14.21	20.49	19.42
Meat & poultry	10.74	12.31	4.04	5.56
Milk & cheese	6.71	6.98	14.56	19.37
Bread	42.45	30.78	34.31	30.43
Other food	21.15	35.72	26.60	25.22
Total	100.00	100.00	100.00	100.00
TOTAL	57.31	87.27	1944.00	24.88.00
	RURAL			
	Protein Intake		Calorie Intake	
	poor	non-poor	poor	non-poor
Starch & grain	53.25	48.85	50.73	50.04
Meat & poultry	8.88	11.51	3.21	4.11
Milk & cheese	5.89	6.79	11.86	12.99
Bread	15.83	12.75	12.56	9.83
Other food	15.14	20.10	21.65	23.03
Total	100.00	100.00	100.00	100.00
TOTAL	43.49	69.42	1599.00	2468.00

Source: Calculated from *The Income, Expenditure and Consumption Survey*, CAPMAS 1993.

and other high-carbohydrate foods represent the basic source of calorie intake for the poor households (54.71 percent and 63.29 percent for urban and rural areas, respectively). They also represent, as a group, the main source of protein for the poor (61.4 percent and 70.08 percent for urban and rural areas). Bread alone represents 30.12 percent of the calorie intake and 42.45 percent of the protein intake per capita in urban areas. The importance of bread for poor urban consumers is further emphasized by Figure 13.1, which presents the per-capita expenditures on bread for all expenditure groups, poor and nonpoor. The difference between yearly expenditures on bread by the poor and by the nonpoor is quite small (no more than L.E. 10), which reflects first, the importance of bread for the poor and nonpoor alike and second, the necessity of bread for the poor, as even the lowest expenditure group maintains the same absolute per-capita consumption level. The predominance of one specific commodity is also encountered when observing the consumption patterns of the rural poor, but the one commodity is in the form of flour instead of bread (Figure 13.2 and Table 13.3).

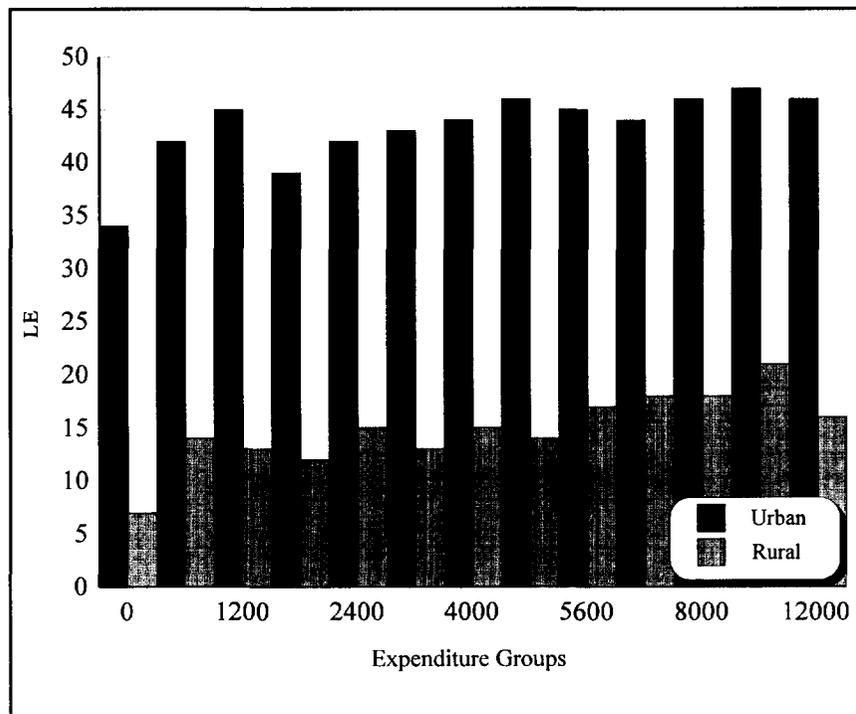


Figure 13.1 Annual per capita expenditure on bread by expenditure group. (Source: Income, Expenditure and Consumption Survey, 1990/91; CAPMAS 1993)

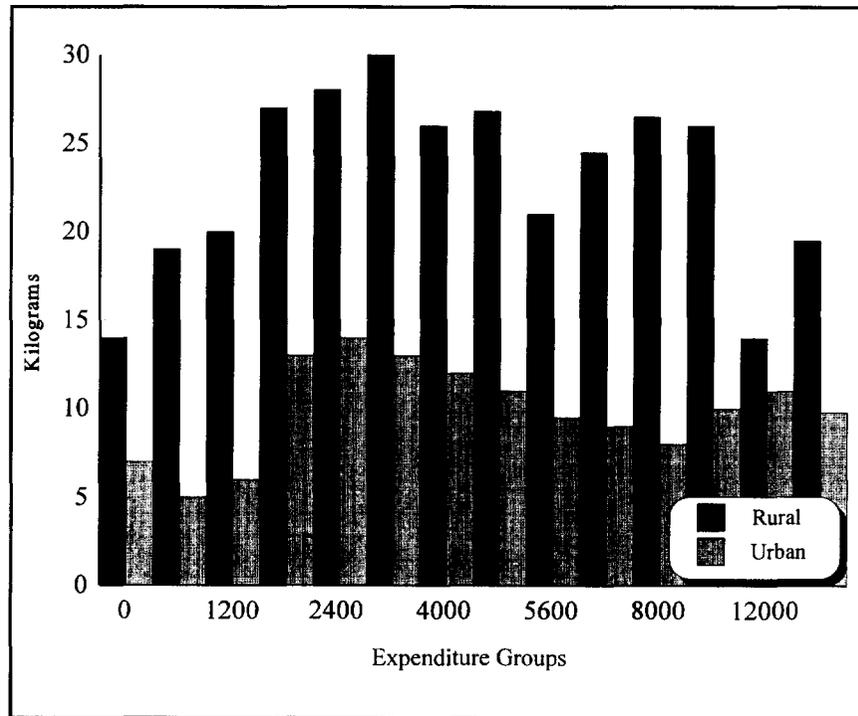


Figure 13.2 Annual per capita consumption of flour by expenditure group. (Source: Income, Expenditure and Consumption Survey, 1990/91; CAPMAS 1993)

Finally, per-capita consumption levels of tea, sugar, rice and oil for all expenditure groups in rural and urban areas are presented in Figures 13.3 through 13.6. With the exception of tea, per-capita consumption rises at higher expenditure levels, showing that the commodities are normal goods, i.e., the richer the households, the more they purchase of these commodities. The rural consumption/expenditure curves are generally steeper than the urban ones, which reflects a bigger disparity between the consumption patterns of the poor and non-poor in rural than in urban areas.

Tea, which has a downward sloping curve in Figure 13.3, is an inferior good. Per-capita consumption of tea in urban areas is at its maximum (2.5 kgs yearly) for the lowest expenditure group (less than L.E. 1000). It falls with higher expenditure levels but remains absolutely high for all expenditure groups below L.E. 1600. Beyond that level it remains almost constant at a low level of approximately 1.5 kg. yearly. This trend conforms with the life style of low-skilled and marginal workers in the self-employed category of household heads, a group previously identified as among the poorest in urban areas.

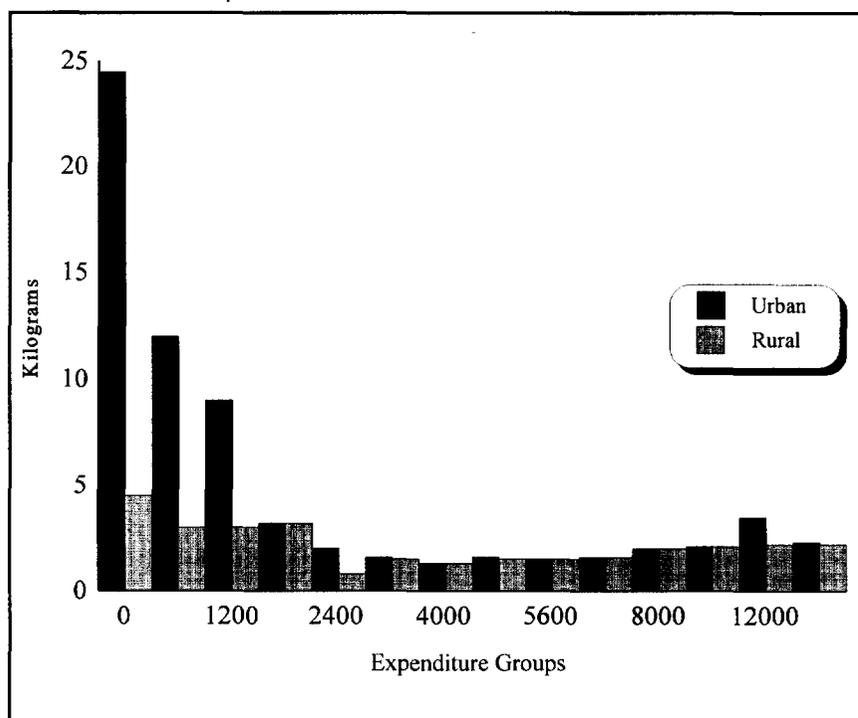


Figure 13.3 Annual per capita consumption of tea by expenditure group. (Source: Income, Expenditure and Consumption Survey, 1990/91; CAPMAS 1993)

The data in Figures 13.3 through 13.6 show how heavily the poor, as represented by the low expenditure groups, rely on rationed quotas for their consumption of sugar and rice. More than 85 percent of the total consumption of these two commodities for the lowest expenditure group originate from the yearly per capita quota received through the ration card.⁸ The opposite is observed in the case of tea, as the total yearly consumption of the lowest expenditure group exceeds by far the rationed amount (2.5 kgs compared to 0.48 kgs). Edible oil is unique, as the rationed quota is higher than the consumption level of any expenditure group.

The Geographical Distribution of the Subsidized Goods

We now compare the size of the population of individual governorates to their shares of subsidized flour, rice, sugar, tea and oil. This is done for 1986 and 1991 by calculating the percentage difference between each governorate's share of the total quantity of subsidized goods and its share of the total population. A positive percentage difference means that governorate receives

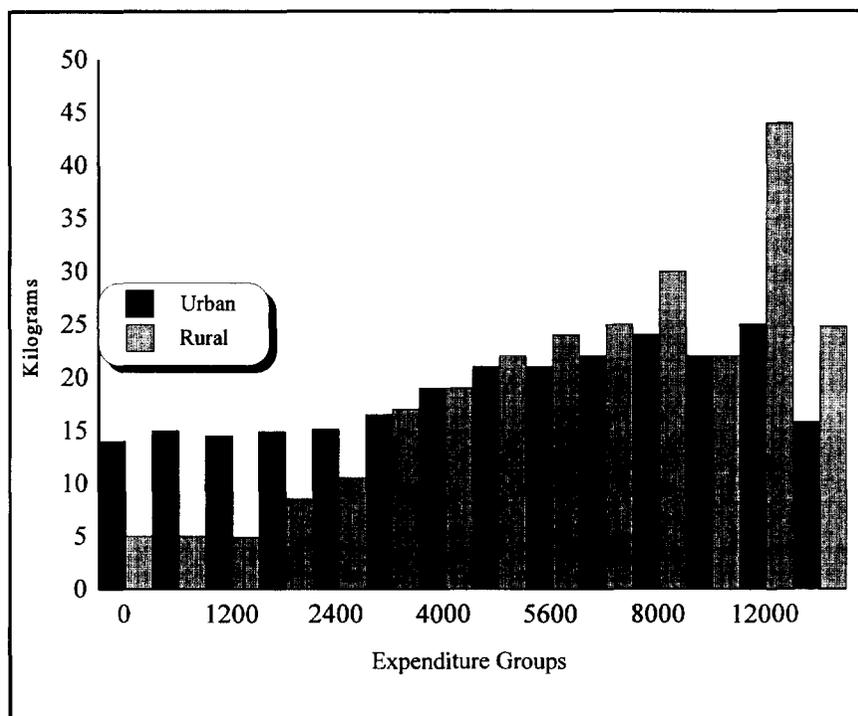


Figure 13.4 Annual per capita consumption of rice by expenditure group. (Source: Income, Expenditure and Consumption Survey, 1990/91; CAPMAS 1993)

proportionately more of the subsidized good than is warranted by its share of the population. A negative difference means that the governorate was discriminated against.

A bias towards urban governorates in both 1986 and 1991 is clear in Figures 13.7 through 13.12, as their shares of the subsidized goods exceeded their shares of the population. Exactly the opposite was observed for all other governorates, with only a few exceptions. The bias is evident in the cases of Cairo and Alexandria, but especially for Cairo. In 1991, Cairo's shares of sugar and oil exceeded its share of the population by 15 percent and 16 percent respectively. Cairo is actually the only governorate that consistently received larger shares of all goods than its share of the population in both 1986 and 1991. The bias towards Cairo was more striking in 1991 than in 1986. Its share of different goods increased during the time its share of the population remained more or less the same, at around 12 percent, while the total quantities distributed all over Egypt decreased. This means that Cairo was receiving a bigger percentage share out of a decreasing total quantity.

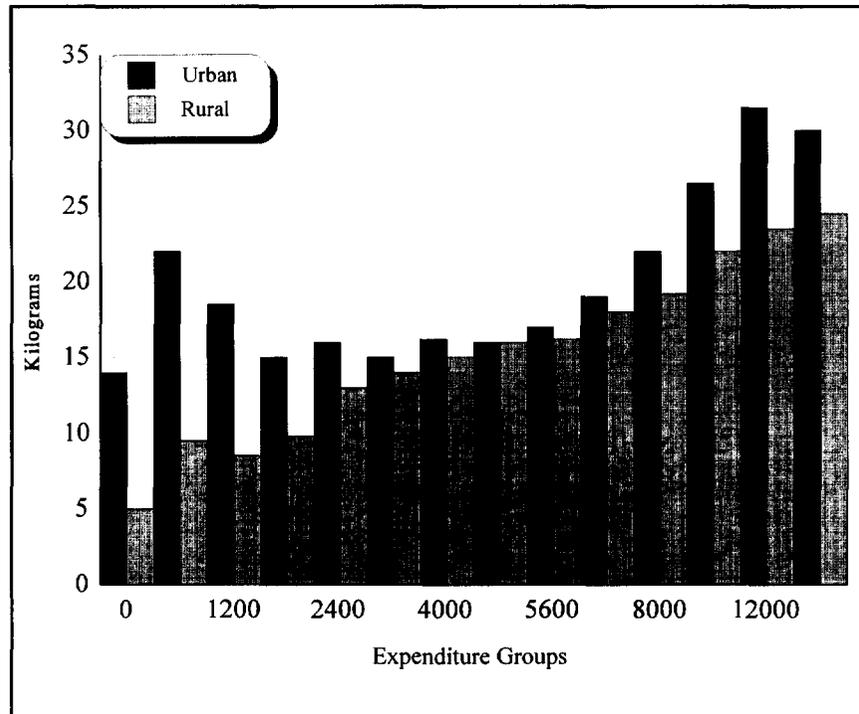


Figure 13.5 Annual per capita consumption of sugar by expenditure group. (Source: Income, Expenditure and Consumption Survey, 1990/91; CAPMAS 1993)

Matching the data in Figures 13.7 through 13.12 to the ranking of governorates on the basis of poverty indices in Table 13.2 shows that the poorest governorates do not receive any preferential treatment. In fact, they are among the most discriminated against (e.g., Sohag, Assuit and Menia) except in the case of flour (82 percent extraction).⁹

We now summarize implications of the analysis in this section.

First, there is a general and consistent bias towards urban governorates and especially Cairo, for which a guaranteed share is reserved, irrespective of the total amount of the commodity available. This means that the accessibility of the poor to food is higher in urban governorates—Cairo in particular—than in all others.

Second, the geographical distribution of the subsidized goods—except for the case of Cairo—is more or less haphazard, as it does not appear to conform to either poverty or population distribution. Proximity to Cairo and easy transportation seem to play an important role in determining how much each governorate receives.

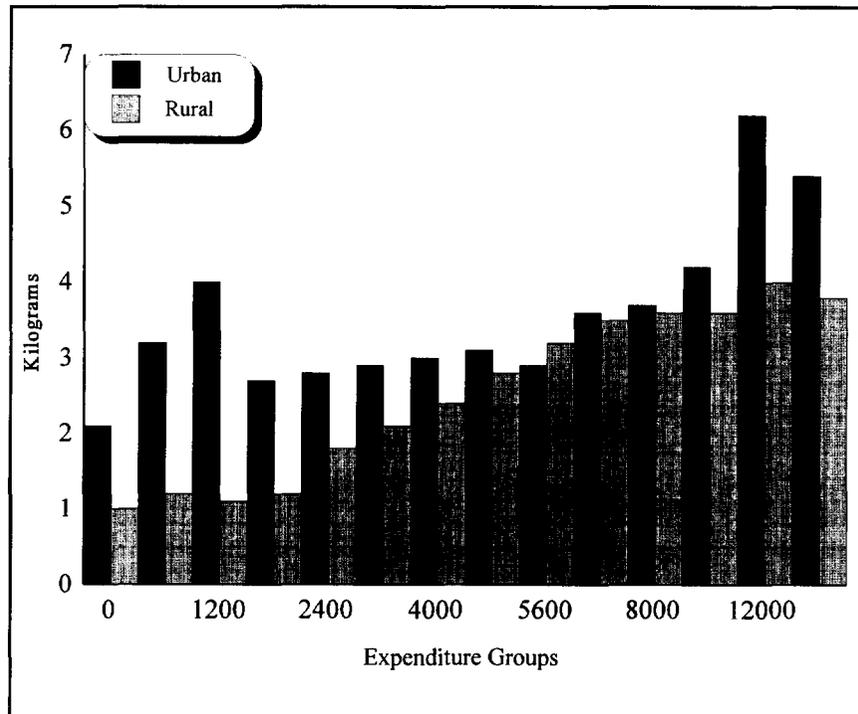


Figure 13.6 Annual per capita consumption of oil by expenditure group. (Source: Income, Expenditure and Consumption Survey, 1990/91; CAPMAS 1993)

Third, although the rural-urban distribution of the goods for each governorate is not available, we can safely say that the system favors urban areas within all governorates. This means that subsidized food is less accessible to the poor in rural areas than it is to their counterparts in urban areas. This last conclusion was supported by a 1981/82 survey in which rural residents reported purchasing half of their needs of flour from the open market. Rice was also unavailable at least once to 17.5 percent of the ration cardholders in the rural sample during the time of the survey. Finally, only 25 percent of village residents reported regular access to subsidized bread, while the corresponding percentage in cities was 75 percent (Alderman 1984).

The ERSAP and Food Affordability by Poor Households

According to the theory of consumer behavior, a consumer's demand for a good at any particular time is primarily a function of its price, the consumer's money income, the prices of

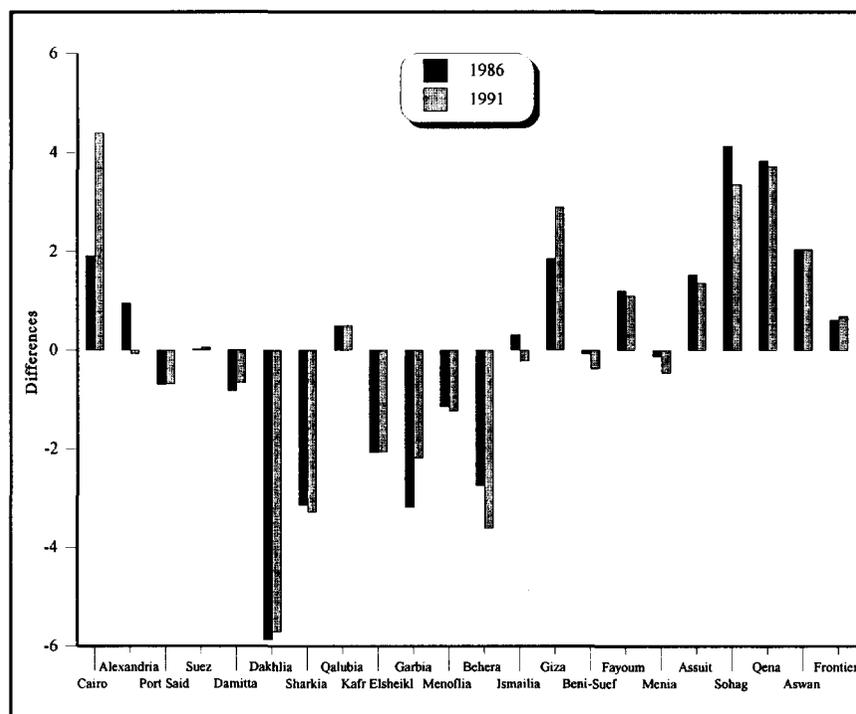


Figure 13.7 Differences of percent shares of subsidized flour (82 percent extraction) and population of governorates

other goods, and tastes and preferences. If tastes are given, then the ERSAP can significantly affect the other three factors.

The Effect of the ERSAP on Money Income of the Poor

Public sector reforms at the heart of the ERSAP will have significant and serious impacts on the money incomes of poor households. This is due to the high probability of job loss associated with the reforms, despite governmental declarations that job losses will be avoided. Whether a public enterprise is actually sold to the private sector or just restructured while remaining in the public sector, the dismissal of surplus labor is a precondition for any improvement in efficiency. Excess labor in 116 public enterprises has recently been estimated at 600,000 workers, to which must be added the high percentage of labor redundancy in government civil service, estimated as early as the 1970s to be as high as 40 percent (World Bank 1991).

Loss of a job means the loss of the main source of income for the household, and this loss may be temporary or permanent, depending on the probability of getting another job. That probability is inversely proportional to illiteracy, low

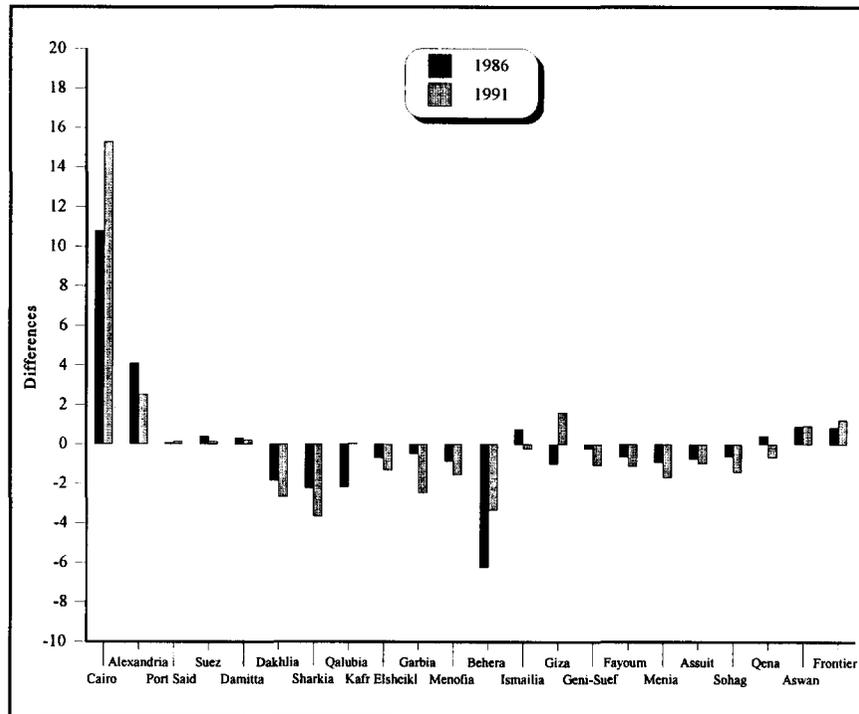


Figure 13.8 Differences of percent shares of subsidized sugar and population of governorates

levels of education and low skills. Since these characteristics are typical of the poor, the poor are not only likely to be the first to lose their jobs but also the last to find new ones.

The probability of getting new job opportunities, or getting new sources of income, depends primarily on the possibilities of growth of the economy as a whole. Generally speaking, the ERSAP's monetary and fiscal reforms so far have had a contractionary impact on total investment and growth of GDP.¹⁰ A more serious problem, however, is the slow response to the reform program of private sector investment, which was expected to compensate for the receding public investment, despite the program's positive contribution to macroeconomic stability. The slow response is mostly caused by policy uncertainty that exceeds the acceptable levels associated with major structural reforms. The average Egyptian entrepreneur now receives only partial information on all future policy changes and thus tends to postpone new investments until the rules of the game become clear. Other regulatory and institutional constraints going further back in history also impede the development of the private sector.¹¹

The above conditions are expected to cause the ex-public employees either to

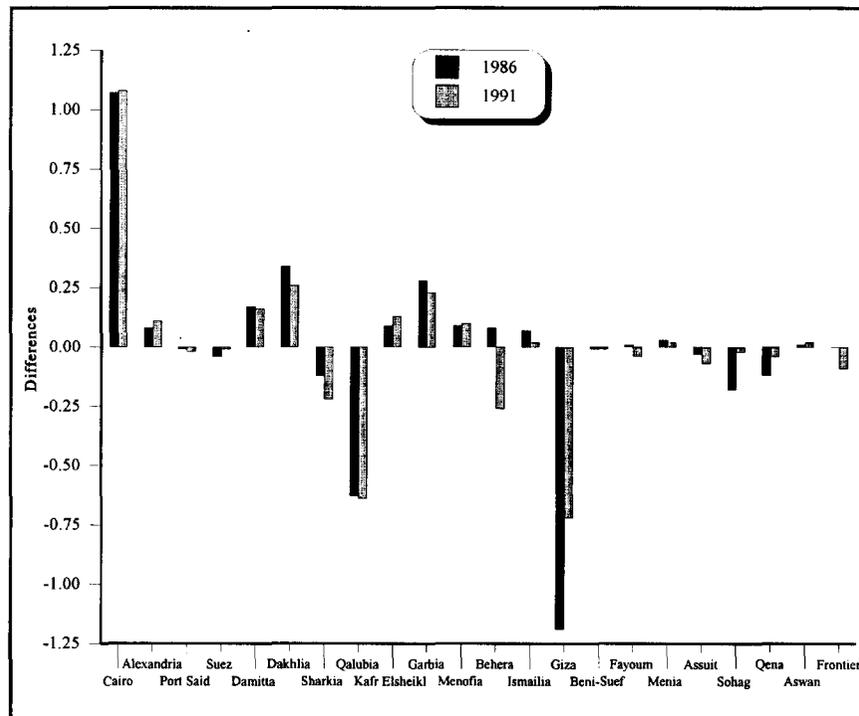


Figure 13.9 Differences of percent shares of subsidized tea and population of governorates

remain unemployed or to get into the informal sector, where jobs are not guaranteed. In both cases, government employees, who already are classified among the poorest groups in Egypt, are expected to become even poorer.

Potential loss of jobs is not restricted just to the public sector employees, however. It also extends to the private sector employees—especially the unskilled—because of the recession that Egypt is undergoing mainly because of the ERSAP's contractionary policies. The problem is further accentuated by the existence of an already serious problem of chronic unemployment, estimated variously between 9 percent and 15 percent of the total labor force.

The foregoing comments focus on the ERSAP's impact on those who might lose their jobs; actually, however, even those who remain in their jobs are negatively affected by the fiscal restraints implemented to reduce public expenditures. Measures such as the gradual restraint of increases in the wage bill and the planned broad civil service reform, which will bring about large reductions in government wages and salaries, have a repressive impact on the incomes of government employees (Korayem 1994). The incidence and the

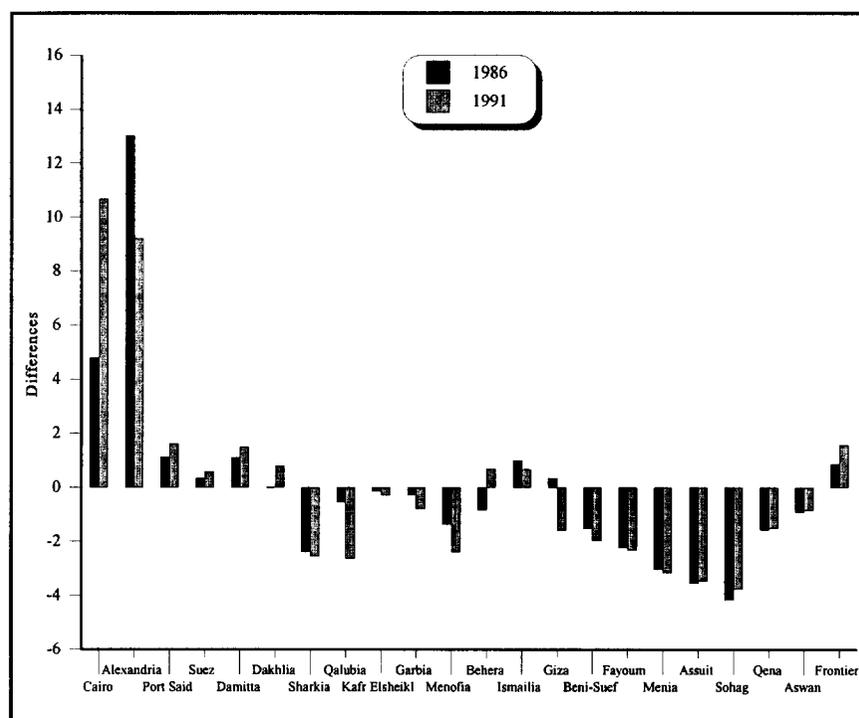


Figure 13.10 Differences of percent shares of subsidized flour (72 percent extraction) and population of governorates

intensity of poverty, already high among government employees, are then expected to increase because of these measures as more households fall below the poverty line and as the poor become even poorer. A similar trend of reductions in wages and salaries would also be expected in the private sector if the recession continues.

The Impact of the ERSAP on the Cost of Food to the Poor

Table 13.4 provides general consumer and food prices indices for the poor and non-poor in rural and urban areas, with 1986/87 as the base year.¹² The data show: (1) food prices sharply increased from 1985/86 to 1992/93 in both rural and urban areas, resulting in a sharp increase in the cost of food for the entire population; (2) the burden of the increasing prices was higher for the poor than the non-poor because food represents a bigger percentage of total expenditure for the poor; and (3) food prices have been increasing faster than general consumer prices between 1985/86 and 1992/93, except for 1992/93.

Within the food groups, the prices of cereals and other high-carbohydrate

Table 13.4 Consumer price indices for the poor and nonpoor

Food CPI using Absolute Poverty Line - Urban Areas							
	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93
poor	76.72	117.38	144.48	183.93	208.09	244.62	251.01
non-poor	79.03	118.64	145.6	181.04	203.09	236.47	245.16
total	78.60	118.40	9	181.58	204.02	237.99	246.25
			145.4				
			6				
General CPI using Absolute Poverty Line - Urban Areas							
poor	81.87	117.03	138.44	170.85	196.09	232.58	257.20
non-poor	83.51	118.20	139.11	169.04	193.86	228.77	261.47
total	83.22	118.00	138.99	169.37	194.28	229.48	260.88
Food CPI using Absolute Poverty Line - Rural Areas							
poor	80.27	112.44	144.09	188.10	211.76	244.44	235.80
non-poor	80.74	112.86	144.31	186.03	207.81	240.50	232.34
total	80.67	112.80	144.27	186.35	208.42	241.11	232.87
General CPI using Absolute Poverty Line - Rural Areas							
poor	80.46	113.88	138.43	174.39	198.64	235.71	243.51
non-poor	80.90	114.96	139.01	173.32	196.35	234.51	246.39
total	80.83	114.80	138.93	173.52	196.76	234.77	246.06

Source: Calculated from *The Income, Expenditure and Consumption Survey* and monthly *CPI Bulletin*, CAPMAS 1993.

foods, which are the basic sources of calories for the poor, increased faster than the prices of all other food items. In urban areas, the price index for these foods reached 277.6 in 1990/91, while the overall food index was only 204.0 and the general index was 194.3. The corresponding figures for rural areas were 264, 208.4 and 196.8, respectively.

An important question to ask is, "To what extent was the ERSAP responsible for the price increases?" It is clear that the cost of food started to increase many years before the ERSAP was launched in 1991 (Abdel-Latif and Kamal 1993). In fact, in the case of bread, the price first increased in 1983/84; most other price increases started in 1986/87. The ERSAP thus marks a continuation rather than the beginning of price increases. This conclusion is supported by the observation that the food price index for all groups in Table 13.4 increased more slowly in 1992/93 than in previous years.

Another question to ask is, "To what extent is the government still subsidizing the salient commodities in Egypt's food subsidy program?" Figure 13.13 measures subsidies as a percentage of the costs per unit in 1991/92. Bread was still heavily subsidized (by over 60 percent), followed by rationed oil and rationed sugar. By 1991/92, the subsidy had already been completely removed from tea and rice. In fact, the government was actually making a profit on these goods. Although data are not available for the years beyond 1991/92, we can still

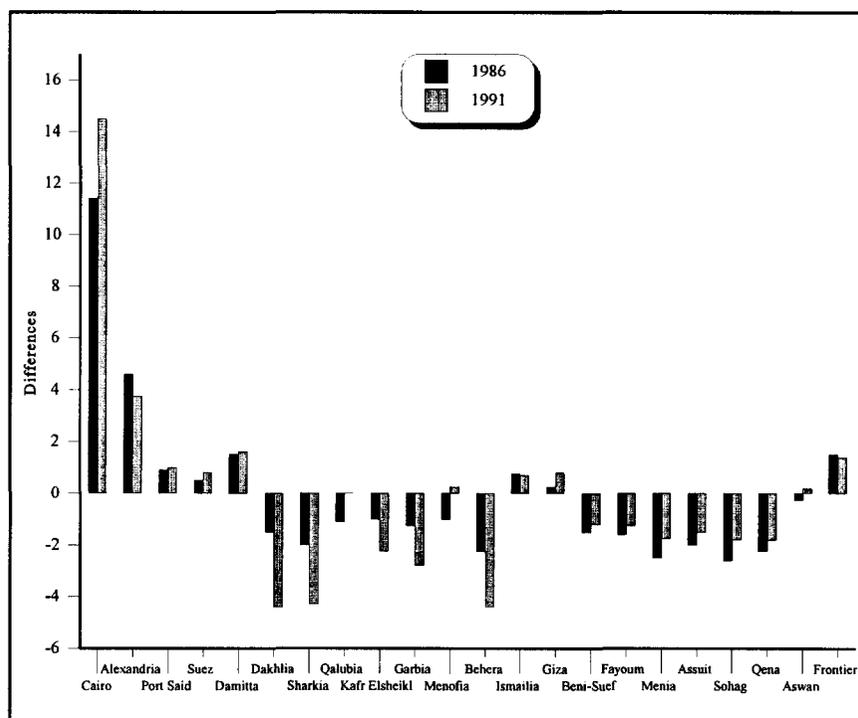


Figure 13.11 Differences of percent shares of subsidized rice and population of governorates

state that the subsidy on bread continues to remain high while that on the other commodities has decreased as consumer prices have reportedly continued to increase.

Other changes associated with the ERSAP are permission for the private sector to import food commodities and removal of all restrictions imposed by the Ministry of Supply (MOS) on transportation, storage, processing, packaging and handling of food commodities. These measures have naturally diminished the role of the MOS as regulator and monopoly distributor of goods. However, it creates for it the equally important new role of protecting consumers by controlling the quality and wholesomeness of products sold in the market.

Implications of the ERSAP for Non-Food Prices and Food Consumption of the Poor

Since decontrol of prices is necessary to move to a market-based economy, the government of Egypt has taken important steps in that direction, starting in the mid-1980s. At present, most controlled prices have been

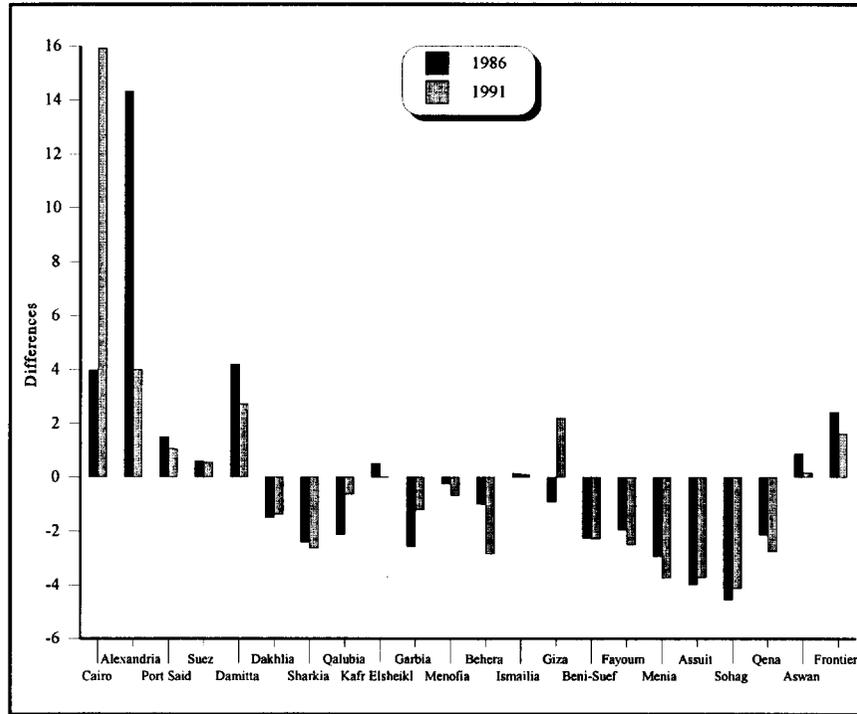


Figure 13.12 Differences of percent shares of subsidized oil and population of governorates

freed. In 1991, only 26 percent of industrial output was subject to price control, compared with 53 percent in 1987/88. By the end of June 1995, prices of all industrial goods, with few exceptions, were liberalized and subsidies on oil, electricity and gas reduced or eliminated. This means that Egyptian industrial products consumed by both the poor and the non-poor are increasing in price. Moreover, the increase in energy prices is placing additional burdens on the poor.

In addition to increases in prices due to the elimination of controls and subsidies in production, expansion of the existing base of indirect taxes and the levying of new ones, such as the sales tax, are also increasing prices. These indirect taxes represent the government's main tool for increasing revenues and thus contributing to reduction of the budget deficit.

Indirect taxes are well known, however, to create a regressive tax burden, because the poor have a higher marginal propensity to consume than the rich and thus allocate a larger part of their income to consumption expenditures. The heavy burden of indirect taxes on the poor extends not only to non-food consumption items but also to foods and beverages, where the regressive tax burden is most serious because of the significant expenditures for these items by the poor.¹³

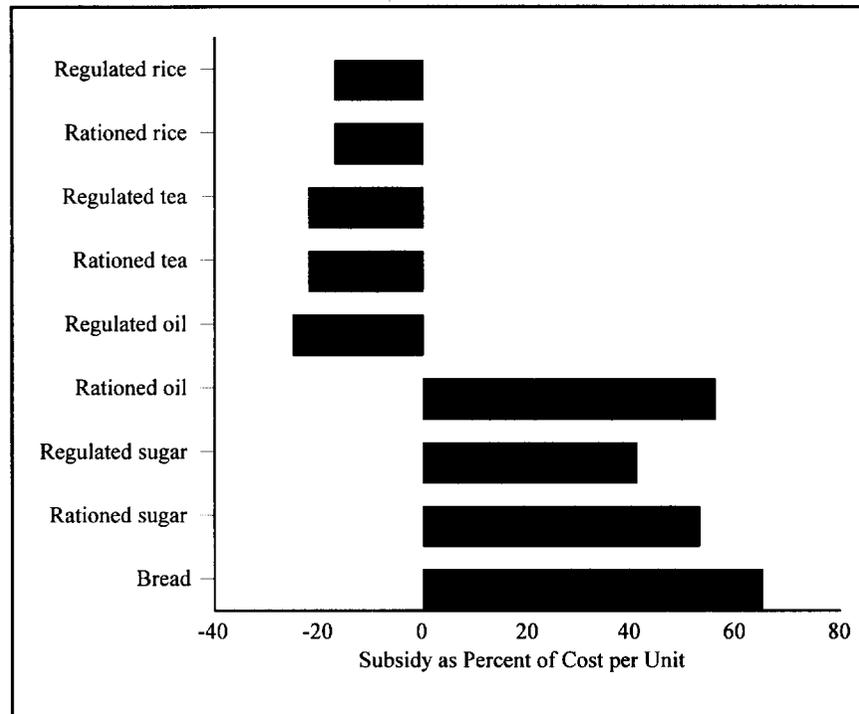


Figure 13.13 Food subsidies in 1991/92. (In 1992 more of the subsidy was removed.)

The decrease the ERSAP has caused in real government expenditures on health and education, to levels below those in the 1980s, is a particularly serious problem for the poor. Cost recovery programs for health, whereby patients contribute to treatment cost, are likely to further increase the burden on the poor. An extra burden also emerges from the liberalization of the transport sector. In January 1991, rail passenger tariffs were increased by 15-40 percent. According to the ERSAP, the tariff is to increase by 5 percent each fiscal year as of 1991/92 until it reaches 100 percent of the costs in 1997/98. The prices of inter-city trucking and bus services were also freed as part of the ERSAP (Korayem 1993).

This trend of liberalization of prices of necessary non-food items, many of which exhibit inelastic demand, will force the poor to allocate a larger share of total expenditures to these basic services that they formerly received free as part of the general subsidy system. The effect of increasing prices for industrial goods, energy and basic services will be to reduce the share of expenditures allocated to food by the poor. Real incomes of the poor are decreasing because of both increasing prices and reduced money incomes.

Approaches for Protecting the Poor

It is clear from the foregoing discussion that the problem of food accessibility and affordability by the Egyptian poor has reached a serious stage and is bound to get worse as the ERSAP proceeds into its second phase, which calls for a serious practical plan of action by the government to improve the economy.¹⁴ Realistically, the success of the ERSAP is conditional upon adequately addressing the social costs of the reforms.¹⁵

A comprehensive plan of action must address more than one dimension of the problem. It should analyze: (1) ways of targeting the poor, given their heterogeneous characteristics and geographical distribution; (2) the time dimension of the food affordability and accessibility problem, as short-, medium- and long-run solutions are likely to differ; (3) given the severity of the problem, what immediate practical steps can be taken to relieve the pressure on the poor until a substitute for the old subsidy system is worked out and tested; and finally (4) the supportive measures needed, at both the national and the household levels, for the plan of action to work.

Targeting the Poor: Administrative Costs and Targeting Accuracy

Targeting the poor can be achieved through four different mechanisms: (1) individual assessment, which relies on income estimation and social worker evaluation for the status of each individual; (2) group targeting, which locates poor groups by their common characteristics, such as geographical location, job of household head, or the like; (3) self-targeting, which typically inserts into the system signals to which only the poor are expected to respond; and (4) universal provision, which is the least effective form of targeting because by definition it is accessible to all, i.e., general food subsidies in Egypt (Grosch 1992).

Targeting the poor is always desirable, because it allows the concentration of expenditures allocated to social programs, or poverty alleviation, on those who need them the most. The expected gains from targeting, measured in the form of improved program efficiency and money saved, must be weighed against the administrative costs of targeting.¹⁶ In general, the more precise the targeting, the higher the administrative cost.

The individual assessment mechanism, which has the highest administrative costs, is actually used in Egypt in the cases of direct cash transfers to the poor through the Ministry of Social Affairs and the ration card system. The assessment in the latter case was never rigorous, because 90 percent of the entire population was covered. Such wide coverage also makes it quite costly for the government later to restrict the system only to the poor.

The recent literature on poverty in Egypt provides an excellent data base that can help policy makers. Generally speaking, group targeting based on geographical location seems to be a more sensible targeting mechanism than the individual assessment mechanism, because it is cheaper and at the same time quite effective,

given that poverty tends to be concentrated in specific governorates. Even within a geographical location, however, the poor must be distinguished from the non-poor. Given the heterogeneity of poverty in Egypt, the same targeting tool is not likely to work for all the poor everywhere. To achieve comprehensive targeting, integrated schemes involving more than one targeting mechanism will have to be used.

In Abdel-Latif and Kamel 1993, five specific targeting options were evaluated: option I, modification of commodity mix and packaging to encourage greater self-targeting; option II, a ration card system restricted to the poor; option III, cooperative distribution restricted to the poor; option IV, self-targeting of food stamps through health clinics; and finally option V, direct cash transfers. The study indicated that no single one of these targeting options can reach all the poor; for example, in the case of work place cooperatives under option III, only household heads who are in the labor force can be reached.¹⁷ Similarly, in option IV, food stamps will reach pregnant and lactating women as well as malnourished children but not other groups, even other groups of women, such as the widowed and the elderly. Similar arguments can be provided for the other options. Therefore, combinations of these targeting options are needed for comprehensive coverage of the poor.

In seeking low administrative costs, targeting options with already-existing institutional frameworks are favored over others. Examples are cooperatives (option III) and self-targeting (option I) using public stores. Institutional reforms are, nevertheless, a necessary precondition for the successful use of these two targeting mechanisms. For instance, law 109 of 1975, which set the rules for operation of cooperatives, needs to be changed to provide more flexibility of action as well as to maintain proper accountability. Similarly, all attempts at self-targeting through the public "gameyyat" channel will be a complete failure given the present distribution of the outlets, which are heavily concentrated in Cairo. In 1992, Al-Ahram and El-Nil chains, the two main channels of public distribution, had 52 percent and 76.6 percent, respectively, of their outlets in Cairo. Moreover, within Cairo, outlets are located in areas where richer people live. Thus the present geographical distribution of public outlets is not only biased towards Cairo, neglecting poorer regions such as Upper Egypt, but also makes aid more available to the nonpoor than to the poor.

A geographical redistribution of these outlets is necessary to increase food accessibility by the poor. It is needed now more than ever because of the recent decision by the Ministry of Supply to keep these chains operating. In fact, the main mission of these chains should be to offer commodities that encourage self-targeting by the poor. That role is of a more permanent nature than providing a "buffer stock" for necessary goods, which is the role these chains now play in response to artificial shortages of necessary food items and price increases by the private sector.

A summary of the advantages and disadvantages of the options is presented

in Table 13.5, which ranks the options based on their suitability for Egypt. The cooperative system is seen as the best solution for the household food security problem, as it is capable of achieving the lowest prices possible for its members.¹⁸

Implementation Speed

Since the five options identified aim ultimately to improve food accessibility and affordability by the poor, then the time it will take each of them to be realized should be a crucial consideration. Cash transfers (option V) have the major advantage of being the easiest program to launch, as all that is required is to increase the cash transfers to the same people already getting them. Naturally, some reassessment of eligibility will still be needed, but in clear-cut cases of poverty, which represent most of the cases, quick relief can be provided by increasing existing cash transfers.

Option II, continuation of the ration card system, is another short-run

Table 13.5 The advantages and disadvantages of various options

Option	Advantages	Disadvantages
1. Option III	<ul style="list-style-type: none"> a. Uses an already existing institution, which reduces administrative costs. b. Provides authentic low prices for the poor without putting a burden on the government. c. Can also be involved in the production process to reduce costs even more. 	<ul style="list-style-type: none"> a. Cooperatives might not include all the poor.
2. Option IV	<ul style="list-style-type: none"> a. Use of the existing setup minimizes costs. b. Universal access to government clinics minimizes the problem of undercoverage of the target groups. 	<ul style="list-style-type: none"> a. Cost of making and distributing food stamps. b. Target groups are limited to malnourished mothers and children less than 6 years.
3. Option V	<ul style="list-style-type: none"> a. Provides help to those who need it most. b. Broad spectrum of target groups. 	<ul style="list-style-type: none"> a. Puts new pressures on government expenditure
New computerized social insurance system	<ul style="list-style-type: none"> a. Allows precise identification of the poor (useful for all options). b. Promotes collaboration of ministries. 	
4. Option II	<ul style="list-style-type: none"> a. Uses an already existing institution. b. Politically popular. c. Universal. 	<ul style="list-style-type: none"> a. Individual assessment mechanisms required for reform are costly. b. Subsidy already removed off most commodities. c. When used to distribute food stamps, the program is costly and impractical.
5. Option I	<ul style="list-style-type: none"> a. Self-targeting, low cost. b. Improve nutrition levels of the poor if applied as recommended in the analysis. 	<ul style="list-style-type: none"> a. Not welcomed by poor if low quality products are used. b. Exploitation.

Source: Abdel-Latif and Kamel 1993.

solution. Despite the removal of subsidies on rice and tea and the continuing reduction of subsidies on other commodities, ration cards are still being used, which implies that these cards represent more to consumers, especially poor consumers, than just a specific quota of a low-priced good. The ration card system provides security for poor Egyptian consumers. Many households in the low expenditure groups plan their monthly consumption on the basis of their quotas of essential commodities, which means that the ration card helps them allocate their income to different uses. Also, households that have established relations with suppliers receive the full quotas of the rationed goods for which they then pay by installments. These factors support the continuation of the ration card system in the short run.

It is also interesting to note that increases in prices of the goods distributed through ration cards, along with the general availability of these goods in ample quantities in all stores, is discouraging the non-poor from using the cards even though they have them. It is true that only a detailed survey can support this claim, but it is the impression of the authors that the above claim is true, and that now is a good time to scale down the beneficiaries of the system by announcing that those who need the card must go to the MOS to secure new ones. Given the time consumed in the process of renewing the cards, only the really poor will endure it. Moreover, the new data base on poverty can be used in formulating future targeted food subsidies.

Options III and IV, dealing with cooperatives and distribution of food stamps through health clinics, are more medium-term solutions. Option I is more a long-term solution because of the institutional reforms involved.

Generally speaking, for all targeting options considered it is essential that there always be an overlap between the short-, medium- and long-run plans to help the poor. Cancellation of existing support without providing alternatives is destructive for the poor. Therefore, the ration card system should not be canceled before another system, or a combination of systems, is worked out and tested. Also, and most important, the subsidy on bread should not be removed in the short or medium runs, given its critical contribution to calorie and protein intake of the poor.

Practical Solutions for Quick Relief

For immediate relief for the poor with respect to food accessibility and affordability, and for temporary measures until a new permanent system is established, three suggestions are offered.

All Year Round "Mawaed El Rahman"

We notice every year how literally no Egyptian goes hungry during Ramadan. We suggest that this should be the case year round, not necessarily every day but at least once a week (for example, on Friday). The

“Mawaed” would be located in specific mosques in different regions throughout the country under the surveillance of a number of non-governmental organizations (NGOs). Funds would be allocated by the government to support the scheme. These funds should be supplemented by donations from individuals through NGOs in both cash and kind. Incentives, suggested in a later section, can encourage the contribution of restaurants close to the “Mawaed.” Pilot “Mawaed” can be initiated in the poorest governorates and later expanded to the entire country. This project will not only maintain some level of food security at the household level for the poor but more importantly it will both improve income distribution and reduce the economic and social frustrations that arise from the coexistence of extreme poverty and wealth in a society.

Daily Meals for School Children

Providing daily meals for school children is already used as part of targeting programs in several countries. The program would be particularly beneficial in Egypt to improve nutrition for children, a national need of high priority. It is an indirect way of helping poor families by granting their children a daily meal.

It is suggested that the meal be a dry one consisting of no more than one or two items, to avoid messy or time-consuming distribution. The nutritional specifications of the meal are best left to specialists. For hygienic purposes, the items should be wrapped, but wrapping should be done in the simplest possible way to reduce the project’s cost. The program should be restricted to the primary public schools in poor areas, with priority given to the poorest governorates.

In addition to contributing to food security, providing daily meals to children is also one of the best ways of targeting the poor, as one of the first things household heads do when income increases is move children out of the public school system and into private schools.

The program’s primary source of funding, at least initially, should be the government in collaboration with NGOs, the latter also being in charge of managing the whole program. The government can reduce its share later, after the system is established. Pilot execution of the project can avoid any large-scale failures. A final point is that such a program may very well reduce the drop-out rate in schools, as the household head will have to weigh the foregone free meal against the possible income that can be earned by a child working illegally.

Free Food Distribution in Literacy Classes

Poverty has been shown to be positively correlated with illiteracy of household heads. The distribution of small quotas of necessary food items to participants in literacy classes would be useful in helping the poor cope with food expenses as well as providing an incentive to attend regularly. In that sense it would be achieving two goals at once, as the eradication of illiteracy will improve the individual’s chance of getting a good job. The quota can be a

monthly quota (for example, one kg of rice or flour) and it can be conditional on each student's progress. Again, such programs can be administered by NGOs in different regions within Egypt.

While these three suggestions still need further study to become implementable, they are less demanding in preparation and execution time than the previously discussed alternatives and thus can provide quick relief. NGOs could have an important role in each, as is the trend all over the world, especially with the receding role of government. However, NGOs can play an important role only if improvements take place both inside the NGOs themselves and in the relationship between NGOs and the government. These improvements are necessary supportive measures at the national level to make it possible to solve the food security problem for the poor.

Supportive Measures at both the National and the Household Level

Success in maintaining food security for the poor in Egypt is conditional upon more than one factor. First, the success of the agricultural reform is necessary to provide incentives for production in agriculture and ensure food self-reliance by producing more food domestically or earning more foreign exchange to import it. In fact, self-reliance, more than economic self-sufficiency, implies not just food security but also greater political and general economic security.

Second, more transparency in the ERSAP measures is important. Although this may sound only remotely related to food security, it actually is not, because ambiguity over future prospects of the ERSAP, and especially the dismissal of workers through privatization, is creating a general atmosphere of uncertainty that tends to aggravate rather than improve the present situation. The employment and retraining program of the Social Fund for Development, whose main objective is to help ex-public sector employees retrain or qualify for early retirement, is hardly operational because of the ambiguity associated with public sector reform and the future of its workers (Abdel-Latif 1994). When workers cannot see their future options with certainty, they tend to delay any serious search for other jobs or any retraining on their own, which in turn extends and aggravates the problem of food security at the household level.

Third, institutional reform at more than one level is needed if the suggestions for improved food accessibility and affordability are to work. The need to change the 1975 law on cooperatives has already been mentioned. The need to change the law specifying the organization and activities of NGOs, which goes back to the 1960s and is obsolete, can be added.¹⁹ More cooperation among NGOs and between NGOs and the government will generally make their role more effective in the future.

Fourth, it is apparent that massive funding is needed for implementation of programs that ensure food security for the poor. While part of the needed funds will necessarily originate in the government, most will have to emerge from

NGOs. In fact, at present NGOs participate much more significantly than the Ministry of Social Affairs in cash transfers to the poor (Soliman et al. 1993). For NGOs to be able to perform such activities as distributing cash and providing meals for children, they need larger donations (in the form of "zakah" and "sadaka") than they now receive from the public. The government can play a major role in encouraging these donations by allowing tax exemptions on the donated funds. At present, according to law 187 of 1993, which is an amendment of law 157 of 1981, tax exemption can apply to no more than 7 percent of the total income subject to tax payments; donations beyond the 7 percent are not exempted. Full exemption of total donations apply only if the government is the recipient, as in the case of businesses building schools and hospitals. We recommend that the tax exemption cover the entire value of donations irrespective of the destination of the donation—government or NGO—as long as there is written proof for it. Such exemptions are likely to encourage donations to NGOs and therefore improve their financial status and their ability to execute projects such as the ones suggested in this chapter.

Several desirable changes in consumption patterns of the poor should be promoted. First, the consumption of tea, which contributes zero calories and is generally believed to be harmful when consumed in large quantities, can be reduced through a mass media campaign. The same approach can be applied to excessive sugar consumption. It is interesting to note that sugar represented a less significant item in the diet of Egyptian households in the 1970s than today, while at present the country has one of the highest per capita levels of sugar consumption in the world (Abdel-Latif and Kamel 1993). The change in consumption patterns was due to the subsidized prices that made sugar cheap and thus encouraged its excessive consumption. Now that the subsidy on sugar is being removed, changing consumption habits is a necessity.

Besides reducing the quantities consumed of certain goods, the media campaign can also adopt the theme of changing the nature of goods consumed. For example, according to nutrition specialists, changing flour from 82 percent to 72 percent extraction reduces its protein and vitamin content. At the same time, it increases the cost of the product. Higher nutrition and lower cost can thus be combined if the public is persuaded to buy the product in its coarser, less processed form. A similar argument applies to brown versus polished rice and brown versus white sugar. A serious media campaign on these themes can in the long run lead to better nutrition as well as lower cost for the poor and non-poor alike.

Second, it was previously noted that purchased bread is considerably more important in urban than in rural areas. This observation suggests that bread outlets should be redistributed in favor of the urban areas to encourage rural households to produce their own bread as they formerly did instead of purchasing bread and using it in part as animal feed because it is subsidized. Also, we pointed out earlier that the oil quota allocated by the ration system is larger than the average

consumption by both the poor and the rich. This suggests the need for a reduction in the quota and a reallocation of the resulting saving in the subsidy bill to bread and flour, which are more important than oil for the poorest households.

Summary and Conclusions

The analysis of trends in production, consumption, imports and self-sufficiency between 1975 and 1993 for wheat, edible oil, sugar and rice revealed that self-sufficiency is unattainable for wheat and edible oil despite recent efforts at agricultural policy reform. Sugar shows higher self-sufficiency than wheat and oil, though of a lower level than in 1960. Rice is the only product with an exportable surplus, but that surplus is quite modest and is jeopardized in the long run by rapid consumption growth.

The rates of growth of the total productions of wheat and oil have large annual fluctuations, making production and therefore the need for imports unpredictable from one year to the next. These fluctuations have a negative impact on the country's development plans, not to mention their political implications due to Egypt's dependence on foreign supplies.

The incidence, intensity and severity of poverty were found to vary considerably across governorates. Fayoum, Suhag and Asyut, all governorates within Upper Egypt, are the poorest governorates. Sohag and Menia have the highest level of urban and rural poverty, respectively.

In both rural and urban areas, the poor are characterized by large households as well as by low levels of education. Poverty measures are highest among households with heads "outside the labor force," including widows, the elderly, and sick or disabled persons who depend on direct income transfers. In rural areas, the poor are mostly agricultural workers, landless farmers and small land holders. In urban areas, poverty is associated with agricultural and services occupations. Poverty is particularly associated with government employment as well as with unskilled and marginal activities of self-employed individuals.

Food generally represents the largest share of a poor household's total expenditures. A detailed analysis of the consumption patterns of the poor reveals that cereal and other high-carbohydrate foods represent the basic sources of calories and protein for poor households. In urban areas, bread alone represents 30.12 percent and 42.45 percent of the per-capita calorie and protein intake, respectively. The predominance of wheat in the consumption patterns of the poor is also observed in the rural poor, but the wheat is in the form of flour instead of bread.

Rural consumption patterns reveal greater disparities between the consumption patterns of the poor and non-poor than between the consumption patterns of their urban counterparts.

Except for tea, all foods appear to be normal goods. Tea was observed to be an inferior good, as the maximum per capita consumption in urban areas was

associated with the lowest expenditure group. Per capita consumption of tea fell with higher expenditure levels.

The poor, as represented by low-expenditure groups, rely heavily on rationed goods for their consumption. In the specific cases of rice and sugar, more than 85 percent of total consumption for the lowest expenditure group originates from the quota received through the ration card.

The geographical distribution of the subsidized goods exhibits a general and consistent bias towards urban governorates, and especially Cairo, for which a guaranteed share is apparently reserved irrespective of the total quantity available. This means that the accessibility of food to the poor in urban governorates, Cairo in particular, is higher than in other governorates.

The geographical distribution of subsidized goods, except for Cairo, seems more or less haphazard, as it conforms neither to poverty nor to population distribution. Proximity to Cairo and easy transportation appear to play important roles in determining how much each governorate receives.

Though the rural/urban distribution of goods for each governorate is not available, we can safely say that urban areas within all governorates are more favored by the system, which means that subsidized food is less accessible to the poor in rural areas than in urban areas.

The fiscal policies and public sector reform of the ERSAP have had a very negative effect on food affordability by the poor, as they tend to sharply reduce the real income of the poor. The pressures on real incomes are due to both decreases of money incomes and increases in prices of food and essential non-food items.

The recent literature on poverty in Egypt provides an excellent data base that can help policy makers. Generally speaking, group targeting based on geographical location seems to be a more sensible targeting mechanism than individual assessment, because group targeting is cheaper and at the same time quite effective, given that poverty tends to be concentrated in specific governorates. Because of the heterogeneity of poverty in Egypt, a single targeting tool is not likely to work for the poor everywhere. To achieve comprehensive targeting, integrated schemes involving more than one targeting mechanism will be necessary. In seeking lower administrative costs, targeting options for which the institutional framework already exists are preferable to others such as cooperatives and public stores.

Self-targeting through the public distribution channels "gameyyat" would be a failure now, given the present distribution of the channels, heavily concentrated as they are in the richer areas within Cairo. The present geographical distribution is not only biased towards Cairo, thus neglecting poorer regions such as Upper Egypt, but is also more oriented to the non-poor. A geographical redistribution of these outlets will be necessary for improved food accessibility by the poor. The main mission of these chains should be to offer commodities that encourage self targeting by the poor.

Three suggestions are given for quick relief for the poor until a new system is in place. Year-round "Mawaed El Rahman" on a weekly basis is suggested. The "Mawaed" can be located in specific mosques in different regions under the surveillance of a number of NGOs. Funds would need to be allocated by the government for the scheme, which would also be supported by donations both in cash and in kind from individuals through NGOs. This program will improve income distribution as well as reduce the economic and social frustrations caused by the existence of poor and rich side by side in a society.

Daily meals for primary public school children are also suggested. School feeding, which many countries already use as a way of targeting the poor, has the advantage of improving nutrition for children and indirectly helping entire poor families.

Distribution of small quotas of necessary food items to participants in literacy classes would help the poor to cope with food expenses. It would also provide an incentive for them to attend regularly and would thus contribute to achieving two goals at once, as eradication of illiteracy improves the individual's chance of getting a better job.

Institutional reforms are needed at more than one level if the suggestions for improved food accessibility and affordability are to work. Changing the laws that govern the cooperative system and the activities of NGOs so as to attain more flexibility of action as well as better accountability is an example.

Funds needed for implementation of programs to provide food security for the poor will necessarily come partly from the government, but most of the funds will have to come from NGOs. However, NGOs operate by donations and larger donations are needed than are received at present. The government can play a major role in encouraging these donations by offering tax exemptions on the donated funds. At present, donations up to 7 percent of income are exempt. This chapter suggests that tax exemption be extended to the full amount of donations.

Media campaigns can promote more healthful diets, including less tea and sugar and greater consumption of higher-extraction flour, brown rice and unrefined sugar, for better nutrition and lower cost. Rural households can be encouraged to produce their own bread as they formerly did instead of purchasing bread and using it in part as animal feed because it is subsidized.

Notes

1. The mean and range for wheat are 5.63 and 50.19. Those for oil are -0.38 and 49.48. We note the wide ranges of fluctuations of growth rates for the two commodities. We also note that the fluctuations of the growth rates are lower for consumption than for production, as the standard deviations for wheat and oil are only 4.71 and 9.76, respectively.

2. The large fluctuations in growth rates of production cannot be due to weather conditions because Egypt does not rely on rain for irrigation, except on a very small scale.

Fluctuations must then be the outcome of decisions of the farmers on what to plant each year in response to their needs and incentives for production as affected by agricultural policies.

3. For a detailed description of the food subsidy system and the way it operated, see Alderman and Von Braun 1982 and Alderman and Von Braun 1984.

4. For more details on the poverty estimation see El-Laithy and Kheir-El-Din 1992.

5. In this subsection, the conclusions of El-Laithy and Kheir-El-Din 1992 concerning the characteristics of the poor are presented.

6. For the ultra poor (specified at a level below the absolute poverty line) the percentages are even higher: 62.11 percent in urban areas and 69.23 percent in rural areas.

7. In developed countries, food represents no more than 20 percent of total expenditure (Nassar and Rizk 1994). High food expenditures even for the nonpoor in Egypt reflect Egypt's level of development.

8. The yearly quota is calculated by multiplying the monthly quotas of the different goods by 12.

9. Given that the 82 percent extraction flour is the one used for production of balady bread, the bias towards these governorates is beneficial to the poor.

10. Particularly important is the heavy tax burden, which is discouraging investors.

11. A more detailed analysis of constraints on private sector development in Egypt is in World Bank 1994.

12. General consumer price indices and food price indices were calculated using price indices for different commodities published by CAPMAS. Weights for the poor and nonpoor groups were derived from group expenditure patterns for 1990/91.

13. According to the Ministry of Finance, increases in indirect taxes started as early as 1986, even before the launching of the ERSAP in 1991.

14. The second phase of the ERSAP is expected to push forward on public sector reform and especially privatization, in addition to completing market liberalization.

15. Aware of this problem, the World Bank in 1990 prepared a full report on social dimensions of economic reform programs applied in different countries.

16. The gains also have to be weighed against any possible disincentive effects. By disincentive effects we mean the effect of discouraging instead of encouraging the participation of the poor in the program.

17. Workplace cooperatives are formed when there is a specific minimum membership of employees. In return for a nominal membership fee, the cooperative sells products needed by its members at low prices.

18. A more detailed analysis of the advantages of the cooperative system is in Abdel-Latif and Kamel 1993.

19. A detailed assessment of the current role of NGOs in Egypt's social safety net is in Soliman et al. 1993.

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After the Transition

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14

Egypt's Agricultural Future

LEHMAN B. FLETCHER

Readers of this book are well aware of the severity of the policy repression that burdened Egyptian agriculture in the pre-reform, socialist era. At its apex, government control was pervasive: Areas for many crops were dictated to each small farmer and enforced by delivery quotas and fines. Producer prices for most products were fixed at low levels relative to border prices. Many larger processing, marketing and trade enterprises were state owned. Exchange-rate overvaluation implicitly taxed agricultural exports and subsidized competing imports. Only a few farm products, notably red meat and poultry, were protected. High industrial trade protection raised the relative prices of producer and consumer manufactures purchased by rural households, except for subsidized inputs and credit and free irrigation water.

These policies created strongly negative trade protection for major crops. They transferred resources on a large scale from agriculture to other sectors. As a consequence, the performance of the sector suffered: Yields were generally static. Self-sufficiency ratios for major foods declined to historical lows. Exports of cotton dropped precipitously. The agricultural sector growth rate fell below the rate of population growth, fueling food imports to meet the rising demand that reflected population growth and subsidized consumption.

Efforts to reform agricultural policies began in the early 1980s as appreciation of the policy constraints spread among high officials in the agricultural administration. Early attempts to raise producer prices met strong resistance from other policymakers in the government concerned with consumer prices, industry and trade. Subsidies on fertilizer, chemicals and credit, which met with less resistance, were elevated to partially compensate farmers for low output prices.

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Costs of these massive subsidies crowded out other government expenditures and exacerbated fiscal deficits.

The world development community now knows about the panoply of agricultural policy reforms implemented in Egypt in the reform era since 1986. These sweeping reforms have dramatically altered the policy environment in the sector. Egyptian farmers have much more freedom to choose what and how much to produce. They purchase inputs from private suppliers at market-determined prices and use them at more economic levels. They borrow in cash at nonsubsidized rates or buy on credit from private suppliers of inputs. Market prices for most products and inputs are much more closely aligned to international levels.

Agricultural Production and Productivity Growth

Growth in agricultural output can come from three sources:

(1) more efficient use of purchased inputs and existing sector resources, (2) use of increased quantities of inputs and resources, and (3) use of new technology that raises the level of the total product curve in the sector. The contribution of each of these sources of growth is, in turn, determined by such factors as land tenure arrangements, policies that affect the prices of inputs and outputs, public investment in infrastructure and government expenditures on support services. Policy reforms since 1986 have had their biggest impacts on the pricing of inputs and outputs. The other determinants of the sources of sector growth will require more attention by policymakers in the future.

The second source of growth identified above, use of increased inputs and resources, has been of little importance in the reform period and will make at best a modest contribution to future agricultural growth. The stock of arable land changes only very slowly. It rises in response to public and private investment in new land development; it falls as agricultural land in the Nile Valley and Delta is converted to nonfarm uses or degraded beyond productive use. Egyptian farmers overused subsidized inputs and still lack incentives to conserve free irrigation water. There is no evidence either that labor is a constraint on sector output or that more labor alone would raise value-added in the sector. More machines and equipment embodying the technology already in use, along with the existing land and labor resources, would contribute little to output growth.

The first source of growth, enhanced efficiency, has been the most important contributor to growth thus far in the reform period. Chapters 4, 5 and 7 provided evidence that adjustments in cropping patterns and input use led to annual increases in income attributable to agricultural resources as much as 30 percent above the pre-reform level in the early years of the reform period. In the later years, the annual resource income increments fell as world prices for major crops declined and input prices rose to nonsubsidized levels. After the reforms, farmers had higher incentives to produce and better prices to guide economic crop and input choices. The resulting increased efficiency in use of inputs, productivity of

resources and exploitation of existing technology generated additional returns to the land, labor, water and capital resources in the sector.

More efficient use of inputs, increased resource productivity and utilization of available technology are, however, inherently limited as sources of sector growth. Once producers have adequate incentives, knowledge of new price relationships and time to fully exploit available technology, the output growth rate will decline to zero if nothing else changes. A high growth rate can be maintained only if the third source of output growth, new technology, becomes the main engine of growth in the sector; the generation, dissemination and utilization of a continuous flow of new technology is, therefore, the crucial determinant of Egypt's agricultural future.

The introduction of new technology in agriculture is a process that takes place over time. In fact, some technology that had been developed but that was "on the shelf" was adopted by farmers after the reforms gave them the necessary incentives. To that extent, the contribution of new technology was confounded with the contribution of enhanced efficiency in the additions to resource income generated in the reform period. However, neither data nor statistical techniques are available to satisfactorily sort out the efficiency and technical change components of the observed income growth.

What can be pointed out with great confidence is that new technology will be the main source of future agricultural growth. To state the main point again, the generation of a continuous stream of new technology, its dissemination to farmers and, finally, its adoption are the keys to Egypt's agricultural growth rate in the future.

Yield increases are often used as an indicator of technical change in agriculture. Thus, yield changes over time, or yields in Egypt compared with those in other countries and with experimental results, are used to assess Egyptian technology and the potential for future increases (Chapter 5). A much more compelling measure is total factor productivity growth in agriculture, defined as the residual rate of sector production growth not accounted for by the contribution to output of purchased inputs and the land, labor and capital resources in the sector. This measure focuses on the generation of additional income *per unit of agricultural resources* as the most crucial indicator of economic progress in the sector.

In this "growth accounting" framework, sector output is measured by value-added on farms, i.e., the gross value of output at farm-gate prices less the value of inputs purchased from other sectors. Next, that part of growth in agricultural value-added that can be attributed to growth in conventional agricultural resources—land, labor, water, capital—is calculated. The residual growth rate over the growth in value-added explained by additional resources represents the growth in total factor productivity in the sector. The faster the growth in total factor productivity, the larger the income attributable to each unit of agricultural resources.

Total factor productivity growth thus creates an increase in income generated per unit of agricultural resources. This increase can come from many sources. Genetic improvements in plants and animals are an important source. But better management practices that reduce unit costs of output also raise total factor productivity. Similarly, new technology embodied in machinery and chemicals can be a source of total factor productivity growth. Shifts to more profitable crops and new irrigation methods that reduce water use per unit of output are other sources of increases in total factor productivity.

Growth in agricultural production is now widely recognized as a necessary precondition for rapid industrial and overall economic growth in most developing countries. Growing agricultural output is needed to feed the urban population, to earn foreign exchange through exports and to supply raw materials to processing industries. When the crucial distinction is made between growth in physical output and growth in factor productivity, the complementarity between agriculture and overall growth is enhanced: Rising productivity in agriculture will strengthen the stimulation of industrial and overall economic growth. Falling labor use per unit of output in agriculture releases more labor for industrial employment. Falling unit costs lower food prices and help keep real urban wages low and industry more profitable. Higher resource income in agriculture expands the domestic market for manufactured inputs and consumer products. Rising agricultural savings finance rural and urban nonfarm investment. In these ways, increasing agricultural productivity accelerates industrialization and overall economic growth.

Egypt and China have been compared several times in this book. Both began their economic transitions in agriculture. The price and marketing reforms in China after 1978, combined with the return to household farming, are credited with several positive impacts on agriculture and the rural economy: Production rose rapidly. Land use shifted to more profitable crops following regional comparative advantage. Rural incomes rose, resulting in higher savings and investment.¹

Rapid growth in agricultural production continued in China until the mid-1980s. Several explanations for the subsequent slowdown there, as well as for the expectation of renewed growth, have been offered (Khan and Khan 1995, p. 25):

First, productivity growth in agriculture has fallen below that of the industrial sector, causing relative declines in incomes in the agricultural sector. Second, there were delays in increases in procurement prices. And third, the rate of investment in agriculture fell as state investment was increasingly directed towards industry and infrastructure. In response to these problems, the government has implemented a series of measures, including raising procurement prices in 1994 closer to international levels, protecting farmland, supplying additional agricultural credits, improving the distribution and marketing systems, and raising the level and quality of technical and support services. In China, developing agriculture remains a high priority for the government, and these measures are likely to lead to renewed rapid growth of the agricultural sector.

Comparable impacts in Egypt of reforms in production controls, pricing and marketing policies, and credit and input subsidies have been assessed in previous chapters. Production and productivity rose, albeit less dramatically than in China. An even more apt comparison can be made, based on the quotation above, of the remaining reforms needed to move Egyptian agriculture on to a higher and sustainable growth path. These further policy needs are discussed in the remainder of this chapter.

Prices, Markets and Marketing Institutions

The primary function of a market system is to discover prices and transmit information on those prices to market participants. An early attempt to assess the efficiency of price discovery and transmission in Egypt's agricultural market was reviewed in Chapter 9. There, and in other chapters, the closer alignment between domestic and international prices in the reform period was emphasized.

The relationship between domestic and external prices for a given product can be conceptualized in the following equation:

$$\frac{P_F}{P_{GDP}} = \frac{P_F}{P_B e} \cdot \frac{e P_I}{P_{GDP}} \cdot \frac{P_B}{P_I}$$

where P_F = nominal farm-gate price in local currency.
 P_{GDP} = domestic price level.
 P_B = border price in foreign currency.
 P_I = international price inflation.
 e = nominal exchange rate (domestic currency per unit of foreign currency).

The left-hand ratio is the real farm-gate price for the product. On the right-hand side, the first term is the nominal protection coefficient, the second is the real exchange rate and the third is the real border price. This approach makes it possible to decompose movements in real farm-gate prices into component sources. It can be used to show the impacts of external factors on the evolution of real producer prices as well as of policy instruments used to affect those prices.

With no interventions, the equation shows what farm-gate price is consistent with the international market price and internal and external macroeconomic conditions. Further, it shows that domestic inflation directly reduces the real producer price corresponding to a given nominal farm-gate price and explains how that effect is transmitted through the real exchange rate: Domestic inflation in excess of international inflation at a given nominal exchange rate appreciates the real exchange rate. The equation clarifies interests of domestic producers in

the evolution of the real exchange rate, a policy issue elucidated in Chapter 2. It reveals why devaluation may be needed to maintain incentives for domestic production consistent with a given real international price. It shows that a policy of "getting prices right" does not end with freeing of domestic prices but requires continuous monitoring of domestic and international inflation and real exchange rates.

Real exchange rate appreciation is a disincentive for domestic production of all tradable goods, industrial as well as agricultural. A second important intersectoral incentive issue concerns the relative prices of industrial versus agricultural goods. It stems from the high level of protection for industry that can be traced back to the import-substitution policy regime and that is still largely intact. The direct effect of this trade protection for industry is to raise the relative domestic prices of manufactured inputs and consumer goods bought by agricultural households, i.e., to bias the domestic terms of trade against agriculture. This bias reduces the profitability of production and investment in agriculture compared to industry, thereby encouraging a shift of resources to the more profitable protected sector. It acts as an implicit tax on agriculture, discouraging resource use in the less profitable unprotected sector.

As a part of the ERSAP, progress has been made in converting quantitative restrictions on industrial imports to tariffs and reducing tariffs to a more uniform level. To this extent, problems of differential incentives within industry have been abated, but the anti-agriculture bias from industrial import protection remains largely intact.

At an even more basic level, Egyptian agriculture stands to benefit enormously from a successful shift to an export-promotion trade policy regime. As noted earlier, a move to more profitable and higher-valued production for export would raise overall agricultural productivity and resource income. But the sector will also benefit indirectly from exports of manufactured products. According to the literature on economic growth, the main linkages of exports to growth are through the effects on productive efficiency required to meet international competition and on total factor productivity growth from learning-by-doing, from use of capital with embodied technology and from spillover effects of the exporting enterprises.² Additionally, because Egyptian manufactured exports are likely to be labor intensive, success in export promotion will create jobs and the opportunity to absorb more labor released from agriculture, thereby raising output and income per worker in agriculture. It should be remembered that the long-term objective of trade and import liberalization is export promotion, and Egyptian agriculture will gain from successful growth of exports of both its own output and industrial goods.

Within the agricultural sector, issues of how to make agricultural markets work better now need to be addressed. The first requirement is careful and continuous monitoring of actual price behavior. The importance of domestic-border price relationships has already been stressed. Spatial and temporal price

behavior is also important and, as explained in Chapters 8 and 9, can serve diagnostic purposes in pinpointing problems that may require policy interventions. Market performance problems arise from noncompetitive behavior or from an array of market imperfections. The challenge then is to diagnose the imperfections and formulate policies that can enforce competition and counteract market failures without themselves introducing new and damaging distortions of the pricing mechanism. Development and enforcement of sanitary, quality and labeling standards are particularly important to improve pricing efficiency and protect buyers and sellers.

A high-priority need in Egypt is to develop a system for collecting and disseminating price and market information. There was little demand for this type of information in the socialist era, when farmers sold mainly to state monopoly buyers at fixed prices. The public interest now is in information that is continuous, credible, timely and equally accessible to all market participants, as a means of improving the operation of the pricing mechanism. This is an area urgently in need of private and public action at this stage of the reform process.

Finally, the issue of price stabilization needs to be faced. It is widely believed in Egypt that opening markets will increase price fluctuations and expose producers to risks from falling prices. These concerns intensified in reform years when commodity prices declined on world markets. The tendency so far has been to convert previously fixed prices to floor prices paid for voluntary deliveries to government buyers. Egypt now needs a systematic study of the price fluctuations that it can expect to experience in the new world trading environment. These fluctuations should be related to income and expenditure variability that producers and consumers will face. Then, low-cost interventions that assist producers and consumers to adjust to the anticipated price, income and expenditure instability should be designed and implemented. It is likely that the most cost-effective interventions will be those that expand public and private capability in Egypt to trade in futures and options contracts on commodity markets in order to hedge risks and stabilize domestic prices. As pointed out in Chapter 9, the great majority of small Egyptian farmers have neither the knowledge of, nor the access to, market institutions for hedging purposes; thus the government will need to establish the required market institutional framework and to educate and assist farmers in its use.

Public Sector and Institutional Reforms

In no other area is the legacy of Egypt's experience with state socialism more calamitous than in the public sector. Almost half of the labor force is on public payrolls, mostly at low wages that have become lower in real terms in the 1990s. The government has provided free education and guaranteed jobs to school graduates, thereby creating an enormous public bureaucracy. Five hundred public companies, mostly overstaffed and

inefficient, account for the bulk of industrial output and many commercial services. Nevertheless, concern for political stability tempers the government's willingness to radically change policies that for 30 years have provided secure jobs and cheap food, housing, education, medical care and energy.

Under the ERSAP, state-owned enterprises are being restructured. They have been allocated to diversified holding companies supervised by the Public Enterprise Ministry. The intent is to give them autonomy from the sectoral ministries that previously owned them, to make them into market-oriented companies and, later, to privatize them. So far, only some small joint venture and tourist properties have been privatized. No mass privatization, as was carried out in Eastern Europe and Russia, is planned. The case for vigorous restructuring and prompt privatization of state-owned agribusiness enterprises is made clear in Chapters 4 and 10.

Inevitably, rationalization of the state enterprise sector and the public administration will require massive layoffs when unemployment is already at least 13 percent overall and much higher among the young. Shedding public employees will severely test the government's resolve and strain its capacity to offer retraining and safety-net assistance to job losers.

At best, the government can only hope to ameliorate the public-sector adjustment costs that fall on the poor and vulnerable. In the longer-term, job creation in the private sector is the key to resolving the employment problem and alleviating poverty. In the transforming economies that have maintained the lowest rates of unemployment, rapid creation of jobs in the private sector has absorbed excess workers released from the state enterprise sector.

The best prospects for job creation in rural Egypt are in agribusiness and other nonfarm activities. Investment in these areas can be encouraged by reducing government controls and government regulation of investment and trade. Reductions in bureaucratic regulations as well as of discretionary administrative controls over private investment and trade activities will stimulate growth in private agribusiness processing, marketing and trade.

Reduction in regulation does not, however, translate to no role for government. The need for a public system of price and marketing reporting was identified previously in this chapter. To that role two additional priorities can be added: regulation of noncompetitive monopoly/oligopoly behavior, and a system of sanitary and quality standards that are uniformly and impartially enforced.

The emphasis in the preceding paragraphs, which was on restructuring the role of government to create the necessary institutional framework for private activity, provide public services and impartially enforce rules for competitive conduct, is counter to some recent reinterpretations of the experience of the high-performing Asian economies. Based on the experience of Japan, Taiwan and Korea, this new view stresses the interventionist role of governments in choosing areas of the economy to subsidize and encourage. It recognizes that the governments of these countries have been moving toward liberalization of trade, capital and financial markets, but only after a more interventionist first stage in

their growth and development. The danger lies in the poor record that most governments have posted in implementing discretionary policies, picking winners to subsidize and trying to remedy market imperfections. In Egypt, the lesson should be long remembered that government interventions to favor selected industries and enterprises are likely to result in the same distortions and inefficiencies that so severely burdened the economy in the past.

Technology Development and Dissemination

The generation and dissemination of agricultural technology is undertaken through agricultural research and extension in both the public and the private sectors. With generous donor support, a large public-sector agricultural research organization has been developed in Egypt. The challenge now is to use that system to effectively support agricultural productivity growth in a market-oriented environment. Critical choices must be made in the allocation of research resources among alternative crops and livestock products.

Stable funding for the research system is of paramount importance. Efforts to curb fiscal deficits have brought problems in maintaining research budgets. Better information is needed on the returns to past research, and on the expected returns from lower-cost production for the domestic market and competitive exports for profitable markets in Europe and the Gulf, to secure adequate public funding for a sustained research program. Efforts are also needed to develop partnerships with the private sector for technology development and transfer.

Substantial reforms in extension are called for. Extension agents were part of the public management of the previous controlled cropping and in-kind credit system. They must now function as a key element of a system that connects farmers' fields to research laboratories. Effective communication of on-farm problems to research staff and supplying of timely and credible technical and economic advice to farmer-clients defines the Janus-like role required of extension workers in the liberalized agricultural sector.

Another aspect of technology development involves improvements in the efficiency of irrigation. Evidence is presented in Chapter 4 that as much as 20 percent of the water used for crop irrigation could be saved, and that this water has a high and growing opportunity cost within the sector as well as in nonfarm uses.

Finally, technology development is needed to increase the productivity of previously reclaimed land and raise the economic rates of return on new land reclamation investments.

Targeting the Poor

Because the further reforms and public sector support services and investments proposed in this chapter will encourage higher growth in agricultural output and productivity, they should

provide increased income to the rural poor over the medium and long term. Successful export promotion of manufactures will create urban jobs and stimulate commerce and services, thus benefitting the urban poor. But this growth in employment and income will not reach the majority of the chronically and newly poor for some time, and it will largely bypass the elderly, disabled, disadvantaged and destitute. These, and the larger poor group bearing the burdens of real wage declines, job losses and price increases, merit targeted assistance. This assistance can include food-for-work programs and targeted food subsidies, as discussed in Chapter 13. Assistance to those bearing the transitional costs of policy reforms should be phased out as economic growth picks up and poverty is alleviated. Long-term programs should be strictly limited to the ultra poor and disadvantaged.

Malthus and the Seven Lean Years

Egypt provided the earliest recorded account of a self-sufficient society that achieved food security for its people by cyclically storing surplus grain in good years for use in shortage years. There is still much popular sentiment in Egypt in favor of food self-sufficiency and public storage programs to stabilize supplies and prices.

Malthusians point to Egypt to justify their long-run pessimism about the race between population and food supplies. In spite of an input-intensive, year-round agricultural system, Egypt's food needs exceed its capacity to produce food. Population growth against a limited arable land endowment has seen to that, just as Malthus reasoned. Population is now growing at about 2.0 percent per year, slower than before but still frighteningly fast—and these people must be fed. If economic reforms succeed and more rapid economic growth begins to generate higher per capita incomes, the proportion of grain-intensive animal-origin foods in the diet will again begin to rise. Then grain import needs will grow even faster.

Two concluding questions about Egypt's agricultural future: First, will known and as yet unknown scientific advances raise crop yields around the world so that Egypt can depend on grain imports with risks no more serious than those from year-to-year price fluctuations? Optimists argue for such scientific breakthroughs, and commodity experts advocate modern risk management techniques to limit exposure to external price fluctuations. If the optimistic and expert arguments are accepted, then the second question is, Will Egypt succeed in promotion of agricultural and manufactured exports so that it can easily pay for its imported grains? The further agricultural policy reforms discussed in this book, along with sustained efforts to liberalize trade and create internationally competitive manufacturing and service industries, will ultimately answer the second question.

Notes

1. A recent study by Wen (1993) of total factor productivity in Chinese agriculture concluded that the productivity index rose from 70 to 140 between 1978 and 1989. That doubling of productivity was the most important source of growth in China's agriculture. Because productivity change was measured as the residual growth in output not accounted for by growth in conventional land, labor and capital inputs, both enhanced technical and economic efficiency and upward shifts in the total product curve were captured in the measured total factor productivity growth.

2. Economic growth theory is expertly reviewed in Barro and Sala-i-Martin (1995).

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