Final Report

Private Sector Contribution to Egypt's Productivity and Growth

Prepared for

The Ministry of Economy and Foreign Trade

Submitted to

USAID
Economic Growth/Sector Policy
Cairo, Egypt

Submitted by

Nathan Associates Inc.

(USAID Contract #263-C-00-96-00001-00)

March 2000

Private Sector Contribution to Egypt's Productivity and Growth

Table of Contents

Page

List of Figures

List of Figures (cont'd)

List of Tables

Page

List of Tables (cont'd)

Page

List of Boxes

Page

Acronyms

AC	Affiliate companies
AE	Allocative efficiency
BOT	Build operate transfer
BOOT	Build, own, operate transfer
CAA	Central Accounting Agency
CAPMAS	Central Agency for Public Mobility and Statistics
CBE	Central Bank of Egypt
CE	Cost efficiency
COMESA	Common Market for Eastern and Southern Africa
DEA	Data Envelopment Analysis
DEPRA	Development Economic Policy Reform Analysis Project
EHTA	Egyptian High Tech Association
ERSAP	Economic Reform and Structural Adjustment Program
EMA	European Mediterranean Agreement
EPRIS	Economic Policy Research Information Service
ERP	Effective rate of protection
ERSAP	Economic Reform and Structural Adjustment Program
ESA	Employee shareholder association
ESA	Egyptian Software Association
ESCC	Egyptian Society for Computer Companies
EU	European Union
FDI	Foreign direct investment
FTZ	Free trade zones
GAFI	General Authority for Investment and Free Zones
GATT	General Agreement on Tariffs and Trade
GDI	Gross domestic investment
GDP	Gross domestic product
HC	Holding companies
HEIA	Horticultural Export Industry Association
HS	Harmonized system
IAS	International accounting standards
IBTCI	International Business & Technical Consultants Inc.
IDSB	Industrial demand supply balance
IDSC	Information and Decision Support Center
IMF	International Monetary Fund
I/N	Input/Output
IOS	Industrial output statistics
ISA	International standards of auditing
ISE	Internet Society of Egypt
ISIC	International Standard Industrial Classification
IT	Information technology
JVB	Joint venture bank
MEFT	Ministry of Economy and Foreign Trade
MOE	Ministry of Economy

Acronyms (cont'd)

MOI	Ministry of Industry
MOP	Ministry of Planning
MOTS	Ministry of Trade and Supply
MPI	Market penetration index
NES	National economic statistics
NRP	Nominal rate of protection
OLS	Ordinary least squares
PE	Public enterprises
PEO	Public Enterprise Office
PFP	Partial factors productivity
PO	Public offerings
RCD	Relative cost reduction
RCR	Real cost reduction
RITI	Regional Information Technology Institute
RITSEC	Regional Information Technology and Software Engineering Center
SFD	Social Fund for Development
SMEs	Small Micro Enterprises
TE	Technical efficiency
TFP	Total factors productivity
TIFA	Trade and Investment Framework Agreement
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
VA	Value Added
WB	World Bank
WTO	World Trade Organization

Preface

This report is based on research conducted jointly by the Development Economic Policy Reform Analysis (DEPRA) Project with the support of the Economic Policy and Research Information Sector (EPRIS) of the Ministry of Economy and Foreign Trade (MEFT). DEPRA is funded by the United States Agency for International Development (USAID)/Egypt (contract no. 263-C-96-00001-00). The DEPRA Project is intended to encourage and support economic reform in Egypt through the provision of technical assistance and services to the Ministry of Economy and Foreign Trade, with substantive focus on international trade and investment liberalization, deregulation of the economy and strengthening of the financial sector. The prime contractor of the DEPRA Project is Nathan Associates Inc. Chemonics International and Allied Corp - Egypt, project subcontractors, also contributed to the study, as did MEFT/EPRIS.

This study was conducted under the direction of Dr. Suzanne A. Messiha, Economic Consultant (Chemonics International) to the DEPRA Project. The DEPRA team members included as local consultants Dr. Abdelhamid A. Mahboub, Macroeconomic and Development Specialist, Professor of Economics, Zagazig University, and author of Chapters 1 and 2; Dr. Lobna Abdel Latif, Industry and Trade Specialist, Associate Prof. of Economics, Cairo University, and author of Chapter 4; and Dr. Kamal Sami, Database and Statistics Training Specialist (Cairo University). Expatriate consultants, Dr. Robin C. Sickles, Professor of Economics and Statistics, Rice University, and Lullit Getachew of Rice University were authors of Chapter 5 assisted by Won Ho Song, and Ruwan Jayasuriya and Ms. Greta Boye, independent consultant, was the author of Chapters 3 and 6 and editor of the entire report. The EPRIS team members were Ms. Souraya Sadek Amer, Economist and Statistician; Mr. Prince Hanafy Ahmad, Economist and Statistician; Ms. Ahlam M. El Santawy, Economist; and Mr. Mohamed Zaki Aly, Economist.

The study team wishes to extend special thanks to His Excellency Dr. Youssef Boutros Ghali, Minister of Economy and Foreign Trade, and Dr. Farouk Shakweer, First Undersecretary of the Ministry of Economy, for their guidance and support. Among others, special thanks are extended also to Dr. C. Stuart Callison, for his valuable comments and final editing of the last version.

The views expressed in this report are solely those of the authors, and they should not be interpreted as representing official views of the Government of Egypt, the Ministry of Economy and Foreign Trade, or the United States Agency for International Development.

Private Sector Contribution to Egypt's Productivity and Growth

Executive Summary

This study assesses the role of Egypt's private sector in enhancing Egypt's productive capacity both on the macro and sectoral levels, with particular emphasis on manufacturing activities. It emphasizes the role of the private sector in improving the allocation of resources, thereby expanding employment opportunities, raising living standards, bolstering exports, improving efficiency and productivity, and disseminating technology. The study examines all types of private sectors by legal entities--formal, informal, and private investment entities (See Appendix 2 for definitions of these various legal entities), and it explores financial, legal and institutional constraints on private sector productivity and competitiveness, particularly as they relate to promising sectors of the economy. It also explores the role of the Government in fostering an improved business environment and supporting the private sector through its economic policies and development programs.

The study adopts an integrated approach for assessing the performance of the private sector and its contribution to growth and productivity, including descriptive, analytical, quantitative and empirical analysis. The approach includes statistical and economic analyses, estimation of total factor productivity as it relates to technical, allocative and cost efficiency, and surveys of promising activities in the software, home appliances and horticulture sectors.

Major conclusions reached by the study are as follows:

At the macro level, the analysis demonstrates that the private sector is generally expanding rapidly relative to the public sector in terms of its contribution to national output, investment and employment, although its export performance has been weak. In general the preferred activities by the private sector in descending order are services, agriculture and industry. Private manufacturing output remains small, relative to the economy's total output.

Since the beginning of economic reform program, the private sector has been able to increase employment significantly, partially offsetting the contraction of public sector employment. The total real wage bill of the private formal sector increased modestly, but decreased in both the private investment and public sectors. These findings suggest that real wage rates have declined.

Government policy towards improving the investment climate and providing incentives under Law 8 of 1997 (amending previous investment laws 230 of 1989, and 43 of 1974) have yielded positive results. The private investment sector operating

under this law demonstrated its capacity to expand output, employment, savings and exports. Most of its activities are more labor intensive than in the formal private and public sectors. In addition, nearly all economic indicators showed positive signs. These improvements have been clearly evident in the utilization of Egypt's scarce resources between 1986/87 and 1995/96. While output per unit of labor fell by 36 percent between the pre-reform (1986-90) and the post reform (1991-96) periods, output per unit of the real wage bill rose by 19 percent and incremental output per unit of new capital investment also rose sharply. Employment in this sector increased by 81 percent during this period. Hotels and restaurants and manufacturing have been the driving forces behind this improved performance. The investment sector was the only sector that had an increase in savings/value added between the two periods. That large savings allowed for greater economic growth.

At the sectoral level, the private investment sector increased productivity the most in hotels and restaurants, building and construction and manufacturing, while the private formal sector became much more productive in agriculture, forestry and hunting. The private investment sector is also more export-oriented than the private formal sector, and it has a more diversified export structure that favors non-traditional technology-intensive products.

The cost of providing tax exemption to the private investment sector relative to the benefits that it generates, though this cost increased between the pre-reform to the post reform periods, is paying off in terms of the greater orientation towards exports, employment generation, and the acquisition of managerial skills, marketing and information technology. However, given the increasing cost of tax incentives to the private investment sector, these and other incentives should be reconsidered.

The role of government in fostering private sector productivity has been formidable as reflected in the following developments:

- Considerable success has been achieved in the Government’s privatization program, compared with those applied by other countries. Most private companies (70 percent of total) are now more profitable than before privatization.

- Egypt’s privatization program has a unique social dimension in its labor compensation schemes for voluntary early retirement. In 1998 the entire scheme cost about LE1.3 billion for 12 companies, which covered about 57,000 workers with an average compensation for early retirements varying between LE11, 000 and LE27,000.

- Enhanced competition and increased private sector participation in public utilities and services is expected from the recent government strategy to allow further privatization through international investment banking. This is expected to attract additional investment embodying high technology and managerial and marketing know-how that will help foster higher levels of productivity and bolster the country’s export potential.

- Egypt’s three-pronged strategy for trade is based on its membership in international trade agreements (viz., WTO) regional trade agreements, and

multilateral trade liberalization (COMESA, and Arab free trade). This strategy is expected to enhance its export potential, particularly after improvements in the trade regulations that extend beyond those already made to the tariff structure.

The analysis of demand and supply sources of growth in the two-digit ISIC manufacturing activity categories, disaggregated into small, medium and large employment levels, reveals the following:

- High growth rates of private manufacturing activities have become the driving force behind the growth of the entire manufacturing sector.

- Since 1991, there has been a clear change in the structure of private manufacturing activities. Traditional activities in basic metals and wood gave way to more sophisticated ones like engineering and non-metal activities by large firms. Small firms have also demonstrated a favorable performance in non-traditional activities.

- Productivity gains are evident in private sector manufacturing activities.

- The growth rate of value added exceeded the growth rate of inputs, except for imported intermediate goods.

- The 1991 devaluation of the Egyptian pound affected the cost of production. Activities with higher rates of growth were able to cope with the devaluation better than others. Small-size firms were able to deal with the devaluation by reducing the import content of their total production cost and expanding output for the domestic market in more effective competition with higher priced imported goods. Large-size firms expanded real exports by 5.5 fold, thereby absorbing the increased cost of imported inputs with higher earnings of foreign exchange and more than doubling their real value added in the process. Medium-size firms seem to have had more difficulty coping.

- The contribution of exports to the economic growth of Egypt private manufacturing activities remains limited. The local market is the principal target of the private manufacturing sector. Egypt's tariff structure increases the profitability of producing for the domestic market, while raising the costs of intermediate goods, whether imported or domestic, and thereby discriminates against exports. The implicit economy-wide tax on Egyptian exports equal to about 19 percent, while a 22 percent premium for not exporting is implicitly being granted to potential exporters of manufacturing goods for selling in the domestic market (see Cassing et al., DEPRA, June 1998).

Private manufacturing productivity estimates point to clear gains to the Egyptian economy and to citizens of Egypt from the economic reform program started in the early 1990's. The results suggest that market forces have made the private sector more efficient than before and therefore more competitive in the 1990's than it was in the late 1980's. This phenomenon is one of the major reasons for the strong performance of the private sector in total factor productivity (TFP) growth. The study also suggests that capital formation in the form of new and existing technologies enhance the

prospects for growth in the next decade.

There is evidence of substantial increases in productive efficiency in 28 Egyptian manufacturing sectors at the 3-digit ISIC level for the period 1987/88 to 1995/96. The level of pre-reform efficiency equaled 65 percent, while that in the of post-reform period equals about 80 percent. The results also indicate that technical TFP would be higher if technical progress embodied in new foreign and domestic investment were higher.

TFP increased by 11 percent between 1987/88 and 1995/96. Productivity growth between the pre-reform and post-reform periods has saved the economy some LE660 million. Over 80 percent of TFP growth was derived from capital, another 8 percent originated from labor, and 11 percent was derived from energy and materials.

TFP growth in the private manufacturing sector reflects the significant impact of the economic reform program. TFP growth is the outcome of improvement in efficiency, as measured by production and cost efficiencies and technological growth rates. In particular, 57 percent of all manufacturing sectors had higher TFP growth rates, 90 percent had higher technological growth rates, and 36 percent had higher efficiency growth rates. The winners in the private manufacturing sector experienced higher growth rates in all three productivity indices: TFP, technology and efficiency. Those sectors were beverages, tobacco, wearing apparel, food, textiles, wood, rubber, plastics and other non-metallic products. Nine sectors experienced lower efficiency growth rates and also lower productivity growth. Five manufacturing sectors had growth in TFP and technology but not in efficiency (paper, industrial chemicals, professional equipment, transport, and fabricated metal). Only two industries experienced decreases in all three indices (iron and steel and non-ferrous metals). These results suggest that the impact of efficiency performance on TFP growth has been quite substantial. The winners have been those not only with higher technological growth rates in the post-reform period, but also with strong efficiency growth rates.

Interviews conducted in three promising activities (software, home appliances, and horticulture) identified a number of major impediments and challenges relating to marketing, finance, support institutions, technology, legal aspects, taxes, labor, machinery and equipment and infrastructure. The results suggest a number of actions needed to rectify the existing situation.

The Egyptian software industry, though highly diversified compared with that of other countries, has expanded quickly and presently employs about 5,000 persons, but it is limited by the extent of the domestic market. Real potential lies in the export market, which is expected to grow worldwide by about 20 to 30 percent a year. The Egyptian software industry has a competitive edge in Arab language application. There is evidence of increasing returns to scale in Egypt's software industry, but several factors threaten to inhibit its export growth

The major challenges to the Egyptian software industry, in descending order of importance, are (1) the lack of an overall marketing strategy, especially compared with countries already successful in this industry, like India; (2) unavailability of

short-term and long-term finance due to bank unwillingness to finance intangible assets; (3) lack of understanding by financial institutions of software business; (4) inability of banks to evaluate software project proposals; (5) inability to find qualified technical employees due to inadequate university training; (6) high employee turnover; (7) software piracy and weak enforcement of the intellectual property rights law; (8) insufficient punishment for copyright infringement; (9) lack of user awareness of the need to use original software; (10) insufficient support by both Government and the private sector; (11) inadequate technical assistance tailored to industry; (12) excessive costs of telephone service, including international leased lines and satellite lines; (13) import taxes and inspections and export fees; (14) expensive training; and (15) neither high-tech on-line data systems nor satellite transmission is currently available in Egypt.

The household appliance industry has a strong local demand that is expected to expand over the next decade. Its output more than doubled between 1991 and 1996. Nevertheless, output per unit of labor and wages per unit of output have dropped drastically. Also, export performance has been poor; with exports in 1996 representing only 8 percent of its 1991 level. It is questionable whether Egyptian firms would be able to compete in export markets, even those in the Middle East and Africa that are members of the COMESA trade agreement, because of the relative low level technology in the industry. One reason is that the current level of protection offered by the tariff structure has acted as a disincentive to upgrade technology and a disincentive to export.

The most important challenges facing this sector, in descending order of importance, are: (1) the absence of market information on demographics and supply-demand balances of local and export markets; (2) the absence of data to determine whether or not Egyptian household appliances would be accepted by consumers in potential export markets; (3) the lack of coordinated effort among businesses; (4) the perceived absence of support from both private and government financial institutions; (5) high interest rates (at 12-17 percent) that raise costs of production relative to foreign competitors; (6) perceived inadequacy of bank officials in evaluating loan proposals, thereby stunting investment and preventing expansion; (7) lack of knowledge in determining optimal production processes and in providing impartial and unbiased outside services; (8) lack of knowledge of how to develop product designs that could compete against European imports; (9) high cost of financing new technology; (10) slow court system in commercial dispute settlement; (11) the existence of export fees of 1 percent that hinder exports; (12) difficulty of dismissing unproductive employees; and (13) shortage of skilled and technical workers, managers and marketing specialists.

The horticulture industry, comprised of vegetables, fruits and cut flowers, makes up 16 percent of Egypt's cultivated area. It is a high value-added industry with large export potential. The bulk of horticulture exports are vegetables, which in 1994-97 averaged US$ 154 million. Exports of cut flowers were lower and recorded negative average annual growth rates.

The major challenges faced by the horticulture industry, in descending order of importance, are (1) lack of public infrastructure for cargo storage space, which prevents small companies from exporting and raises the cost for exporters who can

afford private services; (2) misuse in loading produce on planes, which leads to spoilage and rejection during quality control inspections; (3) cooling facilities that are not sufficiently cold and cause spoilage; (4) perceived lack of support for small and start-up companies; (5) worry over the complex EU quota system and the proposed EU-Egypt trade agreement; (6) perceived unfair assessment of large swings in profits and losses due to weather by tax assessors; (7) accumulation of taxes relative to competitors in foreign countries; (8) lack of timely and reliable data on production and yield for both Egypt and foreign markets; (9) lack of technical information on new varieties, chemicals and other inputs specific to high value added products such as cut flowers; (10) lengthy and time-consuming approval processes for land registration and land permits; (11) lengthy process to approve new seed varieties; (12) lack of managerial skills and workers with technical skills; (13) overvaluation of the Egyptian pound relative to the US dollar, which undermines the competitiveness of the industry in the global market; and (14) new regulations requiring importers to cover 100 percent coverage for letters of credit.

Recommendations.

Based on these findings, the present study makes the following recommendations for accelerating the private sector's contribution to Egypt's productivity and growth:

- Develop an action plan to promote growth in the manufacturing sector that stresses factors affecting both demand and supply. On the demand side, development of a Government strategy to support factors that would increase the demand for Egyptian products in the international markets, such as improved technology, innovation, skills, compatible mix and match, standardization, clusters and export channels. On the supply side, review and reform of investment incentives to re-direct incentives to targeted sectors, in order to stimulate growth and productivity.

- Promote small enterprises to stimulate the growth of employment. The analysis shows that the contribution of small firms to growth and productivity is hampered by existing market imperfections. This was evidenced in their relative success to cope with exchange rate devaluations compared to large and medium-size firms. Since these firms comprise the largest percentage, special attention should be directed to them in designing development strategies.

- Provide more investment incentives for emerging technologies and start-up enterprises, rather than for large, entrenched industries, as this would have a larger and more favorable impact on TFP growth.

- Adopt more market-oriented trade and investment policies. Particular attention should be given to those industries which have not enjoyed efficiency growth, including those in the chemical, non-metallic products, metal, engineering and other manufacturing sectors.

- Strengthen the on-going productivity improvements of private-manufacturing industries of Egypt, so that more sectors can achieve positive and higher technological growth rates. This could be effected through the adoption of

market-oriented practices that eliminate import licenses and bans, and the institution of private industry links with government sponsored R&D organizations.

- The private manufacturing sector should support efforts to build in-house R&D facilities to facilitate the adoption of foreign technology in the local economy. Simply importing the best and latest technology from abroad does not improve TFP growth.

- Since Egypt is a labor-abundant country, it should promote capital-saving technological growth to increase the efficiency of scarce capital. This process has already taken hold in the private investment sector, which enjoys the highest output per unit of capital.

- Technology that enhances labor productivity should be promoted in an effort to reverse the falling labor productivity of Egypt.

- Develop an action plan for software, home appliances and horticulture sectors that covers marketing, financial and other support institutions, technology, legal aspects, taxes, labor, machinery and equipment and infrastructure. This recommendation should be extended to other sectors and industries in the economy. The plan should be designed to strengthen the responsiveness of business owners and managers to changing market signals, provide support to specific weaknesses identified in particular sectors of the economy, and strengthen the capacity of government institutions to support business activity. To be effective, the action plan needs to be viewed as an integral part of the country's economic policy reform package.

Recommendations for the software industry center on the establishment of an inter-ministerial committee with the participation of the private sector to implement an industry strategy that reflects similarities and differences between the software industries of Egypt and India, as well as other countries. Help should be provided to individual companies to develop detailed marketing plans, including funding their participation in international trade shows in the Middle East region and the Far East; Moreover, the Government should (1) develop a long-term financial strategy to promote software industry, including e-commerce; (2) provide training to bank personnel on the importance of intangible assets of companies; (3) provide training to decision-makers in financial institutions on how to evaluate software project proposals; (4) provide continuous dialogue between the private sector and universities; (5) improve the technical capabilities of the enforcing agencies and conduct more raids for illegal software; (6) increase penalties for copyright infringement; and (7) implement a widespread media campaign to raise awareness of need to use licensed software. Involvement by government and private sector agencies in software and information technology promotion should be strengthened, including the updating of the IDSC Software Company Directory on a regular basis. Technical assistance, especially in marketing, and research on Indian and USA software industries with possible application to Egypt should be provided. Technology parks in India with possible application to Egypt should be investigated. A furthur reduction of taxes on key inputs should be considered, together with providing training to customs officials on assessment of CD ROMs and the removal of export

fees on CD ROMs. Finally, the Government needs to develop a more competitive telecommunication sector.

Recommendations for the household appliance industry focus on (1) establishing a market information system with reliable data on demographics and supply/demand balances in local and potential export markets; (2) conducting a detailed market demand study on the feasibility of exporting household appliances to COMESA markets, G15, and other markets; (3) undertaking a follow-up study on the feasibility of exporting home appliances to African markets under the COMESA Agreement; (4) encouraging ways to lower interest rates or offer low-cost loans through donor programs; (5) offering training to bank personnel, preferably abroad, to evaluate loan proposals; (6) introducing the concept of venture capital and risk management to the banking sector to expand exports; (7) offering workshops or seminars to improve management skills in optimizing production, improving marketing, and developing technology; (8) improving the court system so that disputes are settled within a reasonable timeframe; (9) removing the 1 percent export fee; (10) revising the labor code to enable dismissal of unproductive workers; and (11) reviewing the educational system to improve the technical base with hands-on experience .

For the horticulture industry, the recommendations emphasize privatizing air shipping operations, expanding cooling facilities, and shortening the time of loading and unloading. Moreover, there should be improvements in the collection and dissemination of production and yield data and the encouragement of associations to maintain information on inputs of high value-added products. Efforts should be made to short-cut land registration and permit procedures and to simplify the approval process for imported seeds. Special efforts should be made to include small and start-up companies in donor-assisted projects. The Government should continue to negotiate increased EU quotas, especially for promising products like strawberries. Additionally, the status of the tax code with special application to agriculture, such as income averaging, should be examined. Finally, training courses for managers through product associations should be promoted.

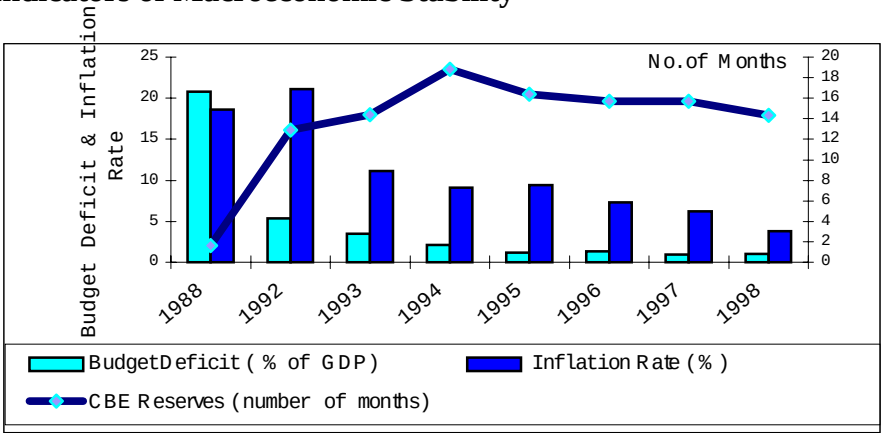
Despite clear gains obtained by the Egyptian economy and its citizens, from the real progress achieved so far by the Egyptian Government to meet the never-ending productivity and competitiveness challenge, including: stabilizing the economy, strengthening financial institutions, promoting increasingly outward-looking and internationally competitive business practices and streamlining regulations, some problems still persist, particularly those related to the external balance. Tariff and non-tariff barriers, foreign exchange issues and transaction costs require immediate remedies. The Egyptian Government in conjunction with the business community should design an action plan to promote growth and productivity in the Egyptian economy in general, and in the manufacturing sector in particular, with focus on promising activities. This includes the development of technology, innovation, skills, compatible mix and match, standardization, clusters and export channels, and support efforts to build in-house R&D facilities.

1 INTRODUCTION

The Egyptian economy showed significant indications of improvement after 1991 and on into 1998 in spite of the challenges facing the world economy since the Asian financial crisis of 1997 (see Figure 1.1). The policy measures adopted have prepared the economy for higher rates of economic growth and development.

A. Macroeconomic Stability

Figure 1.1
Indicators of Macroeconomic Stability



Sources: 1993/94-1997/98, Ministry of Economy (MEFT, 1999); other years, International Business and Technical Consultants, Inc. (IBTCI).

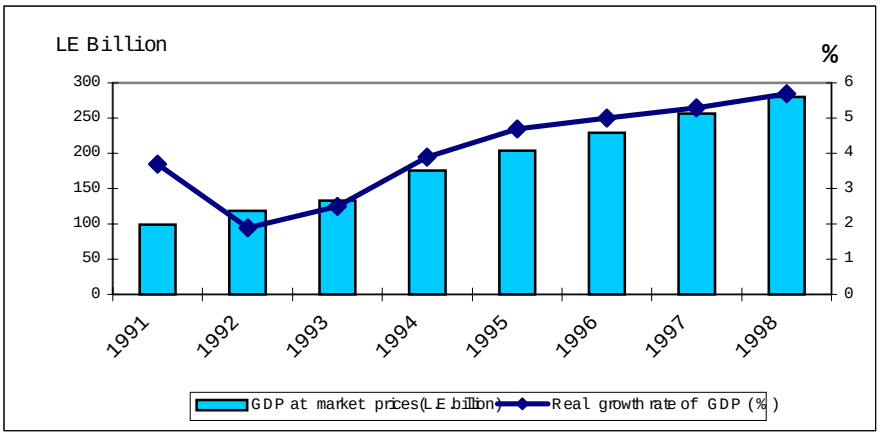
During the first and second phases of the Economic Reform and Structural Adjustment Program (ERSAP), the Egyptian economy succeeded in achieving an impressive degree of economic stability at the macro level. The budget deficit, which reached 21 percent of the gross domestic product (GDP) in 1988, has been steadily declining since 1991 and recently was reduced to one percent of GDP. Improving tax collection, introducing a new sales tax, limiting government subsidies to fewer products, as well as the progress in the privatization of state-owned enterprises, were vital elements in achieving this fiscal deficit reduction. This contractionary fiscal policy as well as the tight monetary policy adopted by the Government resulted in controlling aggregate demand and hence in curbing inflation. The inflation rate dropped from the double-digit level of 18.6 percent in the late 1980's to 4 percent in 1998. Another strong sign of economic stability is that the Central Bank of Egypt (CBE) was able to accumulate foreign reserves equaling US$20 billion by 1998, which provided an import coverage of 14 months. This coverage was in sharp contrast with the 2-month import coverage ten years earlier. The current reserve position represents a strong line of defense against unexpected crises, even though it has recently declined slightly. The foreign debt position also improved over the past decade. After reaching the alarming level of 209 percent of GDP in 1988, the foreign debt was reduced to 34 percent of GDP by 1998. The Government of Egypt's stabilization and structural adjustment program, implemented with the support of International Monetary Fund (IMF), the World Bank (WB) and other donors was the most important factor in obtaining agreement to reschedule and reduce foreign debt to this safer level.

According to the CBE, the level of government domestic debt was LE 136.7 billion in 1998, representing 47 percent of GDP. However, this figure represents only public debt of the central government. When considering government public debt in its broadest sense, including debt of the economic authorities, the public sector, and the central government, then the government debt was LE 187.8 billion, representing 68.1 percent of GDP, (Financial Organization Sector, General Directory of Specialized Banks, 1999).[1] This level of public debt could crowd out domestic investment by competing with private investors for the already low level of domestic savings (for details, see Klaus Dutsche, 1998).[2]

B. GDP and the Real Side of the Economy

GDP at market prices in 1997/98 was estimated at LE 280 billion, an increase of 5.7 percent over the previous year (see Figure 1.2). The Ministry of Economy and Foreign Trade expected the growth rate of GDP in 1998/99 to be 6.9 percent, nearly equal to the Government's medium-term target growth rate of 7 percent. This target appears to be achievable, especially in view of the gradual and steady increase in the growth rate since 1991/92.

Figure 1.2
GDP and its Annual Growth Rates



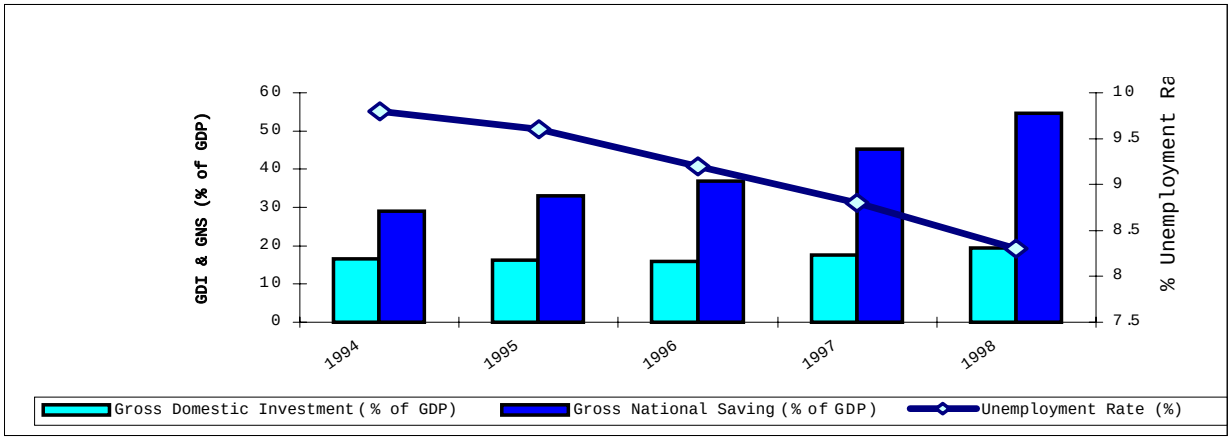
Sources: For 1993/94-1997/98, Ministry of Economy (MEFT, 1999); for other years, International Business and Technical Consultants, Inc. (IBTCI).

For this growth to be sustainable, gross domestic investment must rise above its current level of 19.5 percent of GDP (see Figure 1.3). The private sector should be more active in investment and in the creation of new jobs.

[1] The European Union Mastrkhet agreement set the regulations governing EU fiscal policies. The agreement set a limit for public debt of 60 per cent of GDP.

[2] The Government raised the interest rate on saving time deposits in its banks by 0.5 percent in order to boost the domestic savings ratio to 25 percent; this savings ratio, in turn, is expected to achieve the targeted 7 percent growth rate for GDP (Al Ahram, 1999).

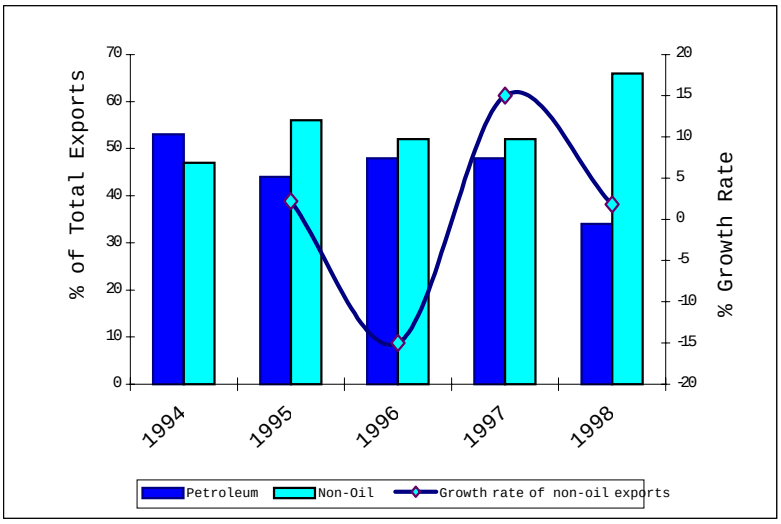
Figure 1.3
Savings, Investment and Unemployment Rates



N.B. GDI: Gross Domestic Investment, GNS: Gross National Saving
Source: MOE (1999).

C. The External Sector

Figure 1.4
Composition of Total Export and Non-Oil Export Growth Rate



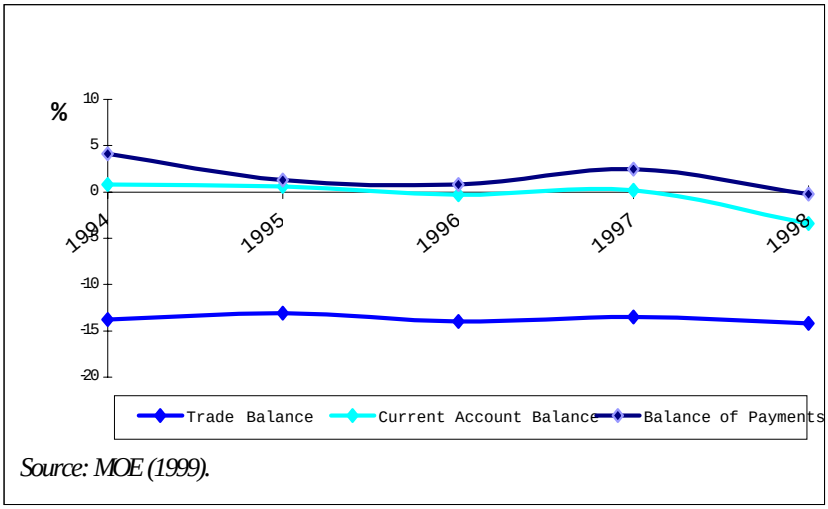
Source: MOE (1999).

The Egyptian economy was reasonably able to face the challenge of the drop in oil prices by continuing to diversify its exports. Over the past five years there was a moderate growth in non-oil exports in real terms, which peaked in 1997 at 15 percent but slowed down to 1.8 percent in 1998 (see Figure 1.4). As a result, oil exports recently declined to about one-third of the country's total exports, compared with about one-half during the previous ten years.

The trade balance however, continues to be in deficit. Despite an invisible trade surplus (services), there was a deficit of 3.4 percent of GDP in 1997/98. The overall balance of payments also showed a deficit in 1997/98 after many years of surplus (see Figure 1.5). This resulted in a loss of CBE reserves in 1999.[3]

[3] Foreign reserves stood at US$18.9 billion in March 1999, down from US$19.3 billion one month earlier and US$20.1 billion in March 1998 (see Egyptian Gazette, Aug. 31,1999).

Figure 1.5
Balance of Payments (percent of GDP)



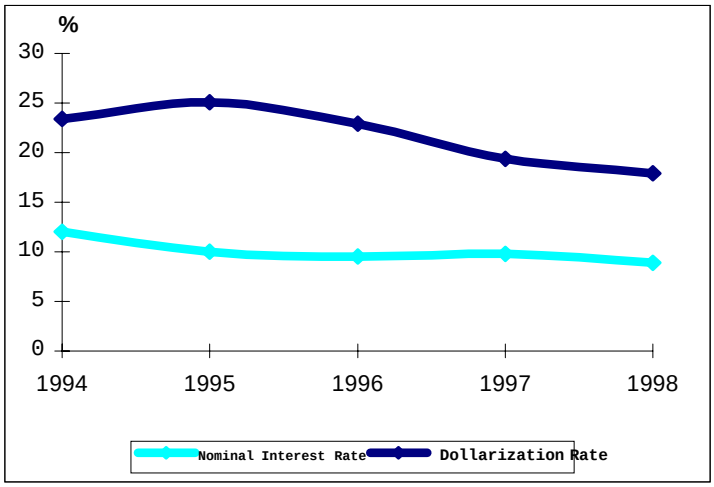
Source: MOE (1999).

The government reaction to this included the recent announcement that companies working in the fields of export or export marketing will be exempted from all of several types of taxes, including corporate income taxes.[4]

D. Financial Side of the Economy

Financial liberalization, which was adopted at the onset of the economic reform program, has presented many challenges to the Government. Monetary authorities, however, seem to have gained the trust of the public and hence the dollarization rate (foreign currency deposits/total liquidity) has been declining after years of rising prior to the economic reform (see Figure 1.6). The exchange rate has been unified and freed but anchored to the dollar since 1991. Stability of the exchange rate has helped to curb inflation.

Figure 1.6
Dollarization and Interest Rates, 1994-98



Source: MEFT, (1999).

The Asian crisis has had some impact on the Egyptian economy. The importers' rush towards Asian markets created pressure on the exchange rate, and, with the slowdown of export receipts from oil and tourism, the Government reacted by adopting policies aimed at reducing non-capital commodity imports. Also, the Ministry of Trade and Supply (MOTS) issued Decree 580/1998 that prevents importing automobiles produced prior to the year of importation.

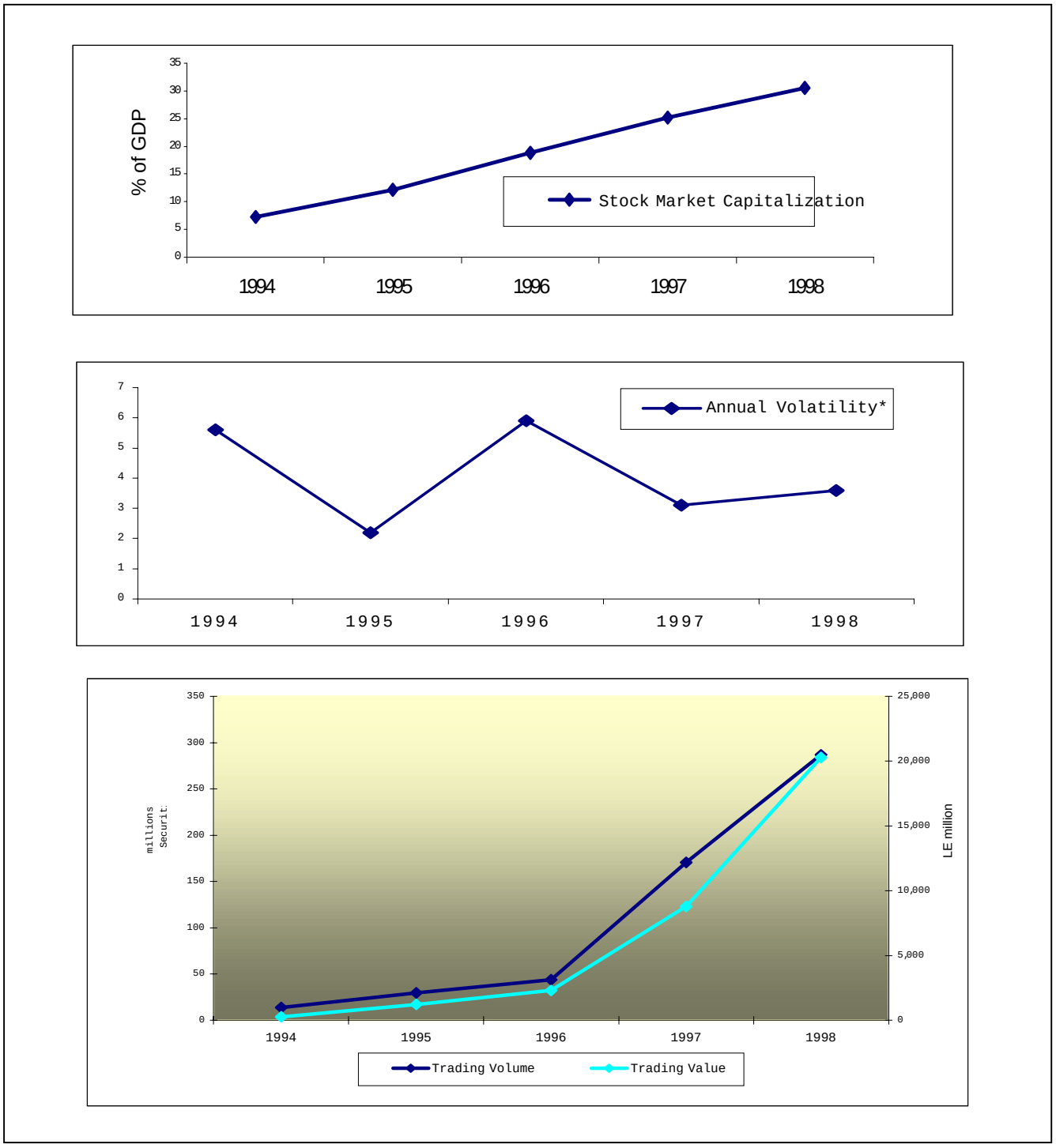
[4] Stated by the Prime Minister in the Export Ministerial Group meeting in August 1999 (Al Ahram, 1999).

The emerging capital market has grown rapidly since 1996, partly as a result of the privatization of many public enterprises began through the stock market. According to IBTCI (1998), factors such as high capital gains, new investment tools, and new issues of government-owned enterprise stocks contributed to a rapid rise in stock market prices. After February 1997, prices began to stabilize and the stock market began to correct itself. The result was a decrease in the price of many of the newly privatized company stocks. By end-1998, the share prices of 65 percent, or 22 of the 34 companies privatized, had fallen below their initial flotation prices. This situation is unlikely to improve in the near future given the poor financial performance of large, frequently traded companies, the lack of a significant increase in international investors, and concerns about the financial performance of traded companies. Nonetheless, as a percentage of GDP, stock market capitalization increased from 7.2 percent to 30.5 percent over the past five years. The number of securities being exchanged in the market increased dramatically from 13 to 286 million, and their value rose from LE 0.2 to 20 billion over the past five years (see Figure 1.7).

E. The Key Role of the Private Sector

The Egyptian economic performance is impressive in terms of achieving the macroeconomic stability required for higher growth rates in the near future. Specifically most macro indicators suggest that the medium-run target of 7% growth rate is achievable. For this growth to be sustainable the gross domestic investment must rise well above its current level, and most of it must come from the private sector. Although exports have been diversifying, overall export performance has been disappointing, especially in the face of increasing imports. Again the private sector has to be encouraged, through price incentives and regulatory reform, to expand exports. In both respects, obtaining higher rates of investment and increasing the propensity to export, the private sector is essential to the achievement of Egypt's economic growth and employment goals.

Figure 1.7
Capital Market Indicators



- *Volatility = Standard deviation of monthly returns during the year*
- *Source: MOEFT (1999).*

F. Private Sector Contribution to Egypt's Productivity and Growth

This study assesses the role of Egypt's private sector in enhancing Egypt's productive capacity both on the macro and sectoral levels, with particular emphasis on manufacturing activities. It emphasizes the role of the private sector in improving the allocation of resources, thereby expanding employment opportunities, raising living standards, bolstering exports, improving efficiency and productivity, and disseminating technology. The study examines private sector by its legal entities-- formal, informal, and private investment (See Appendix 2 for definitions of these legal entities), and it explores financial, legal and institutional constraints on private sector productivity and competitiveness, particularly as they relate to promising sectors of the economy. It also explores the role of the Government in fostering an improved business environment and supporting the private sector through its economic policies and development programs.

The study adopts an integrated approach for assessing the performance of the private sector and its contribution to growth and productivity including descriptive, analytical, quantitative and empirical analysis. The approach includes statistical and economic analyses, estimation of total factor productivity as it relates to technical, allocative and cost efficiency, and surveys of promising activities in the software, home appliances and horticulture sectors.

The study covers a nine-year period 1987/88-1995/96, the latest year for which data are available for the private sector manufacturing. Macroeconomic data, however, extends to 1997/98. The major sources of information were the Central Agency for Public Mobilization and Statistics (CAPMAS), the Central Bank of Egypt, and the Capital Market Authority.

The study is organized as follows:

- Chapter 1 provides an overview of the performance of the Egyptian economy as it relates to macroeconomic stability, the real sectors of the economy, the external sector and the financial sector.

- Chapter 2 investigates the role of the private and public business sectors in enhancing Egypt's economy, particularly as it relates to the contribution to sectoral and overall employment, income generation, and economic growth.

- Chapter 3 examines the Egyptian Government's strategy to foster and nurture the emergence of private sector led economic development. It examines the wide spectrum of tools used by the Government for privatization and the legal, regulatory, and institutional environment to boost the investment climate.

- Chapter 4 analyzes the contribution of private sector manufacturing to growth and productivity. It examines supply sources of growth including economies of scale, human resources, capital and imported technology. It also analyzes the effect of the scale of operations on the rate of private sector adjustment to government policies. Demand sources of growth in Egyptian manufacturing activity are examined through domestic and

export competitiveness indices (including growth, diversification and market share indices), and the impacts of technology are derived from input/output analysis, particularly through the effects of capital imports and linkages with foreign firms.

- Chapter 5 provides productivity estimates for Egypt's private manufacturing sector based on parametric and non-parametric methods. It applies complementary methodologies to analyze the growth of total factor productivity and its decomposition into efficiency and technical changes for Egypt's private manufacturing sector. It highlights the important role that TFP growth plays in the economic development process, reviews trends in aggregate private manufacturing output, and identifies the contribution of inputs to total factor productivity (TFP) growth. TFP growth is decomposed into three sources of growth: technical change, allocative efficiency change and technical efficiency change. The determinants of TFP growth are analyzed and impediments and potential remedies to TFP growth are reviewed.

- Chapter 6 presents profiles of the productivity and competitiveness of three industries: software, household appliance and horticulture. These industries have high export potential and use of technology. This chapter provides a synopsis of information gathered in firm-level interviews focusing on labor, machinery and equipment, technology, institutional factors (infrastructure, tax administration, support organizations, legal framework, and financial services) and firm strategies and marketing.

- Chapter 7 considers Egypt's prospects for higher sustained productivity and growth, based on the findings and conclusions presented in the preceding chapters. It also offers recommendations to accelerate Egypt's transition to a private sector led economy with high growth and productivity.

References

Al Ahram, 1999, 31 August 1999, page 1.

Financial Organization Sector, General Directory of Specialized Banks, Ministry of Economy and Foreign Trade, 1999.

International Business and Technical Consultants, Inc. (IBTCI), *Quarterly Review for USAID Privatization Project, Evaluation Services Contract*, various issues, reports submitted to US Agency for International Development by IBTCI.

Klaus Dutsche *et al.*, 1998, Deutsche Bank Research.

Ministry of Economy (MOE, 1999), *Monthly Economic Digest*, July 1999.

2 THE ROLE OF THE PRIVATE SECTOR IN ENHANCING EGYPT'S ECONOMY

A. Introduction

The private sector was already an important force in the Egyptian economy before the start of the recent economic reform program in 1991. However, the current government policy has emphasized the private sector as the leading force for economic growth and development. This policy has encouraged private business development, although it is generally recognized that there remains a great deal more work to be done to enhance the ability of the private sector to lead the economy towards higher rates of growth and development.

This chapter examines the current and potential sources for high productivity in the private sector. It begins with a general look at the contribution of that sector relative to both the public sector and the whole economy. It then analyzes the various economic activities of private businesses to determine the areas where they have potential productive capabilities. Finally, we narrow the focus on the private industrial sector since the core of any development strategy, especially one based on an export-led development strategy, is highly dependent on the performance of this sector.

B. Overview of the Private Sector

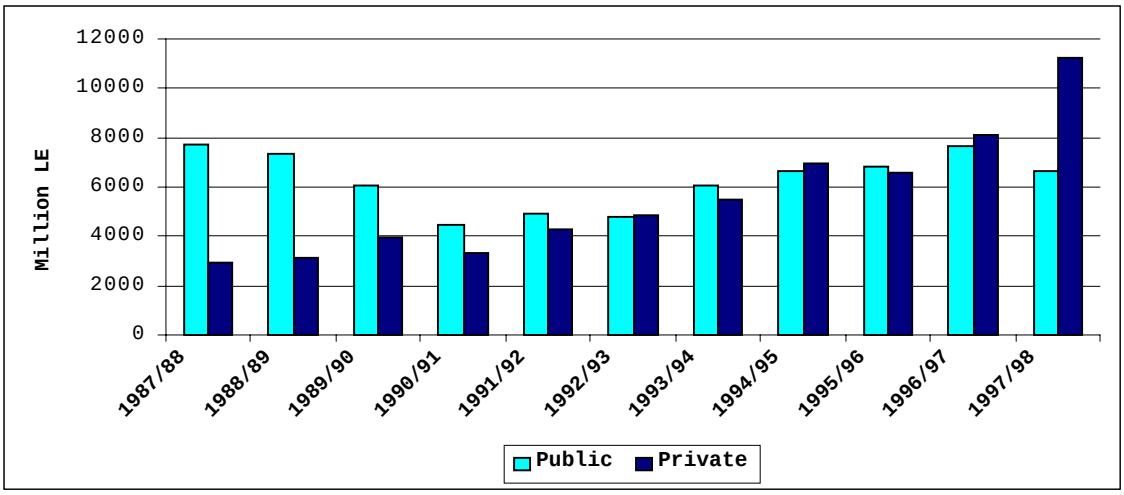
Both the level of investment and the relative share in gross domestic investment of the private sector have expanded greatly over the last few years. Private investment increased from 28 percent of gross domestic investment (GDI) in 1987 [1] to 63 percent of GDI in 1997, representing an average annual real growth rate of 27.9 percent. This compares with 7 percent for total investment.

The contribution of the private sector to gross domestic product (GDP) has increased to 70 percent (see Figure 2.2). Privatization of state owned enterprises has been responsible for part of this trend, as output has shifted from the public sector to the private sector. The change in the business environment, however, has been more important. On one hand, the privatization program has not been completed, so that the market value of privatized companies represents only about 7 percent of GDP, while the market value of the initial privatization portfolio represents about 35 percent. On the other, private sector production has grown twice as fast as that of the public sector. During 1991-96 the growth of public sector output averaged 2.6 percent a year compared with 4.9 percent for private sector output. In 1998 public sector output grew by 1.9 percent, while private sector output grew by 7.6 percent. When the annual growth rates of the private sector's output are weighted by their relative shares in GDP, the contribution to GDP growth

[1] All years in the report refer to fiscal years; e.g. 1988 is the fiscal year ending June 30 1988.

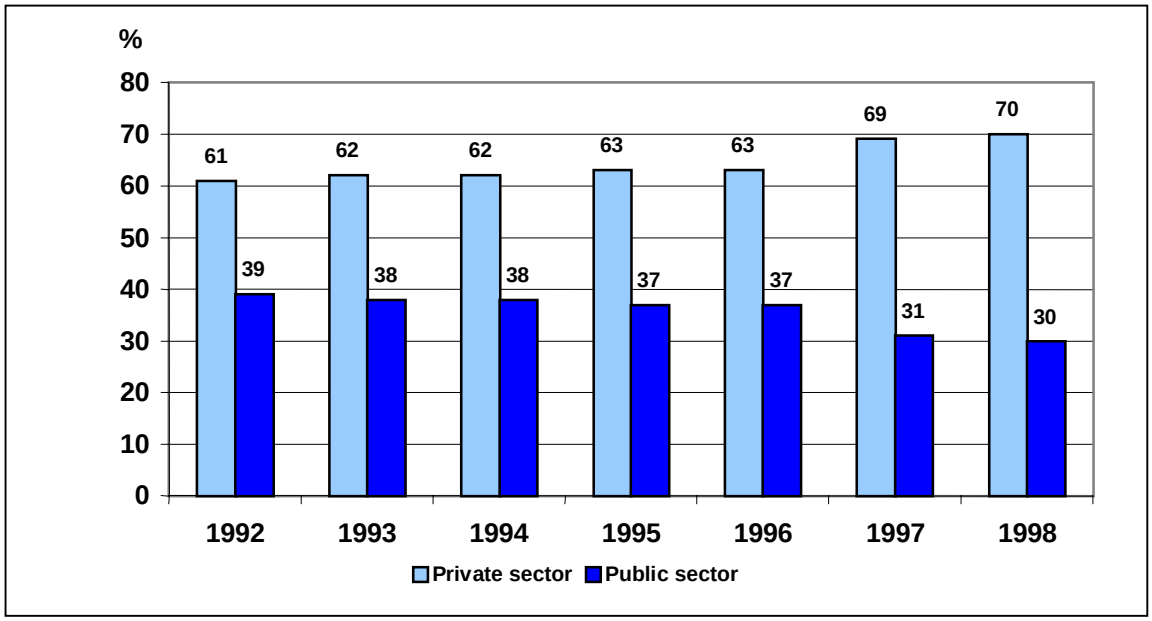
increased from 2.1 percent in 1993 to 5.3 percent in 1998. The performance of the private sector since the beginning of the 1990's is therefore impressive.

Figure 2.1
Implemented Investment in Public and Private Sectors at Constant 1987/88 Prices



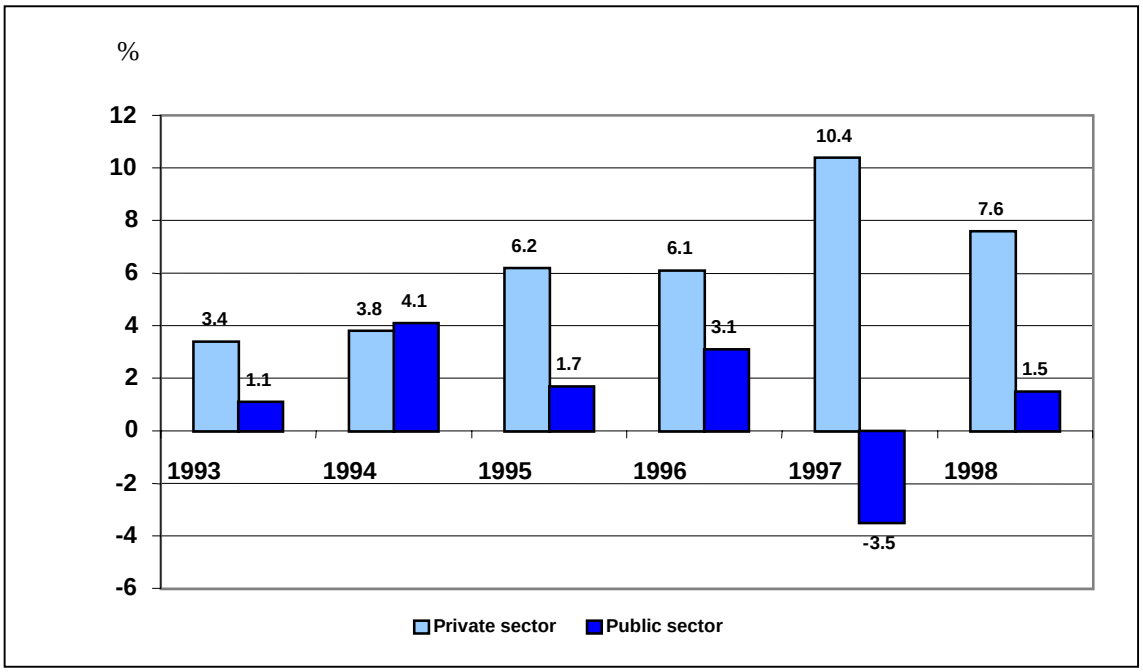
Source: Ministry of Planning in Central Bank of Egypt, Annual reports, various issues.
N.B. Starting from 1992/93, public sector investment includes government, administration, municipalities, and social and economic authorities. Also starting from the same year, private sector includes public business and its companies subject to law 203 of 1991 and other private and cooperative sector.

Figure 2.2
Relative Share in GDP at Factor Cost



Source: Same as Figure 2.1

Figure 2.3
Growth Rate of Real GDP at Factor Cost



Source: Central Bank of Egypt, Annual Reports, various issues

Within the private sector as a whole, the contribution of the private sector to total manufacturing output is low, but gradually increasing (see Figure 2.5). The industrial sector as a whole, which includes manufacturing as well as mining and quarrying (including oil extraction), still represents a much lower percentage of total private output than does agriculture. Services, whether social or productive, represent little more than half of total private output. Given the limited capacity to expand domestic demand for industrial goods in low per capita income countries such as Egypt, the need to reorient industrial production towards the export sector is strong.

C. Private Sector Activities[2]

The private sector is classified into three sub-sectors: the formal sector (PrF), the informal sector, and the investment sector (PrI). Private formal sector firms are private corporations established under Law 159/1981. They are obliged to maintain organized bookkeeping and regularly report to the Central Agency for Auditing. The private investment sector firms are established and organized under Investment Law 230/1989 for regulating the investment of local, Arabic and foreign capital, as well as regulating the free zones. This law (which is an amendment to the Investment Law 43/1974) contains several fiscal and other incentives for the purpose of encouraging investment. The private informal sector contains small and medium size firms, which do not usually have organized bookkeeping records. The public sector is composed of the public business

[2] The present section uses data from CAPMAS, National Economic Statistics.

sector (PuB), which contains the state-owned companies that are being prepared for privatization (organized by Law 203/1991), and other public sector firms (Pu) (organized by Law 97/1983). Data on the private informal sector are available at the industry level, rather than national level (see the Appendix of this chapter). Most of the analysis in this section will be limited to the private formal, private investment, and public business sectors. (Pre1991 data on public business sector (PuB) activities are included in public sector (Pu) data.)

Figure 2.4
Private Sector Contribution to Growth of GDP

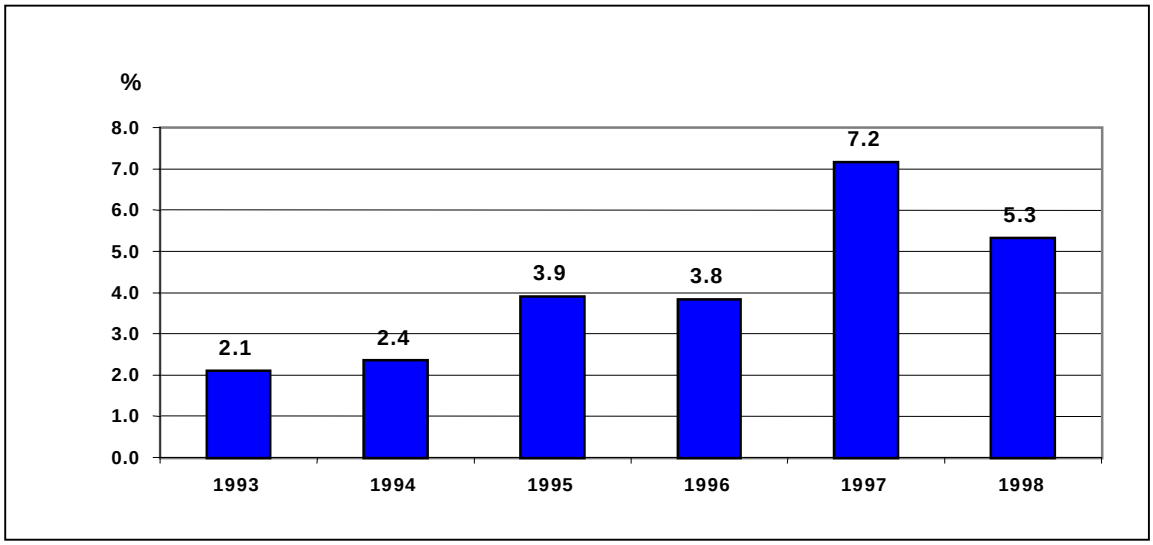
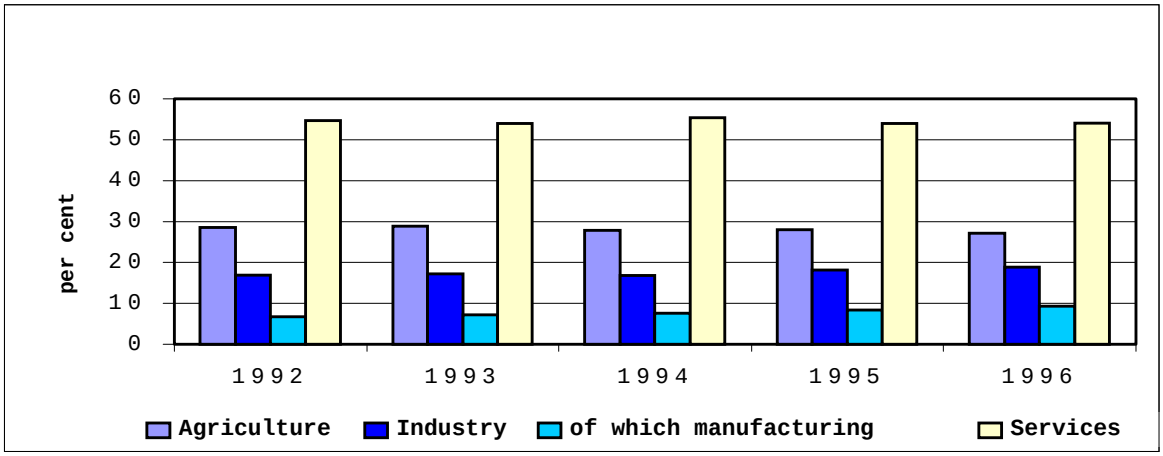


Figure 2.5
Relative Sector Shares of Private Sector in GDP



Source: Central Bank of Egypt, Annual Reports, various issues

The recently enacted Investment Law no. 8 was issued in May 1997 and replaced Law 230 of 1989. The new law covers almost all-economic activities in the commodity production sectors, productive services and infrastructure. It provides new investment projects with an exemption from the corporate income tax for five years. This tax exemption period is extended to 10 years for new projects established in the new industrial zones and to 20 years if projects are established outside the old Nile Valley (desert land reclamation and projects in the New Valley). The Law also treats both national and foreign projects equally in terms of incentives and guarantees. It does not rule out any advantage enjoyed by projects established under the previous investment laws. In general, the new Investment Law (8/1997) is considered more generous than similar laws in many other emerging economies such as Mexico, Malaysia, Indonesia, and even South Korea (for more details see Appendix A of chapter 6).

Data on foreign merchandise trade underscore the private sector's limited export-related activities. In 1998 the private sector contributed twice as much as the public sector to the overall trade deficit. The private sector accounted for two-thirds of the trade deficit (of which 56 percent was from the formal sector and 10 percent from the investment sector). The contribution was even greater in 1997 when the private formal and investment sectors created 90 percent of the trade deficit. It is noteworthy, however, that between 1994 and 1998 the contribution of the private sector to the trade deficit decreased from 85 to 66 percent. In recent years the value of the private sector's imports has been about twice has large as that of the public sector, while the public sector's value of exports has been twice as large as that of the private sector. Figures 2.6 A, B, and C summarize these trends over the past five years. It could be argued that this trend is the result of the private sector's faster growth. But this trend should have produced a larger export market share. In fact, as will be discussed later in this chapter, a good deal of the private output is in non-tradable such as construction, building, and real estate.

Figure 2.6A
Public and Private Shares of Trade Deficit
.

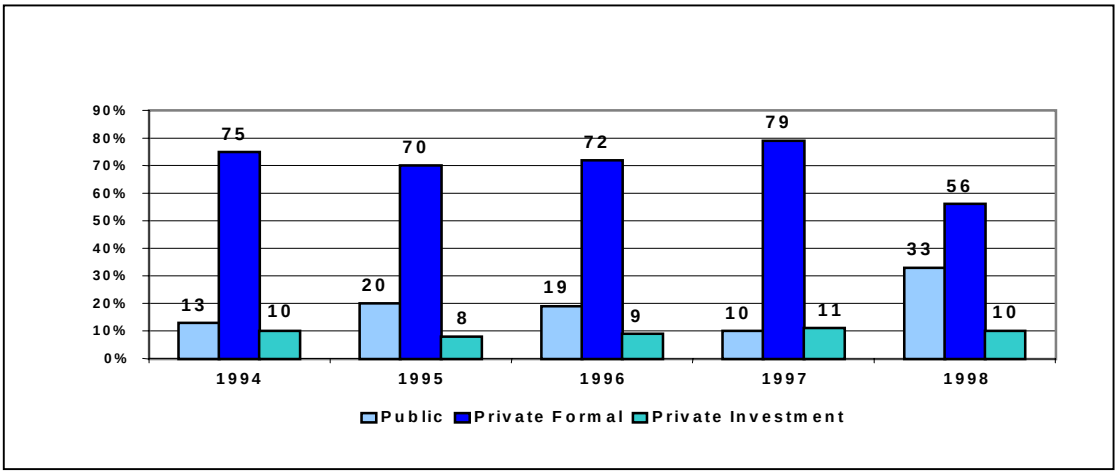
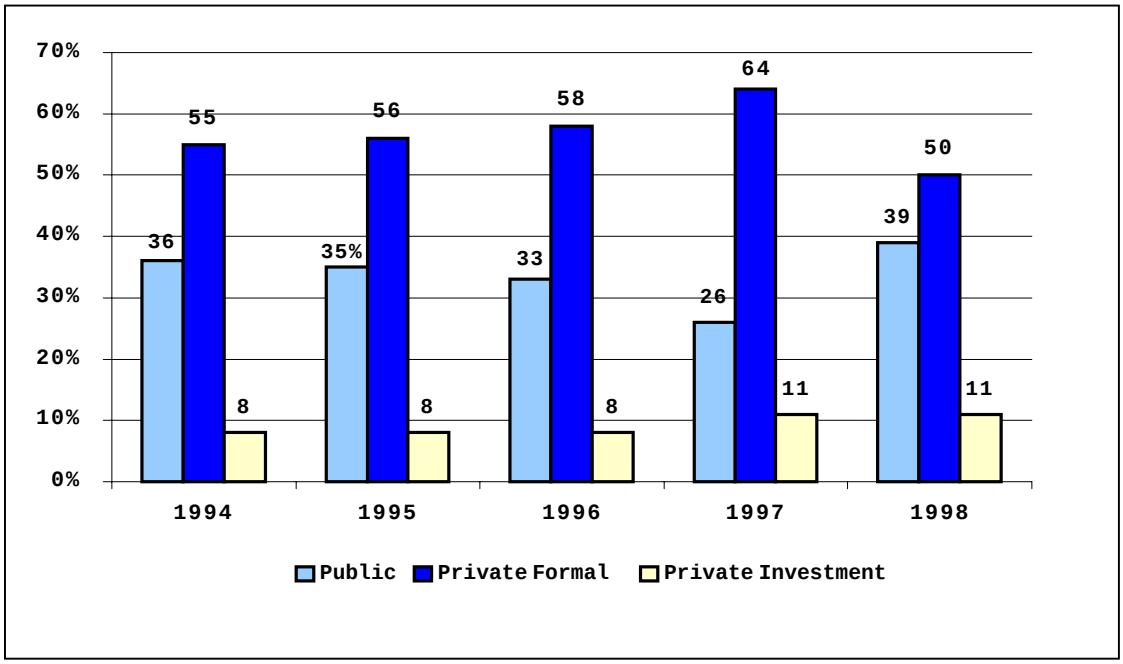
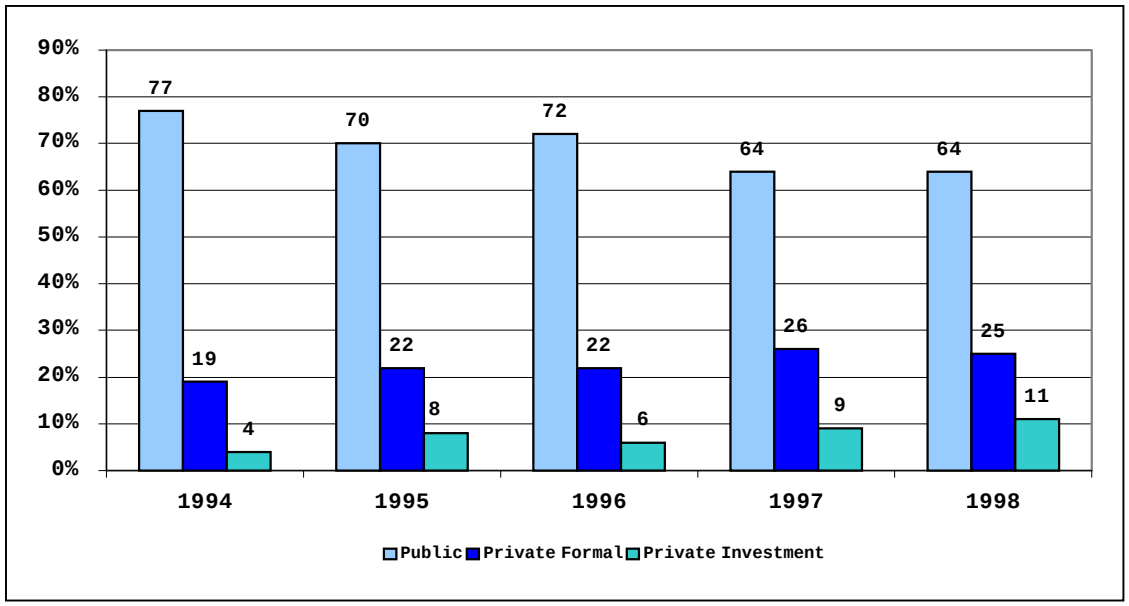


Figure 2.6B
Public and Private Shares of Imports



Source: CAPMAS Trade Statistics, computer printout provided to DEPRA

Figure 2.6C
Public and Private Shares of Exports



Source: CAPMAS Trade Statistics, computer printout provided to DEPRA

Several indicators will be used to measure the contribution of each sector to Egypt's productivity (see table 2.1). The period covered in this table has been sub-divided into two parts: that before the start of the economic reform (1987-1990) and that after the reform (1991-1996). Each indicator is measured over the two periods. The percentage change in each indicator is a comparison between the average values of the second period relative to the first period.

Table 2.1
Productivity Indicators for Private and Public Sectors (constant 1987 prices)

	Private Formal		Private Investment		Public		Public business*	
	87-90	91-96	87-90	91-96	87-90	91-96	87-90	91-96
VA / L	11127	9072	9655	6187	4221	3951		3072
Change (%)		- 18		- 36		- 6		- 27
IOCR** :	-.5	.4	-.02	.19	-.02	-.19		
		NA		NA		-850		
VA / W	2.35	2.52	2.46	2.93	1.64	1.73		1.70
Change (%)		8		19		5		4
S / VA	0.42	0.35	0.00	0.20	0.06	0.02		- 0.08
Change (%)		- 17		NA		- 66		

VA = real value added or the total product at factor cost, deflated by the whole sale price index for the relevant activities.
L = labor employment. W = real total wages, deflated by consumer price Index. S = savings defined as the difference between turn over period of revenues and expenditures
**The Public Business Sector was established in 1991 under Law 203/1991. The percentage change is calculated for the second period compared with values of public sector (includes PuB) in the first period.*
*** IOCR: Incremental output to capital ratio. Real gross fixed capital formation (RGFCF) was used for capital investment.*
IOCR= VAt-VAt-1/GFCFt-1
Source: Calculated from National Economic Statistics, CAPMAS.

In this subsection (C) only non-oil economic activities are analyzed among the four sectors: the private formal (PrF), the private investment (PrI), the public business (PuB) and the public (Pu) sectors[i3]

The first indicator, labor productivity, measures the average output of labor (VA/L). The private formal sector (PrF) has the highest labor productivity in both periods. However, the value of this indicator for all four sectors has decreased between the two periods. The

[3] The 'mining and quarrying' value added (oil extraction and products) represented 74 percent of the total value added of the PrF sector in 1986. The share fell to 39 percent in 1996. In contrast, we find that in 1996, the shares of mining and quarrying value added were 0.15 percent, 1.2 percent, and 13.5 percent of the total value added in PrI, PuB and Pu sectors, respectively. Thus most of the oil companies are classified as private formal sectors firms. This industry is excluded from subsection C to focus the analysis on non-oil industries.

PrI sector experienced the largest decline in labor productivity (-36 percent) followed by the PuB sector (-27 percent), the PrF sector (-18 percent) and the Pu sector (-6 percent).[4] The PuB sector had the lowest labor productivity; it contains the majority of the state-owned companies that are in the process of being privatized. Although worker redundancy and its consequent low labor productivity are among the strongest motivations for the privatization program, it has been argued that higher labor productivity is not necessarily a good indicator of efficient resource use since it may hide uneconomic capital-intensive (labor-saving) technology. The sectors with low labor productivity may be more beneficial for the labor-abundant Egyptian economy in terms of the number of jobs they provide per unit of investment. This argument may not be appropriate, however, with respect to the PuB sector (being privatized due to its inefficiency). The average product of labor must be viewed as a first approximation for measuring productivity.

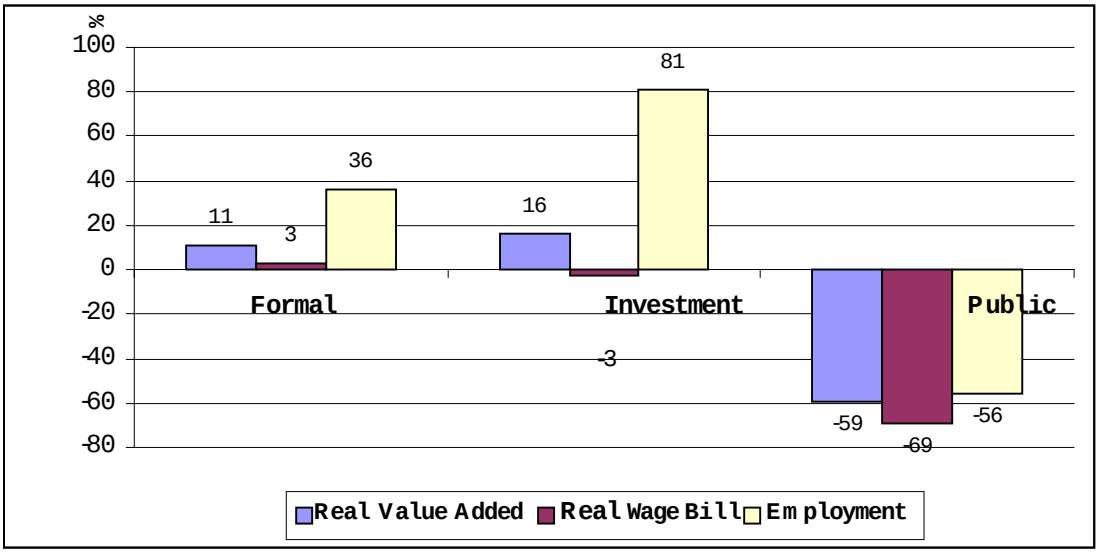
Incremental Output to Capital Ratio (IOCR) can be viewed as a measure of the productivity of capital, a scarce resource in Egypt. Table 2.1 shows that IOCR recorded negative figures during the pre-reform period (87/88-90/91) for all PrF, PrI and Pu. In the post reform era, the PrF had the highest productivity. The average figure was .4, i.e., one additional unit of capital generates .4 unit of output, implying an incremental capital to output ratio (ICOR) of 2.5. Capital productivity increased by 180 per cent between the pre-reform and the post reform period. In PrI, IOCR was .19 in the post reform period, i.e., one unit of capital generates .19 unit of output, implying an ICOR of 5.26. Although ICOR in PrI is much higher than that of PrF, productivity growth appears huge between the two periods, rising from a negative figure to the positive value just mentioned. The investment sector is a more modern and new sector compared to the PrF, which requires comparatively high capital expenditures in their early phases of production.

The third indicator of productivity is the ratio of value added to total wage (VA/W) this indicator is complementary to the first one. It is interpreted as the average productivity per L.E. spent on labor. The value of this indicator has increased in the PrI sector between the two periods (pre and post economic reform), and it remained higher compared with other sectors. For all sectors in general, however, the average productivity of money spent on labor has increased. It is worth noting that, while VA/L has decreased in all sectors, the VA/W ratio has increased in all of sectors. This suggests that employment has increased faster than total real wages, indicating that nominal wages failed to keep up with the relatively high rates of inflation between these two periods. This contrast was especially noteworthy in the PrI sector where employment increased between the two periods by 81 percent, while the total real wage bill decreased by 3 percent. In the PrF sector employment increased by 36 percent, while the total real wage bill increased only by 3 percent. By way of comparison, the public sector's employment

[4] This decline can be attributed to more labor intensive (and capital-saving) new investments and utilization of existing capacity (a good thing in an economy with less than full employment) or to more redundant workers hired in "make-work" efforts to reduce unemployment and its resulting poverty (a bad thing economically, although sometimes necessary from political standpoint).

fell by 56 percent and the real wage bill fell by 61 percent. The real value added (total product at factor costs), on the other hand, has increased by 11 percent and 16 percent between the two periods in the PrF and PrI sectors, respectively (see Figure 2.7). Distortions in factor markets prevent real wages from paralleling the growth of the private sector's real value added. This phenomenon is more evident in the investment sector. Although the private sector has generally been able to expand employment, it was not able to offset the decline in the public sector's employment, so overall employment declined by 43 percent. But in all sectors the total real wage bill either decreased or increased only moderately.

Figure 2.7
Changes in Output, Wage Bill and Employment
Percentage Between 1987-1990 and 1991-1996



Source: CAPMAS, National Economic Statistics

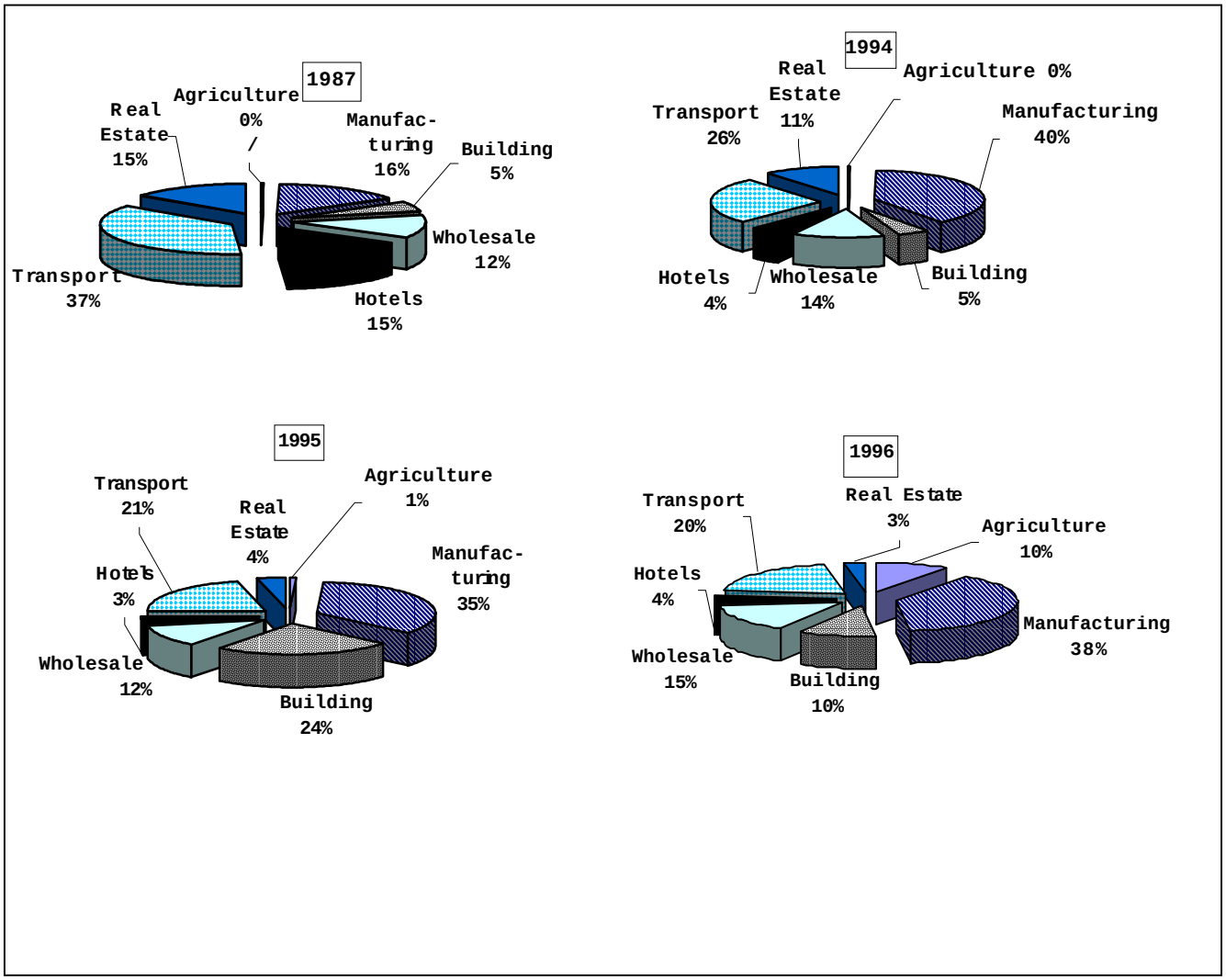
The fourth indicator is the ratio of savings to value added (S/VA).[5] Savings by firms are considered a sign of past healthy growth and also a sign of future or potential growth. The PrF sector has a much higher value of this indicator (around 40 percent in the two periods) compared to that of the other sectors. The PrI sector experienced a negligible value in the first period, rising to 20 percent in the second period. As a result, there was an improvement in the potential growth of the PrI sector. It was the only sector that increased its S/VA between the two periods covered in this study.

Data on the relative participation of the private sector in different economic activities (excluding oil) shows that the share of manufacturing in total output of both PrF and PrI has been rising. However, the PrI appears to be more oriented toward manufacturing than the PrF sector. Within the PrI sector, the share of manufacturing to total output ranged

[5] *VA = real value added or the total product at factor cost, deflated by the whole sale price index for the relevant activities.*
S = savings defined as the difference between turn over period of revenues and expenditures

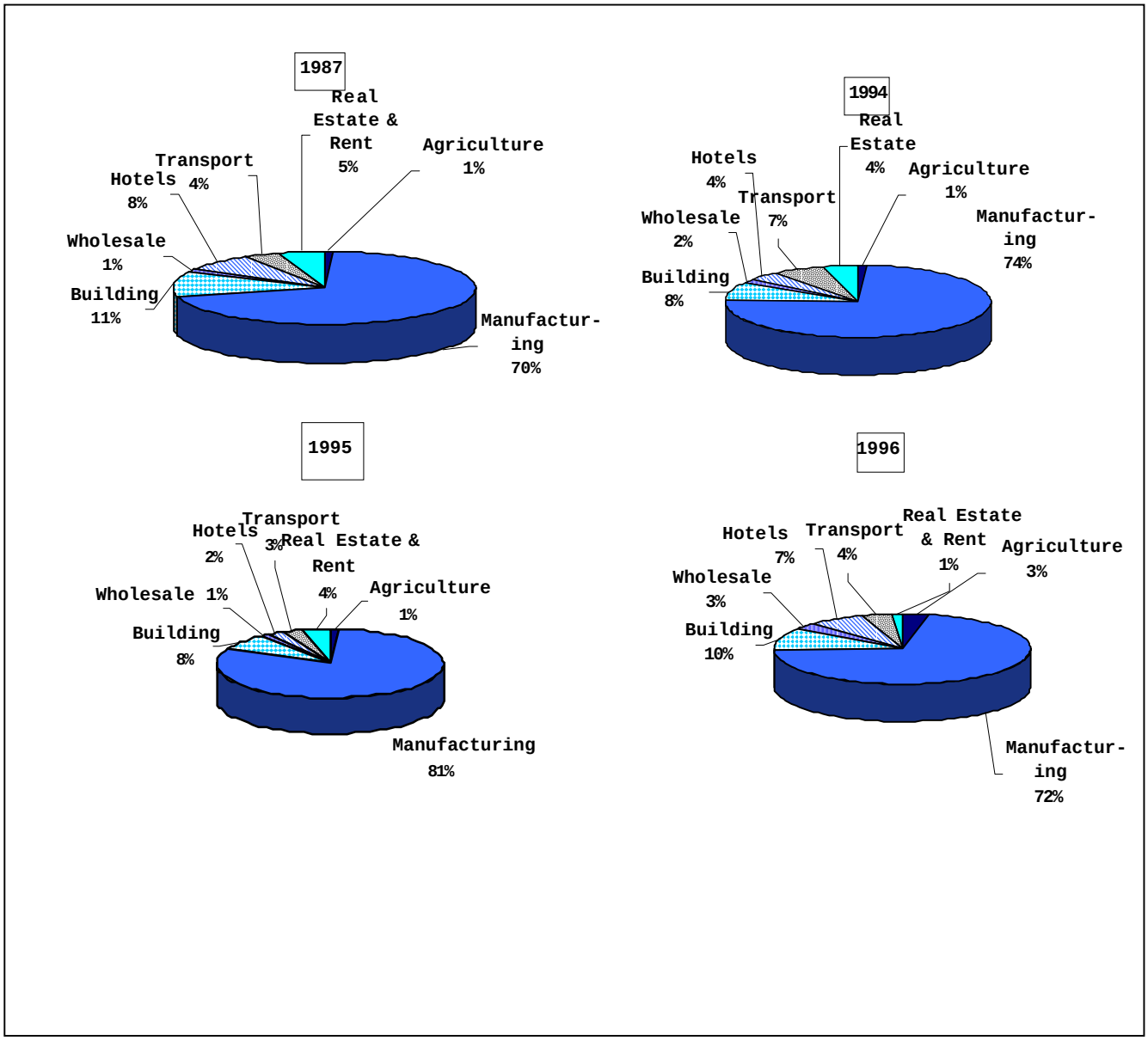
from 70 percent to 81 percent, while in the PrF it ranged from 16 percent to 40 percent (see figures 2.8 and 2.9). The construction and building industry is becoming increasingly dynamic in terms of attracting private businesses, whether in the PrF or the PrI sector. After that, trade (wholesale and retail) is the most attractive activity for the formal sector firms. These activities, especially construction and building, do not add to merchandise exports while they do add to the demand for imports. This pattern partially explains why the higher growth of the private sector has been matched by a higher contribution to the trade deficit, relative to that of the public sector (Figure 2.6).

Figure 2.8
Relative shares in Total Product of Private Formal Sector



Source: CAPMAS, National Economic Statistics.

Figure 2.9
Relative Shares in Total Product of Private Investment Sector



Source: National Economic Statistics.

In examining activities where the private sector has significant potential we use the three indicators (labor productivity VA/L, value added per unit of wages VA/W, and change in value added per unit of new capital IOCR). Each indicator is calculated as an average over the two periods 1987-1990 (pre-economic reform) and 1991-1996 (post-economic reform). The values of the indicators in the first period were normalized to 100 and the corresponding values for the second period were calculated according to the changes that occurred between the two periods. We also calculated the average of the three indices for each activity of the private formal (PrF), the private investment (PrI), and the public (Pu) sectors. The average value of these indices for

each activity provides a rough indication of changes in that activity's productivity between the first and the second periods.

Table 2.2
Average Index of Productivity Indicators for the period 1991-1996 (1987-1990=100)

Sectors	Private Formal	Private Investment	Public
Agriculture, Forestry & Hunting	3218	-783	151
Manufacturing	182	256	-38
Building & Construction	214	1113	81
Wholesale & Retail Trade	80	120	-73
Hotels & Restaurants	43	9038	30
Transport, Storage, Communication	60	110	-11
Real Estate & Rent	82	-297	989
Social & Other Personal Services	42	56	18
Average of all sectors	123	417	289

The negative value is due to the negative value added in that sector
Source: Calculation from CSPMAS, National Economic Statistics.

Table 2.2 shows that PrI sector has the highest overall index (417) and thus its value increased by 317 percent between the two periods. The Pu sector's overall index increased by 189 percent, which is primarily driven by a significant rise in the index of real estates and rent, with clear deterioration in all other activities, compared to those of the private sectors. The PrF sector overall index increased by 23 per cent, spurred on by huge productivity gain in agriculture, forestry and hunting and smaller, though still significant, gains in building and construction and manufacturing, while productivity in all the other activities appears to have declined. This suggests that the PrI sector has been the most dynamic sector in terms of increased productivity.

The three more dynamic PrI activities are:

1. Hotels & Restaurants (9038)
2. Building & Construction (1113)
3. Manufacturing (256)

The more dynamic PrF activities are:

1. Agriculture, Forestry & Hunting (3218)
2. Building & Construction (214)
3. Manufacturing (182)

The only two dynamic sectors in Pu are:

1. Real Estate & rent (989)
2. Agriculture, Forestry & Hunting (151).

In the PrF sector, productivity increased faster in commodity production activities (agriculture, manufacturing, building & construction) than in service activities (hotels, real estate). In the PrI sector productivity increased in both commodity and productive services, except for real estate, social and other personal services.

The relative change in productivity is based on a ranking system for each indicator. The rankings depend on the ratios of the values of the indicator (e.g. VA/L) in the economic activities to that of the average value for all activities. Average values of the three ratios in each activity are used (see Table 2.3).

Table 2.3
Current Status of Productivity Indicators by Sector and Economic Activity (average for 1991-1996)

Sectors	Private Formal	Private Investment	Public
Agriculture, Forestry & Hunting	26.2	-1.9	0.52
Manufacturing	1.5	0.6	-0.13
Building & Construction	1.7	2.7	0.28
Wholesale & Retail Trade	0.7	0.3	0.25
Hotels & Restaurants	0.4	21.8	0.11
Transport, Storage, Communication	0.5	0.3	-0.04
Real Estate & Rent	0.7	-0.7	3.42
Social & Other Personal Services	0.3	0.2	0.06
Average of all sectors	1.00	1.00	1.00

Source: Calculated from CAPMAS, National Economic Statistics.

The value 1.5 for manufacturing in the PrF sector is an average value of the ratios of each of the three indicators to their corresponding values for the total in PrF sector. Manufacturing has a productivity level 1.5 times as much as the average productivity change for all activities in the PrF sector. Other figures in Table 2.3 are interpreted in the same way. Any value in the table below 1 means that the productivity level in this activity improved less than the average for all activities. Values between one and two are considered moderate levels of improvement, and those greater than two are high levels.

We can summarize in Table 2.4 three important types of information about the productivity of the private formal sector and the private investment sector in different economic activities:

1. Relative shares of economic activities in the total value added in each sector, taken from data in Figures 2.8 and 2.9.
2. Recent relative changes in productivity of each sector in the economic activities, from pre-reform period to the post-reform period, relative to the average change taken from data in Table 2.3.
3. Change in productivity of each sector in economic activities from pre-reform period to the post-reform period, taken from Table 2.2.

Table 2.4
Summary of Productivity Indicators by Activities in the Private Formal and Investment Sectors

	Private Formal			Private Investment		
	1	2	3	1	2	3
Agriculture, Forestry & Hunting	M	VH	UP	L	VL	DOWN
Manufacturing	H	H	UP	VH	L	UP
Building & Construction	M	L	UP	M	VH	UP
Wholesale & Retail Trade	M	L	DOWN	L	L	UP
Hotels & Restaurants	L	L	DOWN	M	VH	UP
Transport, Storage, Communication	H	L	DOWN	L	L	UP
Real Estate & Rent	L	L	DOWN	VL	VL	DOWN
Social & Other Personal Services	VL	M	UP	VL	L	DOWN

1= relative shares in total value added
2= current status of productivity
3= change in productivity
VH= very high, H= high, M = moderate, L = low, VL = very low

The PrF agriculture and manufacturing activities enjoy high and increasing productivity. Activities related to trade and services have low and decreasing productivity. Productivity of nearly all PrI activities is rising with the exception of agriculture, real estate and social services. The highest productivity is in buildings and construction and hotels and restaurants.

This analysis has ignored the participation of the PrF and PrI sectors in exports. A comparison of merchandise exports relative to total production (total sales) in the two sectors shows that the PrI sector is somewhat more oriented toward exports than the PrF sector. The private sector is less export oriented than the public sector (Figure 2.5). Details of the exports of the private sector in terms of the export structures of the PrF and the PrI sectors are presented in Tables 2.5A and 2.5B.

Table 2.5A
Export Structure of Private Formal Sector, 1994-1998 (percent)

	1994	1995	1996	1997	1998
Edible vegetable roots & tubers	12%	20%	15%	8%	7%
Edible fruits & nuts	3%	3%	3%	2%	0%
Cereals	7%	6%	14%	7%	15%
Oil seeds & leguminous fruits & fodder	4%	4%	3%	3%	3%
Essential oils resin oils &toilet preps	3%	2%	2%	2%	0%
Plastics & articles thereof	2%	2%	3%	4%	3%
Cotton	1%	1%	1%	3%	3%
Garments & clothing access. of knitted	9%	8%	7%	7%	10%
Garments & clothing access. not knitted	13%	14%	13%	9%	15%
Other made up textile artc. & worn cloth	3%	4%	5%	4%	5%
Ceramic products	0%	1%	1%	9%	0%
Vehicles, tractors, bicycles & parts	0%	0%	0%	3%	0%
Salt, sulfur, earth stones & cement	1%	2%	2%	3%	3%
Fertilizers	1%	1%	1%	1%	3%
Others	40%	33%	29%	36%	29%%
Total Exports	100%	100%	100%	100%	100%

Source: Calculated from CAPMAS, printout provided to DEPRA

Table 2.5B
Export Structure of the Private Investment Sector 1994-1998 (percent)

	1994	1995	1996	1997	1998
Edible vegetable roots & tubers	2%	3%	4%	3%	1%
Inorganic chemicals	2%	4%	8%	6%	8%
Pharmaceutical Products	2%	1%	5%	4%	4%
Cotton	1%	0%	1%	14%	10%
Carpets & other Textile floor covering	19%	9%	10%	6%	11%
Garments & clothing access. of knitted	9%	2%	4%	4%	4%
Garments & clothing access. not knitted	24%	15%	18%	13%	16%
Other made up textile artc. & worn cloth	1%	0%	1%	2%	2%
Ceramic products	9%	6%	8%	7%	6%
Glass & glassware	1%	0%	1%	3%	4%
Iron & steel	2%	0%	1%	10%	14%
Tools, implements, cutlery, spoons	5%	4%	6%	4%	1%
Miscellaneous manufactured articles	0%	0%	0%	5%	0%
Others	24%	54%	33%	20%	18%
Total Exports	100%	100%	100%	100%	100%

Source: Calculated from CAPMAS, printout provided to DEPRA.

Most of the private formal sector exports are in five groups: edible vegetables, cereals, garments and clothing (knitted, and not knitted), and other textile. The first two groups are raw materials, which represented 18 percent of total exports of that sector in 1998. The other three group are cotton-related manufactures, which amounted to 30 percent of total private formal exports and

22 percent of the private investment sector's total exports in 1998. Iron and steel products represent 14 percent, ceramic products 6 percent, and chemicals and pharmaceuticals 12 percent of the private investment sector's exports. It is important to note that a part of this diversified structure favors technology-intensive products, especially chemicals and pharmaceuticals.

Concerning the private investment sector, it has been shown that the sector has certain advantages over the other private sectors (in exports, the tendency to increase its productivity and its high preference of manufacturing). However, society bears a cost in supporting this sector through fiscal incentives, especially tax exemptions. The ratio of indirect taxes paid by the PrF sector over the period 1987-1990 to its total sales (total production) for the same period was 0.11 versus 0.017 for the PrI sector. The figures for the period 1990-1996 were 0.14 versus 0.009. In order to estimate the cost of the tax incentive borne by the whole economy we applied the tax/sales ratios of the formal sector to the actual total sales of the investment sector. These estimated taxes are what the PrI sector should have paid in the absence of tax exemptions. Subtracting the actual taxes paid by the PrI sector from the estimated taxes is what society gave up in tax revenues foregone to support the PrI sector. Table 2.6 shows the real net benefits accruing to the Egyptian economy from PrI performance over the period under study 1987/88-1995/96. These net benefits were converted to present value using 1987/88 as base year, using a discount rate of 10%, reflecting the opportunity cost of capital to Egypt, then annualized using the same discount rate, and finally compounded at 10% over the study period.

Table 2.6
Cost/Benefit Analysis of Tax Exemption in Private Investment Sector, 1987/88-1995/96

000 LE	87-90 Average Annual	91-96 Average Annual	PV	Annualized	FV
Real foregone taxes	293,051	671,464	3,349,056	545,043	8,686,589
Real VA	919,598	1,064,445	6,622,052	1,077,708	17,175,897
Net Benefits	626,547	392,981	3,272,996	532,665	8,489,309

Source: Calculated from CAPMAS, National Economic Statistics.

Table 2.6 shows that although real taxes foregone have been rising between the pre-reform period and the post reform period, both in real terms and in proportion to value added, they still yielded a NPV of 3.2 LE billion at constant 1987/88 prices. When these net benefits were annualized, the net gain to the economy reached 533 LE million per year, and when compounded for the whole period, the estimate is 8.5 LE billion.[6]
In general the calculations show that tax incentives are paying off in terms of net benefits accruing to the whole economy. This is besides other benefits resulting from technology transfer, provision of employment opportunities, and the acquisition of skills for labor. Some of the benefits were mentioned earlier and include greater productivity increases relative to other sectors and a greater orientation toward exports.

[6] This was carried out on the assumption that these net benefits are supposed to accrue to the economy. If deposited in a bank on an annual basis with an interest rate of 10%, real net benefits accumulated during the study period would have amounted to this sum. In nominal terms this figure would be 27.6 LE billion at 95/96 prices.

D. The Private Industrial Sector[7]

Industrial activity includes manufacturing as well as mining and quarrying (which includes oil extraction). Table 2.7 shows that the private sector is increasing its share of total industrial value added, growing from 45 in percent in1991/92 to 49 percent in 1995/96. In the meantime, the public sector's share decreased from 55 percent to 51 percent. This is consistent with the general trend on the macro level. As far as the participation of the various private sectors in value added generation is concerned, it is apparent that the private formal sector is the dominant sector, with almost half of the total private industry value added. While in the previous section it was shown that the investment sector was larger than the formal sector at the aggregate (economy) level, in the industrial sector itself we have the opposite situation. The industrial informal private sector has about the same contribution as that of the private investment sector (see Table 2.7).

Table 2.7
Percentage Distribution of Industrial Value Added
(total product at factor cost)

	Formal Private	Informal Private	Private Investment	Total Private	Public	Total
1991/92	20	16	10	45	55	100
1992/93	20	14	8	42	58	100
1993/94	20	10	14	44	56	100
1994/95	24	12	12	47	53	100
1995/96	22	13	14	49	51	100

Source: Industrial Output Statistics, CAPMAS.

For industrial employment, the public sector's share, though declining, is still dominant (60 percent of total industrial employment in 1995/96). The informal sector has the largest share in employment compared with that of the formal private and private investment sectors (23 percent against 8 percent and 9 percent for formal and investment sectors respectively).

Table 2.8
Percentage Distribution of Labor in Egyptian Industry
(percent)

	Formal Private	Informal Private	Private Investment	Total Private	Public	Total
1991/92	5	19	8	32	68	100
1992/93	5	21	4	31	69	100
1993/94	7	18	8	33	67	100
1994/95	10	19	7	35	65	100
1995/96	8	23	9	40	60	100

The formal sector has consistently high labor productivity (value added or total product at factor cost at constant 1991/92 prices per worker), but it is declining over time (falling by 17 percent over the 1991/92-1995/96 period). In contrast, the private investment sector's labor productivity

[7] The analysis in this section is based on data from CAPMAS, *Industrial Output Statistics*.

rose by 27 percent over the same period. The private informal sector's average labor productivity fell by 26 percent during that period (see Table 2.9).

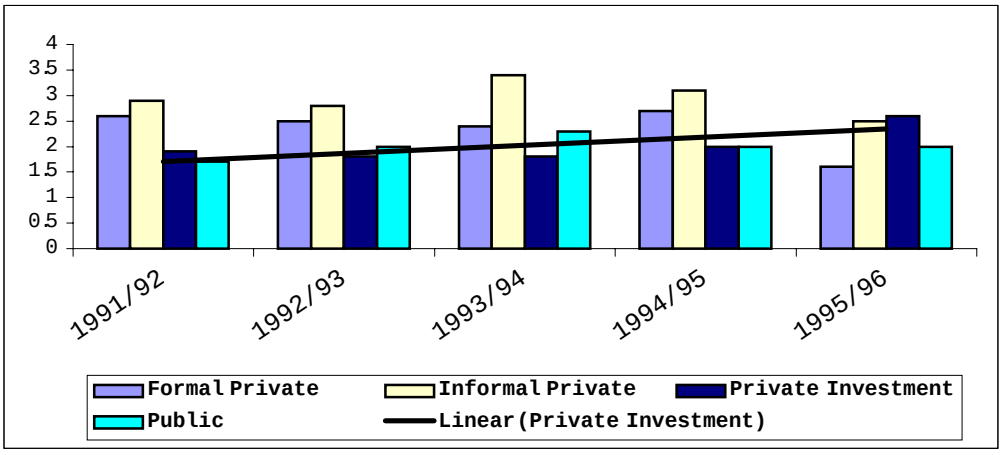
Table 2.9
Value Added Per Worker, 1992-96
(LE thousand, constant 1991/92 prices)

	Formal Private	Informal Private	Private Investment	Total Private	Public	Total Republic
1991/92	204	44	72	77	44	55
1992/93	219	36	97	74	46	54
1993/94	168	29	94	73	46	55
1994/95	145	37	104	80	48	59
1995/96	168	33	92	71	49	58
Index*	83	74	127	93	109	105

Source: CAPMAS Industrial Output Statistics
** 95/96 (91/92=100)*

As noted earlier, the average output of labor is just one indicator of productivity. Average productivity of capital (value added /value of fixed assets at year end) also measures productivity. The PrI sector's values for this indicator improved in the last year (1996) relative to the first year (1992), increasing by 37 percent. The values of the indicator for the PrI sector were lower than those of both formal and informal private sectors over the period 91/92-94/95 (see Figure 2.10).

Figure 2.10
Value Added Per Unit of Fixed Assets, 1992-96
(constant 1991/92 prices)



Source: CAPMAS Industrial Output Statistics
** 95/96 (91/92=100)*

The investment sector is more export oriented than the other private industrial activities (see figure 2.10). The share of the private investment sector in industrial exports in 1995/96, for example, is six times larger than that of the formal private sector, and it is more than two times

larger than that of the informal sector. The public sector still retains the largest share because of the importance of oil and petroleum products in its total exports.

As a ratio of total industrial sales, the private investment sector's industrial output has favorable prospects for expanding its export orientation (see Figure 2.11). Moreover, output is highly diversified and is technology intensive. Table 2.10 also shows the same trend as in figure 2.6C, namely that the industrial private sector lags the public sector in its export orientation. It does, however, have a diversified export structure.

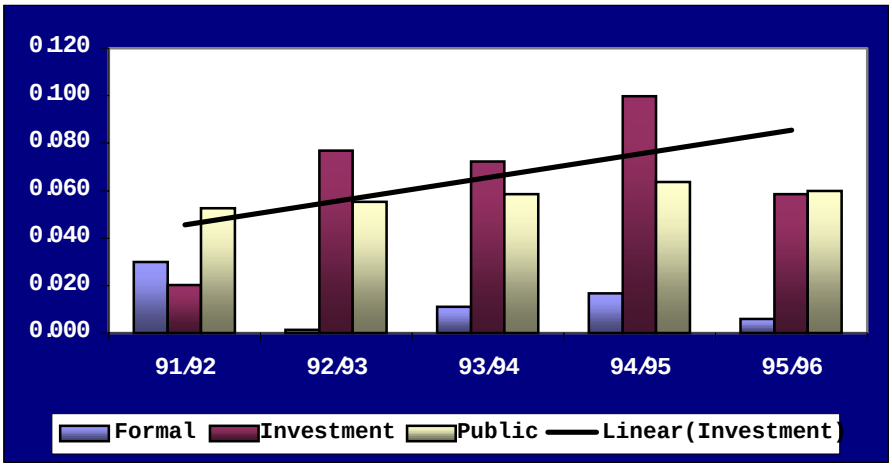
The private investment sector's export orientation has been increasing, with an increasing share of industrial exports relative to total industrial sales. Private investment exports reached 10 percent of its total industrial sales in 1994/95. This rate compares with only 1.7 percent for the private formal and 6.4 percent for the public sectors (see Figure 2.11). As a means of enhancing exports of industrial production, the formal sector should therefore be encouraged to be more active in export-oriented production activities.

Table 2.10
Private and Public Shares in Industrial Exports, 1992-96
(percent distribution)

	Formal Private	Informal Private	Private Investment	Total Private	Public	Total
1991/92	15	11	5	31	69	100
1992/93	1	5	23	29	71	100
1993/94	5	4	22	30	70	100
1994/95	8	4	23	35	65	100
1995/96	3	7	18	28	72	100

Source: CAPMAS, Industrial Output Statistics.

Figure 2.11
Export Orientation in Private and Public Sectors, 1992-96
(exports/total sales)



Source: CAPMAS, Industrial Output Statistics.

E. Conclusions

1. The private sector has been growing faster in the 1990's than the public sector in terms of its levels of output and investment.

2. At the aggregate level, the main activities of the private sector in descending order of importance are services, agriculture, and industry. Private output in industry (manufacturing in particular) remains low (relative to the economy's total output) and it is far below what it should be.

3. The trade deficit created by the private sector in general and the industrial private sector in particular is high, but it declined in 1998.

4. In the economy as a whole the private investment sector (PrI) is larger than the private formal (PrF) sector, while at the industrial activity level the investment sector is smaller than the formal sector due to the latter's involvement in mining activities. The PrI sector experienced the largest increase in productivity between the two periods 317 per cent (before and after the start of economic reform), while the PrF sector had a smaller increase in the index of productivity and overall productivity improvement in the public sector (Pu) is solely attributed to real estate and agriculture activities. The PrI sector has been the only sector that has experienced an increase in the ratio of savings to value added.

5. The PrF and PrI sectors have increased employment by a significant amount, which partially offset the decrease in employment in the Pu sector.The real wage bill in the PrF sector increased somewhat, while it decreased in both PrI and Pu sectors.
6. The PrI sector is more export-oriented than the PrF sector. The PrI sector also has a more diversified structure of exports than the PrF. It also tended to favor non-traditional (especially technology-intensive) exports.

7. The PrI sector is currently more productive in service sectors (hotels and restaurants, building & construction) than in other sub-sectors, while the PrF sector is more productive in commodity sectors (agriculture, building and construction and manufacturing).

8. Economic benefits generated from the provision of tax exemptions to the PrI sector, relative to the cost incurred by the economy in terms of foregone revenues to the treasury, are nearly double. Estimated net present value NPV is LE 3.3 billion at constant 1987/88 prices, over the period under study (LE 27.6 billion in 1995/96 prices).

9. To promote exports the PrI sector will need to expand productivity in the exportable commodity sectors in which it is less productive. The PrF should also be encouraged to be more export-oriented in the commodity sectors in which it is more productive.

Annex 2 SOURCES OF DATA

For details on the private sector economic activities the best source available is the Central Agency for Public Mobilization and Statistics (CAPMAS). It issues two relevant annual publications: National Economic Statistics (NES) and Industrial Output Statistics (IOS).

NES publications

NES contains data on economic variables classified by activities: agriculture forestry and hunting, mining and quarrying, manufacturing, electricity, gas and water, building and construction, wholesale and retail trade, hotels and restaurants, transport storage and communication, financial intermediation, real estate, education, health and social services. This coverage excludes banking, insurance, government and the informal sector. Within the private sectors, data on the private informal sector are not available since NES includes only firms that send reports to the Central Agency for Auditing. Unorganized or informal (usually small-sized) businesses do not usually conform to this practice. Within the public sector the NES does not include data on public financial firms (banks and insurance companies). Data were obtained for the following sectors and cover a period of 10 years for 1986-1996. The data are based on calendar years for private and investment sectors, and fiscal years for public and public business sectors.

1. Formal private sector: governed by Law no. 159 for 1981 concerning audited accounting. The private sector includes the following legal forms: joint stock companies limited by shares, limited liabilities, and branches of foreign branches.
2. Private investment sector: 1986 through 1996 as above (governed by Investment Law No. 43 of 1974 as amended by Law 230 of 1989, and law no. 8 for 1997 for investment incentives). Total private investment sector includes the following legal formation: joint stock companies, limited by shares, limited liabilities, branches of foreign companies, single proprietorship, partnership, and simple liability.
3. Public sector: governed by Law no. 97 of 1983.
4. Public business sector: only since 1992/93. Public businesses used to be an integral part of the public sector. Since the start of the privatization program, they started to operate under the Ministry of Public Business Affairs for the purpose of privatization. They are governed by Law 203 of 1991.

National economic statistics include production at market prices, intermediate goods and services, net value added and its origin from factors of production (wages, rent, interest, net return on productive assets, current transfers, savings, fixed capital formation, net

capital transfer, total value added at market prices and net value added at factor cost). Data analysis was in compliance with the unified accounting system.

National economic statistics are based on closing accounting statements as follows:

1. Operating accounts for industrial expenditures
2. Utilization accounts for utilization expenditures
3. Commercial accounts for sales and distribution
4. Profit and loss account and general administrative expenditures
5. Distributed profit account
6. Depreciation on fixed asset by type
7. Capital Addition according to type sold or scrapped
8. Total number of workers as the date of budget issue

Care was given in reporting the data in accordance with the unified accounting system that Egypt follows. However, because of the non-inclusion of informal sector, banking and insurance and government in the NES, GDP generated from summing the private sector, investment sector, public and public business, for example, in 1995/96 was only L. E. 24,795 million, which represented only 15.2 percent of GDP published by the Central Bank of Egypt (CBE) of LE 163,540 million. It is only 11.6 percent of the GDP value for the same year published by the Ministry of Economy (MOE). The large residual is attributed to the activities of the informal sector, banking and insurance and government sectors.

Industrial Output Statistics

Industrial statistics data were obtained from the Central Agency for Public Mobilization and Statistics (CAPMAS) in Egypt. The data were collected through questionnaire No. 150. Normally data are collected during fiscal year starting July 1st to June 30th for companies following this system and calendar year for companies following calendar years.

The information obtained covered a period extending from 1986/87 to 1995/96 (the last year available up to the release of this study) at the four-digit ISIC level. From 1987/88 to 1990/91 private sector manufacture data cover total private sector for the whole country, that is, the formal private, informal private and private investment sectors. However, the inclusion of these three private sector categories was not explicitly stated in CAPMAS publications for these years, but it was later deduced from the analysis conducted on the whole time series. From 1991/92 onward, CAPMAS stated that its publications on private sector manufacturing are divided into separate categories (formal, informal and investment).

Industrial data are arranged according to three broad categories:

(1) Mining and quarrying
(2) Manufacturing
(3) Repair non-classified elsewhere

General definitions of variables included in CAPMAS industrial output publication are:

Total cost of production = Total value of product + Total services to others + Other revenues + Subsidies - Value of taxes and duties

Net value added = Total cost of products - Total intermediate costs and depreciation

Total monetary wages = Total wages and salaries + Social insurance + Fringe benefits.
Taxes and custom duties = custom duties + production tax + treasury revenues from price differences + stamp duties.

Savings = periodical revenues – periodical expenses.

The first industrial statistics survey was issued by CAPMAS with the general census in 1937. Industrial statistics were issued every 3 years: 1944, 1947 and 1950. From 1952 to 1956 they were issued every 2 years on establishments employing 10 workers or more. Starting in 1957 the survey was conducted annually on public enterprises, and starting in 1964/65 both public and private enterprises were included separately in publications for industrial establishments employing 10 or more. Starting in 1989/90 publications were in separate documents for each. Beginning from 1991/92, annual industrial statistics were divided into formal private sector, informal private sector, private investment sector, private sector total Republic (formal, informal and investment), and public sector.

3 THE ROLE OF THE GOVERNMENT IN ENHANCING PRIVATE SECTOR PRODUCTIVITY

The Government of Egypt is trying to move the country toward a private sector-led market economy to improve efficiency and bolster long term growth prospects. The privatization program is the cornerstone of its economic reform program, designed to create a more positive and conducive environment for domestic and international business and enterprises. This process is characterized chiefly by a gradual change from state management control towards greater reliance on the discipline of free market competition. Throughout the reform period, the Government has provided a more conducive business environment through the removal of trade barriers, the relaxation of industrial investment licensing procedures, and the reform of trade and financial markets, as well as of the legal, taxation and regulatory frameworks.

This chapter examines the Egyptian Government privatization strategy. It reviews the wide spectrum of tools and policies in areas of privatization and its impact on companies' performance. It describes the uniqueness and peculiarities of the Egyptian privatization program, particularly regarding its observance of the social dimensions of displaced workers. It also reviews trade strategies, administrative, institutional, and legislative reforms that have accompanied the economy's liberalization process.

A. Government Privatization Strategy

1. Privatization Achievements of Non-Financial Enterprises

Egypt initiated its privatization program in 1991 as part of the Economic Reform and Structural Adjustment Program (ERSAP). Although the program started slowly due to its initial focus on small agricultural businesses, the Government soon took steps to actively promote privatization by passing the Public Business Sector Law 203 in 1991.[1] Law 203 aims to restructure public enterprises (PE), increase commercial orientation and improve accountability by management. The law abolished the government authorities that previously supervised state-owned companies and replaced them with 27 state-owned holding companies (HC). In 1993 these HCs were further consolidated into 17 HCs to avoid the possible concentration of a company within any given sector. The role of the HC has been to initiate, administer and implement the privatization of 314 non-financial affiliate companies (AC), known also as Law 203 companies.[2] The ACs in turn own holdings in 184 joint venture companies, which provide a means of creating partnerships between the private and public sectors. Law 203 created the Ministry of Public Enterprise which is charged with the overall privatization program, and it established the Public Enterprise Office (PEO) as the advisory body of that government agency.

[1] In addition to agriculture, the industries that are actively promoted as part of the privatization program include: food and beverages, engineering, construction, textiles, electricity, mining, chemicals, rice and flour, metallurgy, cotton, textiles, spinning and weaving and pharmaceuticals.

[2] The total number of companies that are intended to be privatized represent 70 percent of Egypt's industrial sector (IBTCI, 1998).

At the end of the first quarter 1999, 105 companies or 33 percent of the total number of Law 203 companies had been privatized. The greatest number of companies has been privatized by majority public offerings (PO), followed by liquidation and Employee Shareholder Associations (ESAs). The method by which the least number of companies has been privatized is that of anchor investors (see Table 3.1).[3] By the end of 1998, sales proceeds of privatization of Law 203 companies reached nearly 14 billion, with 60 percent of proceeds being generated by transferring direct ownership to the private sector (see Table 3.2). Sales by the PO method generated more than one-third of the total proceeds, followed by the anchor investor method. Only two percent of the total value of the proceeds was generated by sales to ESAs (IBTCI, 1999).

In recent years the proceeds from the sales have been used for three main purposes, according to the International Monetary Fund (IMF, 1998). These uses consist of debt settlement with the banking sector, debt retirement, and the restructuring of labor. Between January 1996 and June 1997, 40 percent of the LE 5.2 billion earned from privatization completed was used to settle debts owed to the banking system, 55 percent was used to retire debt, and the remaining 5 percent was used to restructure labor.

Table 3.1
Number of Law 203 Privatized Companies by Method, 1991-99

Method	1991	1992	1993	1994	1995	1996	1997	1998	1999 a/	Total
Majority POs						15	13	3		31
Liquidation	4	2	1	1	2	1	6	12		29
ESAs				10			5	11	2	28
Anchor Investors				3		3	4	4	3	17
Total	**4**	**2**	**1**	**14**	**2**	**19**	**28**	**30**	**5**	**105**

a/ As of March 31, 1999.
Source: IBTCI (1999).

Table 3.2
Law 203 Privatization Sale Proceeds by Method, as of March 1999

Method	Value (LE Million)	Percent of Total
Majority POs	5,158	33.4
Anchor Investors	3,012	20.1
Liquidations	625	3.2
ESAs	323	2.2
Subtotal	9,118	60.9
Sale of Unutilized Assets	3,079	20.6
Minority POs	1,998	13.3
Operating Assets	352	2.4
Local Governorates	300	2.0
Joint Venture Companies	128	0.9
ESOPs	3	0.0
Total	**14,978**	**100.0**

Source: IBTC (1999).

[3] Public offerings are made on the stock market; anchor investors are those investors who operate enterprises having activities similar to the companies that are purchased through privatization; and ESAs, considered a new approach to privatization in Egypt, purchase shares at a discount and maintain control of the enterprise by its employees.

In comparison with other countries undergoing privatization, Egypt has performed favorably (IMF, 1998). In fact, when data are normalized to account for a country's relative size and pace of privatization, Egypt ranks within the top five countries (see data for privatization receipts as expressed as a percentage of GDP, Table 3.3). This achievement is laudable because an important share of privatization receipts for many countries results from sales in the infrastructure sector that usually yield large revenues and involve few transactions. In contrast, Egypt's privatization program has thus far excluded the infrastructure sector, yet it compares favorably with the programs in other countries

Table 3.3
Comparison of Egypt's Privatization Record

Country	Years	Cumulative Privatization Receipts (US$ billion)	Average Privatization Receipts per Year (US$ billion)	Average Privatization Receipts per Year % of GDP
Egypt	**1996-97**	**1.5**	**1.02**	**1.5**
Transition Economies:				
Hungary	1989-95	8.0	1.14	3.0
Czech Republic	1993-95	2.3	0.77	1.9
Poland	1990-95	3.0	0.50	0.6
Developing economies:				
Malaysia	1988-95	9.2	1.15	2.1
Argentina	1988-95	18.2	2.28	1.2
Chile	1973-91	3.4	0.38	1.2
Mexico	1988-95	27.3	3.41	1.1
Philippines	1989-95	3.4	0.49	0.9
Venezuela	1990-95	2.5	0.42	0.7
Brazil	1989-95	9.7	1.39	0.3
Industrial economies:				
New Zealand	1985-95	9.0	0.90	2.2
Portugal	1985-95	5.3	0.53	0.8
United Kingdom	1979-95	96.7	6.04	0.8
France	1985-95	33.1	3.41	0.3
Italy	1985-95	17.0	1.70	0.2
Spain	1985-95	8.3	0.83	0.2
Canada	1985-95	7.6	0.76	0.2

Source: IMF (1988).

2. Impact of Privatization on Non-Financial Companies

a. Company Performance After Privatization

The financial statements of the 55 companies that were privatized during 1997-98 show that 33 ACs, or 60 percent of the total number, returned higher profits than when they operated as state-owned enterprises (IBTCI, 1999) (see Table 3.4). Twenty-two ACs registered a decline in net profit over the two-year period. Many of the companies that failed to register increases in net profits had been loss-makers with a negative net worth before the privatization process was initiated. Table 3.5 shows changes in the net profit for companies privatized under the ESA method. Nearly all companies recorded profit between 1993-95, with only two companies recording a negative change under this method of privatization.

Table 3.4
Change in Net Profit of Law 203 Companies Privatized through the Stock Market, 1997-98

Company	LE thousand		% Change	Change in profit
	1997	1998		
Nile Matches and Prefabricated Housing	-1,753	299	NA	
Nasr Dried Agricultural Products	-169	221	NA	
Misr Chemical Industries	1,236	3,631	194	Change in profit > 50%
Industrial and Engineering Projects	17,704	35,874	103	
Eastern Company	70,590	140,166	99	
Al Shams Housing	5,246	10,321	97	
Upper Egypt Contracting	1,054	1,901	80	
Bisco Misr	15,016	26,197	74	
Nasr Company for Civil Works	10,441	17,684	69	
Egyptian Financial and Industrial	25,257	42,332	68	
Alexandria Spinning and Weaving	7,199	11,870	65	
Giza Contracting	3,801	5,425	43	50% < Change in profit > 20%
Nubareia Agricultural Engineering	810	1,132	40	
Al Ahram Beverages	46,107	60,310	31	
Development and Engineering Consultants	10,563	13,609	29	
Arab Cotton Ginning	5,548	7,058	27	
Misr Oil and Soap	11,534	14,090	22	
Mahmoudia Contracting	1,574	1,926	22	
Misr Duty Free Shops	13,904	16,717	20	
United Arab Spinning and Weaving	25,607	30,100	18	20% < Change in profit > 10%
Al Wadi for Exporting Agricultural Products	12,422	14,521	17	
Delta Industries (IDEAL)	14,549	16,851	16	
Helwan Portland Cement	154,095	175,224	14	
United Housing and Development	2,594	2,893	12	
Cairo Pharmaceuticals	9,401	10,522	12	
Torah Cement	88,050	99,000	12	
Alexandria Pharmaceuticals	17,691	19,205	9	10% < Change in profit > 1%
North Cairo Flour Mills	15,278	16,571	8	
Memphis Pharmaceuticals	20,804	22,352	7	
Madinet Nasr Housing	83,894	88,532	6	
Alexandria Cement	32,000	33,667	5	
Egyptian Starch and Glucose	8,166	8,428	3	
Middle Egypt Flour Mills	8,346	8,461	1	
per Egypt Flour Mills	57,857	57,536	-1	Negative change
Cairo Housing	8,820	8,121	-8	
East Delta Flour Mills	20,818	18,718	-10	
Middle and West Delta Flour Mills	28,434	25,152	-12	
Alexandria Flour Mills	32,097	28,185	-12	
Egyptian Electro Cables	31,210	27,200	-13	
Kafr El Zayat Pesticides	4,978	4,294	-14	
Arab Pharmaceuticals	5,082	4,362	-14	
Heliopolis Housing	47,841	40,704	-15	
Nile Cotton Ginning	9,045	7,379	-18	
Paints and Chemical Industries	56,337	45,784	-19	
Abu Qir Fertilizers	113,848	89,723	-21	
Ameryah Cement	97,306	75,884	-22	

Table 3.4 (cont'd)
Change in Net Profit of Law 203 Companies Privatized Through the Stock Market, 1997-98

Company	LE thousand		% Change	Change in Profit
	1997	1998		
South Cairo and Giza Flour Mills	9,318	7,202	-23	Negative change
Nile Pharmaceuticals	11,523	8,589	-25	
Nasr Clothes and Textiles	16,037	11,544	-28	
Misr Aluminum	210,786	140,484	-33	
General Silos and Storage	26,016	17,062	-34	
United Arad Stevedoring	6,828	1,129	-83	
Egyptian Chemical Industries	16,671	1,988	-88	
Telemisr	6,649	460	-93	
Middle East Paper	2,355	-1,509	-164	

Source: IBTCI (1999).

Table 3.5
Change in Net Profit of Law 203 Companies Privatized through ESAs, 1993-95

Company	LE thousand		% Change	Change in Profit
	1993/94	1994/95		
Beheira	7,219	10,750	48.9	50% > Change in profit > 10%
Upper Egypt Dredging	304	450	48.0	
Arab Bureau	3,347	3,944	17.8	
Egyptian Dredging	4,824	5,481	13.6	
Regwa	4,570	5,078	11.1	
Mechanical Excavation	3,263	3,619	10.9	
Arab for Land Reclamation	8,337	9,074	8.8	10% > Change in profit > 0%
Kom Ombo Land Reclamation	15,258	16,182	6.1	
General for Land Reclamation	9,618	10,042	3.4	
Egyptian Akarya	12,312	11,589	-5.9	Negative change in profit
Consulting Office for Design	260	242	-6.9	

Source: PEO, as reported in American Chamber of Commerce (1997a).

b. Labor Issues

To counteract the risk of displacing labor after public enterprises are sold or liquidated, the Government has developed ten labor compensation schemes that are made available to employees of former state-owned enterprises. With the exception of the last three schemes, all are based on offering a separation package in return for voluntary departure. The schemes can be applied to privatized, liquidated or restructured private enterprises. Details of the schemes, as described by the American Chamber of Commerce (1996), are presented in Box 3.1.

The early retirement program (Scheme 2) has been a popular option and is financed by both the HC and the Social Fund for Development (SFD). Table 3.6 presents details on the beneficiaries and costs of the early retirement program as of June 1998. The greatest number of employees participated in the Spinning and Weaving HC program, which was also the most expensive at LE 212 million. The fewest number of employees participated in the Electricity Distribution HC program, which also had the lowest cost of LE11 million, but with an average cost per employee

of nearly LE24,000, slightly higher than that of the average cost per employee participating in the spinning and weaving HC. According to IBTCI (1998), the large differences in costs among the HC programs are attributed to the relatively large variation in wages among industries. For example, wages in the metallurgical industry are high compared with those of the engineering industry, and are reflected in the high average cost per employee.

Table 3.6
Details on the Benefits Provided to Employees under the Early Retirement Program, as of June 1998

Holding Company	Number of Workers Benefiting from Program	Total Program Cost (LE)	Average Cost Per Employee (LE)
Spinning and weaving	10,896	211,905,408	19,448
Mining and refraction	7,451	167,498,480	22,480
Engineering industry	6,318	145,598,310	23,045
Metallurgical industry	5,790	191,301,600	33,040
Housing, tourism and cinema	5,648	152,202,304	26,948
Food industry	5,641	67,601,744	11,984
Cotton and international trade	5,048	108,198,832	21,434
Maritime transport	3,290	82,098,660	24,954
National construction	2,021	45,799,902	22,662
Inland transport	1,861	43,000,266	23,106
Textile manufacturing	1,509	29,700,138	19,682
Rice and flour mills	692	12,500,288	18,064
Electricity distribution	466	10,900,206	23,391

Source: IBTCI (1998).

Box 3.1
Government Employment Loss Compensation Schemes

Core Components

1. Cash separation payment
   - Offers a one-time cash severance payment in return for voluntary resignation
   - Attractive to employees nearing retirement
   - Not beneficial for young employees, those whose low wages do not entitle them to a large lump-sum payment, or to those whose lack of experience and skills would make a new job search difficult
2. Early retirement
   - Offers early retirement but loss of pension
   - Loss of pension (normally beginning at age 60) discourages employees from taking this option
   - Guaranteed increases in basic salaries create added incentive to continue employment

Supplementary/Complementary Components

3. Separation benefit in kind
   - Offers in-kind benefits in the form of land
   - Attractive to many employees since they can sell assets
4. Subcontracting goods and services to departing employees
   - Enterprise can assist in the procurement of machinery and provide training or credit to subcontracting employee
5. Credit for start-up businesses
   - Offers credit for start-up businesses
   - Attractive for employees who have managerial skills and want to start own business
6. Training and retraining to improve skills
7. Job placement and job counseling
   - Both schemes (6) and (7) offer training and job placement services
   - Challenge to privatization since few state-owned institutes offering these schemes have adequate resources and there are few labor placement services
8. Attrition through retirement (no new hiring)
9. Enforcement of existing legal grounds for dismissal
10. Reduction of incentives not based on real productivity.

Source: American Chamber of Commerce in Egypt (1996).

A recent study by the IBTCI (1998) has calculated the Government's savings associated with the early retirement program based on HC (see Table 3.7). After the first year of privatization, the Government saved LE61 million in wages that would otherwise have been paid to workers in the spinning and weaving HC. Assuming that wages remain constant in real terms, the total program cost would be recovered within four years. Other HCs will take longer to recover the total program costs, and the time will depend on the combination of annual saved wages and the program cost. The electricity distribution HC, for example, will take five years to recover its total program costs.

Table 3.7
Annual Government Savings Due to Early Retirement Program

Holding Company	Total Cost of Program (LE million)	Annual Saved Wages (LE Million)	Year in which Program Cost is Recovered
Spinning and weaving	212	61	Year 4
Metallurgical industry	191	54	Year 4
Mining and refraction	167	39	Year 5
Housing, tourism and cinema	152	34	Year 5
Engineering industry	146	42	Year 4
Cotton and international trade	108	24	Year 5
Maritime transport	82	28	Year 3
Food industry	68	24	Year 3
National construction	46	10	Year 5
Inland transport	43	9	Year 5
Textile manufacturing	30	11	Year 3
Rice and flour mills	13	10	Year 2
Electricity distribution	11	2	Year 5
Total	**1,268**	**348**	

Source: IBTCI (1998).

3. Privatization Achievements in Financial Sector

a. State-Owned Commercial Banks

A special plan is underway to privatize Egypt's four large state-owned commercial banks, although no privatization has yet occurred. The four banks account for 70 percent of total bank assets in Egypt and have a combined total of 866 branches throughout the country (for financial details, see Table 3.8). The dominance of the banks is further strengthened by their ties to the Government and the public's perception that the banks are safe havens for their funds, especially in rural areas.

Despite the lack of privatization of public banks, progress was achieved with the passage of Law 55 in June 1998. This law allows for private sector entry into the banking sector and privatization of the state-owned banks. The law intends to define procedures for transferring a public sector bank to the private sector after the sale of any part of its capital. It also intends to clarify the type of information that must be disclosed by a potential investor in its bid for partial ownership of a state-owned bank, such as nationality, holdings in other companies and secondary holdings in other financial institutions of any companies owned by the potential investor. Other requirements have been established for investors who wish to own 10 percent or more of a privatized bank's capital (IBTCI, 1998).

Table 3.8
Financial Data for Egypt's Four State-Owned Commercial Banks as of Quarter III, 1998 (LE billion and percent)

	Total	National Bank of Egypt	Banque Misr	Banque du Caire	Bank of Alexandria
LE Billion:		*Percentage Distribution:*			
Paid-In Capital	3.45	29%	29%	22%	20%
Reserves	3.65	61%	18%	10%	11%
Net worth	7.10	46%	23%	16%	15%
Loans	77.27	40%	26%	21%	13%
Customer Deposits	133.45	36%	34%	19%	11%
Total Assets	162.30	38%	32%	18%	12%
Net Profit	0.34	27%	14%	50%	9%
Memo Items (percent):					
Rate of return to capital	8%	9%	5%	23%	5%
Loans to deposit ratio	58%	64%	45%	65%	67%
Reserves to deposit ratios	3%	5%	1%	1%	2%
Branches					
Total number	866				
Percentage distribution	100%	29%	28%	21%	21%

Source: Computed from IBTCI (1998).

b. Joint Venture Banks

Progress to date has also been slow in meeting the public banks' target of 20 percent ownership in joint venture banks (JVB). At the end of 1998, the state banks owned less than 50 percent of 16 JVBs and they have majority shares in two other JVBs. According to the IBTCI (1998), this slow progress is probably due in large part to the downturn in the Egyptian stock market since early 1997. Like private companies, the state banks are waiting for an upturn in the market to improve their profits. Moreover, the reluctance to divest control of JVBs could also be attributed to concerns over the possible losses of high returns since JVBs are the best earning assets in the public banks' portfolios.

c. Insurance Companies

Recently steps have been taken to deregulate Egypt's insurance sector. In June 1998 the Insurance Law 156 was adopted to allow private sector entry into the capital of the three largest state-owned insurance companies, as well as the country's sole reinsurance company. Together, the three insurance companies account for nearly 80 percent of total premiums; separately, Misr Insurance accounts for 37 percent of total premiums, followed by El-Shark with 27 percent and National with 14 percent. Law 156 also removed all restrictions on majority foreign ownership of insurance companies and allows non-Egyptians to manage insurance companies based in Egypt. International advisory companies, including two investment banks, have been contracted by the Government to assist in the privatization of the major insurance companies. A key issue is the evaluation of financial coverage so that an internationally accepted rating can be determined. Another issue is the valuation of the assets of the companies, which are likely under-valued.

Each of the three large insurance companies has substantial portfolios of property assets valued at the purchase price or less, which require that they be reassessed to a realistic value. This constraint on privatization is closely related to the issue of defining and enforcing property rights in Egypt. The Government expects to complete the privatization of state-owned insurance companies by 2003.

4. Privatization Achievements in Infrastructure

The privatization program also includes plans to allow private sector competition at airports in Egypt. To date, no plans have been made to privatize the state-owned Cairo Airport or Egypt Air, although a private airfreight company is allowed to operate in the fruits and vegetable handling facility. There also appears to be some activity in the airline charter business that does not compete directly with Egypt Air. Additionally, in late 1998 the Government of Egypt approved a proposal to study the restructuring of Terminal 3 on a build, own, operate transfer (BOOT) basis. BOOT contracts are also being used to build or develop six regional airports throughout the country.

The privatization of Egypt's maritime ports has begun, and suggests a potential movement towards increased private sector participation in the country's airport infrastructure and services. In early 1999 an offer was made to construct Egypt's first private sector railroad through a build operate transfer (BOT) arrangement. The line would cover 220 kilometers starting in Boulak el Dakrour and ending in Alexandria. If implemented, the railroad line would likely increase the returns on the public and private sector investments that have been made in agricultural and industrial infrastructure in the areas serviced by the new railroad. These changes would increase the competitiveness of Egyptian businesses and expand their exports, especially for agriculture and industry. Moreover, land values would likely increase due to the proximity to an alternative mode of transportation.

The mobile telephone system has also been recently extended due to the granting of an operating license to a private sector company. The increased competition has resulted in an approximate 50 percent drop in price and consequent broadening of use including rural areas. The use of mobile telephones is of particular importance to agricultural producers, who are now able to find and verify prices of crops and inputs by telephone. Public payphones will also benefit from two franchise licenses that were recently awarded to install 40,000 new lines. Privatization is also expected to take place soon in the power industry, a new thermal generation project, and a pumping and storage power facility on the Gulf of Suez (IBTCI, 1999).

5. Future Plans and Challenges for Privatization

As noted above, considerable progress has been achieved in Egypt's privatization program, yet more work remains to be done if Egypt is to fully develop a well-functioning market economy. To advance the process, the Government recently initiated a new strategy to promote privatization that is based on international investment banking. This approach is expected to facilitate the sale of additional affiliate companies and joint ventures with GOE ownership. Other advantages include enhanced competition and increased private sector participation in providing public utilities and services, especially in electricity, telecommunications and transportation. As of end-December 1998, 36 of the 56 banking consortia that bought application forms from the MPE were approved to provide investment-banking services in Egypt. According to IBTCI

(1998), the banking groups were approved because of their expertise in promoting and underwriting the shares of privatization candidates that would be offered to individuals and institutions through the stock market. They would also provide a mechanism for promoting and searching for investors to sell the ACs that are privatization candidates to strategic investors.

During 1999 the Government plans to include 62 ACs in the its next phase of privatization. The sale of those enterprises using the investment banking approach represents an important opportunity to engage Egyptian businesses with international markets since many of the banking groups are leaders in the field of investment banking and have not previously operated in Egypt. Moreover, success using this new approach is expected to have positive ramifications for Egypt beyond the actual sales of formerly government-owned enterprises. Additional investments would bring technology and management to Egypt that would help to expand exports and provide Egyptian workers with high-paid employment.

The success of future sales under the privatization program will largely depend on the fair and realistic valuation of the companies that are being offered for sale. This valuation, in turn, depends on Egypt's adoption of international accounting and auditing standards. The task of changing from the Egyptian accounting system currently mandated by the Central Accounting Agency (CAA) to international accounting standards (IAS) and international standards of auditing (ISA) involve large up-front costs. Legislation could easily be enacted through a ministerial decree to accomplish these changes. More importantly, significant changes must be made to educational curriculum and training programs and other support services must also be established. Nonetheless, the adoption of international measures would ensure transparency in the worldwide business community and allow Egyptian enterprises and banks to use reliable and consistent methods to compile, report and certify their accounts. Moreover, such standards are critical to Egypt's participation in the World Trade Organization and the global economy (IBTCI, 1999).

B. Government Trade Strategies

1. Trade Agreements

Egypt's three-pronged strategy for trade is based in large part on its membership in international trade agreements. The first part of the country's strategy is to open the Egyptian market to the global economy through its multilateral commitments under the World Trade Organization (WTO). The second part is to liberalize bilateral trade with Europe through its new agreement with the European Union (EU); and the third part of the strategy is to liberalize trade on a unilateral basis (IMF, 1998). The 1994 Uruguay Round of the General Agreement on Tariffs and Trade, from which the WTO resulted, set out provisions for increased market access for industrial products and brought trade in services and intellectual property into a multilateral trading framework. The Uruguay Round also established rules for trade in agriculture, textiles and clothing. Additionally, improvements were made in rules on subsidies, anti-dumping and countervailing actions and dispute settlement procedures. Transparency in regulations such as standards and licensing was also encouraged. IMF (1998) estimates show that the Uruguay Round is expected to produce minimal effects on Egypt's trade balance with the exception of the textile and clothing sectors. By 2005, the value of imports is expected to increase by US$247 million, which is mainly due to the lowering of tariffs. That increase, however, is offset by an

expansion in exports by the nearly comparable amount of US$240 million, thus resulting in a modest net effect of US$-7 million on the trade balance.

The Government has taken important steps in recent years to comply with WTO commitments and improve its trade regime, all of which are positive benefits of joining the WTO. With the assistance of donor agencies such as USAID, the Government has implemented programs to improve product standards, labeling requirements and quality control, and adopted legislation concerning anti-dumping measures and intellectual property rights. Computerization of the Customs Department and training provided to officials on shipment processing also has been of great importance to the facilitation of trade. By following these programs, Egypt has improved its productivity in conjunction with the improvement of its trade regime, which will enable it to compete more effectively in the world economy.

The European Mediterranean Agreement (EMA) for Egypt is close to being signed and follows the agreements signed in 1995 between the EU and Tunisia and Morocco. According to Cassing *et al.* (1998) the EMA's basic objectives are to (i) support economic growth and integration throughout the Mediterranean region, (ii) achieve free trade in manufactured goods between EU and Egypt, (iii) grant preferential access in agricultural products, and (iv) liberalize trade in services and capital. The agreement offers a framework for significant increases in exports of both fresh and processed fruits and vegetables to the European Market. In recent years, fruits and vegetables accounted for 35 percent of Egypt's total agricultural exports, and vegetables accounted for 88 percent of Egypt's agricultural exports to Europe. On the import side, Egypt only accounts for 0.25 percent of Europe's total agricultural imports (Cassing *et al.*, 1999). A study to assess the impact of the EMA on Egypt's trade in processed food exports to the EU was recently completed. It concluded that: 1) EU agricultural policies are rigid and prevent rapid growth in exports of Egyptian fruits and vegetables, and the few new concessions being offered Egypt by the EU are small with benefits equivalent to about 10% of current exports—although if Egypt does not sign the agreement it will lose concessions previously granted on a temporary basis; and 2) while long term gains can be expected from tariff reductions on industrial goods, they derive as much from Egypt's own trade liberalization measures as from new EU concession.

In 1998 Egypt signed regional and bilateral trade agreements that also play an important role in the country's trade strategy. The Common Market for Eastern and Southern Africa (COMESA) exposes Egypt to 19 new markets in Africa with more than 350 million consumers. Zero-rate tariffs will be implemented for intra-COMESA trade by the year 2000 with a Customs Union to take effect in 2003. In the first year of Egypt's membership, trade among COMESA countries is expected to surge to US$4 billion, up from previous levels of around US$2.4 billion (Arabic News, 1998 and Al-Ahram Weekly, 1998). With expected competition from South Africa, Egypt will be forced to improve product quality and shipping facilities to bolster competitiveness and productivity to meet the anticipated increase in intra-regional trade. The first step was taken in August 1999 by the private sector with support from GAFI, when the first direct maritime route to eastern Africa was established. According to the *Egyptian Gazette* (July 19, 1999), the shipping line will link the Suez Port to the eastern African harbors of Mombasa, Kenya and Djibouti. Both Egypt and its African partners will benefit from the regular transport service, which will be serviced initially by six ships with a cargo capacity of approximately 40 tons. Egypt Air has also committed to increasing the number of flights to many members of COMESA.

On the financial side of promoting COMESA, Egyptian banks and the African Import and Export Bank are expected to strengthen relations and the Egyptian Ministry of Economy and Foreign Trade is investigating the possibility of developing an export guarantee scheme with insurance companies. The proposed insurance scheme, to be funded by the Social Fund for Development, will offer soft loans to small and medium size businesses that do not have assets to be used as collateral (*Egyptian Gazette*, July 21, 1999). The former Ministry of Trade and Supply planned to launch trade and marketing teams to boost trade between the two continents at the end of this year, and recently allocated LE300 million to insure and guarantee the marketing of Egyptian exports in African markets (*Egyptian Gazette*, July 20, 1999).

Box 3.2
Summary of Important Tariff Reforms Made Since 1991

Date	Action Taken
1998	Tariff rates reduced by 5 to 10 percentage points, with maximum rates of 50% lowered to 40%, rates of 45% reduced to 40%, and 40% and 35% both reduced to 30%. Rate changes excluded those on passenger cars and did not affect those above 50% and below 30%.
1997	Tariff rates reduced by 5 percentage points with maximum rate at 50% (from 55%); other rates above 30% reduced by 5 percentage points.
1996	Maximum tariff rate reduced to 55% (from 70%); other rates reduced by 10 to 15 percentage points, such as 60% tariff reduced to 45%, 50% reduced to 40% and 40% reduced to 30%; maximum rates for passenger cars reduced to 135%
1994	Maximum tariff rate reduced to 70 percent; tariffs between 30 and 70 percent reduced by 10 points; rates below 30 percent were unaffected.
1993	Tariff rate dispersion narrowed to a range of 5 to 80 percent.

In May 1998 Egypt and the United States agreed to begin talks on a Trade and Investment Framework Agreement (TIFA). A TIFA is expected to be an intermediary step before starting talks on a free trade agreement at some future date. In January 1998 Egypt began implementing agreements reached with Arab League members in connection with the Arab Common Market treaty of the 1960s. These agreements call for phasing out existing tariffs over a 10-year period.

New free trade zones (FTZ) were also created between Egypt and Turkey and Egypt and Tunisia in 1998. The Egypt-Tunisia FTZ exempts 58 Egyptian and 42 Tunisian products from custom duties and a gradual exemption for all other items by 2007. A 20 percent reduction in custom duties was also granted to a group of other commodities for five years. The expected impact of tariff reductions and exemptions is an increase in bilateral trade from US$72 million in 1997 to US$300 million in 2000. The Egypt-Turkey FTZ intends to boost trade, investment ties and cooperation by using Turkey as a gateway for Egyptian products into markets of East Europe and Western Europe. In turn, Egypt will serve as a gateway for Turkish commodities to the Middle East and Africa. The expected effect is to increase trade value from US$795 million in 1997 to US$1 billion by end-1999 (Egypt Guide, 1999).

2. Trade Policies and Regulations

a. Tariffs

Egypt's tariff regime is a principal channel through which trade can be liberalized, and it has already undergone many changes in recent years (see Box 3.2). The current structure was established by Law 187 of 1986 and is based on Harmonized System (HS) codes adopted in 1993. The general maximum tariff is currently 40 percent, which has been progressively reduced

during the last several years. According to Cassing *et al.* (1998), in 1998 the average nominal rate of protection (NRP) was 22.9 percent, down from 23.6 percent one year earlier. The effective rate of protection (ERP) was higher than the NRP, as calculated by Kheir-El-Din (see Nathan Associates, *et al.*, 1998), in 1998. Changes in nominal and effective rates of protection, shown in Table 3.9, illustrate the downward trend in tariff rates.

Table 3.9
Nominal and Effective Rates of Protection in Egypt, 1997 versus 1998 (percent)

Activity	NRP a/		ERP b/	
	1997	1998	1997	1998
Agriculture	**7.14**	**7.01**	**6.81**	**6.67**
1. Agricultural food products	6.82	6.44	6.62	6.20
2. Agricultural non-food products	9.49	9.49	9.63	9.63
3. Livestock products	5.11	5.11	3.17	3.17
Manufacturing	**27.37**	**25.42**	**33.22**	**31.53**
4. Food processing	6.87	6.82	6.39	6.54
5. Beverages	271.64	263.03	-1781.70	-888.65
6. Tobacco processing	85.00	85.00	88.47	88.90
7. Cotton ginning	3.01	5.01	-10.89	-10.86
8. Spinning and weaving	27.95	28.95	47.55	53.09
9. Final wear	46.64	38.29	55.86	45.06
10. Leather & leather products (excl. footwear)	31.13	28.49	47.57	43.44
11. Footwear	39.10	33.55	50.81	43.79
12. Wood & wood products (excl. furniture)	8.64	8.61	6.10	6.26
13. Furniture	49.90	39.95	83.80	63.30
14. Paper and printing	17.05	16.37	17.84	17.11
15. Chemicals (excl. petroleum refining)	10.01	9.98	9.20	9.25
16. Petroleum refining	11.81	11.81	13.76	13.80
17. Rubber and plastic products	28.47	27.64	43.07	45.31
18. Porcelain, china and ceramics	35.04	29.55	55.95	45.33
19. Glass products	20.65	19.74	23.20	22.27
20. Non-metallic products	15.18	15.01	18.52	19.11
21. Steel, iron and metallic products	16.06	15.78	18.06	17.97
22. Machinery and equipment	15.30	13.29	13.49	13.14
23. Means of transport	43.97	41.49	55.62	52.64
24. Other manufacturing	18.14	17.47	18.52	17.49
Average	**23.62**	**22.91**	**30.48**	**28.14**

a/ NRP – nominal rates of protection were calculated as average nominal tariffs weighted by 1996 imports.
b/ ERP – effective rates of protection.
Notes: Calculations for 1998 were completed before new tariff changes were announced and are therefore estimates.
Source: Cassing** et al. **(1998).

b. Trade Regulations

Egypt has made significant improvements in trade regulations beyond those made to the tariff structure. Import bans, which were once a key instrument in regulating trade, have undergone many important changes. For example, in 1990 the import ban list covered 210 products. By July 1993, the Egyptian Government had dropped all but three commodities from the import ban list: textiles, apparel, and poultry. Also in 1993 the list of goods requiring prior approval before importation was eliminated. The poultry ban was lifted by the end of July 1997 and was replaced by tariff subject to annual reduction. On January 1, 1998, the textile ban was also lifted. The remaining ban on apparel is expected to be lifted by January 1, 2002. In 1998 the Minister of Trade and Supply passed two key ministerial decrees that affect trade. Ministerial Decree 364/1998 reduced export restrictions and Ministerial Decree 1026/1998 improved the temporary

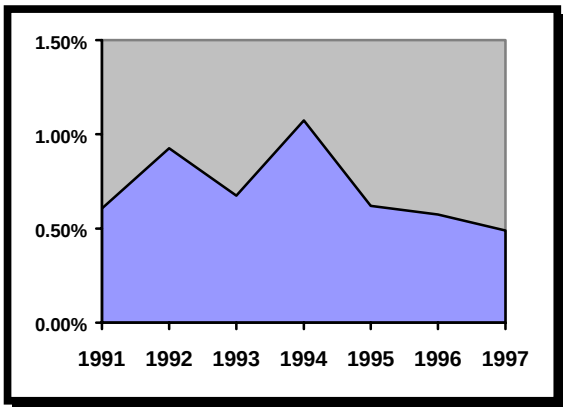
admissions and duty drawback scheme. Other improvements to trade regulations, such as port services and customs processing, are being planned.

C. Investment Promotion Strategy

1. The Role of Investment in Egypt's Economic Development

The rapid expansion of global production and markets in the last two decades has given rise to systemic changes in the world economy. In most regions of the world the introduction of new technologies through cross-border production networks and the dissemination of new skills in the workforce have become as important to the specialization of production activities as capital, labor and natural resource endowments. This new globalization process represents a fundamental shift from the earlier emphasis on an inward-oriented strategy to one based on integrated trade and investment networks. In line with this process, Egypt has undergone significant economic reforms since the early 1990s in favor of macroeconomic stability and market liberalization that have induced substantial capital inflows and encouraged the country's participation in global production and market networks.

Figure 3.1
Egypt's Share of FDI Flows to Developing Countries, 1991-97



An essential component of this globalization process for Egypt has been the strategic interactions that have occurred between private firms and the Government. As new investment opportunities have arisen from the liberalization and deregulation of business activities, the Government has increasingly sought to encourage domestic investment and foreign capital and technology transfers. It is the liberalization of this regulatory environment that has helped to determine the location and effectiveness of the cross-national production networks in Egypt. The regulatory system has become a key facilitating mechanism for globalization of international production systems and markets. To accelerate the globalization process in Egypt, efforts are being made to exploit international factor cost differentials, minimize transactions costs, access clusters of specialized capabilities and contested growth markets, and reduce the response time to technological changes and market requirements. Until the recent global financial crisis, foreign direct investment (FDI) inflows into developing countries increased by an average of 15 percent a year, and in Southeast Asia it averaged 33 percent a year. As a result, developing countries' share of FDI inflows worldwide has increased sharply. Egypt has yet to realize levels that are anywhere near to those of the East and Southeast Asian economies before that region's financial crisis, but FDI inflows have nevertheless expanded significantly. Inflows into Egypt equaled US$253 million in 1991 and rose to around US$750 million by 1997, although relative to total FDI inflows into developing countries, the country's share fell somewhat during the period (see Figure 3.1). In 1998, FDI inflows into Egypt reached US$1.3 billion, according to the Central Bank of Egypt. The challenge for Egypt is

therefore the creation of a system that will facilitate cross-border investment and trade, and ensure that it is a full participant of the globalization process.

2. Impact of New Legislation

Annex 3 provides details on legislation impacting on investment. The expected benefits resulting from the introduction of new legislation and amendment of previous legislation on investment incentives include increased private sector investment in targeted areas and the improvement in the competitiveness and productivity of those new companies. Other benefits include diversion away from less productive to more productive uses and stimulation of capital inflows from abroad. In contrast, the main costs associated with the legislation are the tax revenues forgone to the Government of Egypt. Indirect costs, which are not easily quantified but are also important, include interference in market forces, distortion of competition resulting from investment incentives, and investments foregone that could have been made by companies were they eligible under the law.

The impact of Egypt's recent legislation on investment incentives was recently evaluated by Marks and Gianni (1998) and is summarized below. While complete data are not available due to the short time elapsed since the introduction of new legislation, it appears that investment has increased significantly in Egypt as a result of Law 8. It should be noted, however, that the statistical results may be biased upwards because the database published by the General Authority for Investment and Free Zones (GAFI) includes mainly planned rather than actual data for investment and employment.

Table 3.10
Companies Established with Investment Incentives, 1995-98

Activity	1995	1996	1997	1998	Total
			New - -- -- > Law		
Industry					
No. of companies	91	117	622	1,137	1,967
% change	*93.6*	*28.6*	*431.6*	*82.8*	
% of total	*62.3*	*48.3*	*67.1*	*69.4*	
Agriculture/Construction					
No. of companies	5	14	80	179	278
% change	*66.7*	*180.0*	*471.4*	*123.8*	
% of total	*3.4*	*5.8*	*8.6*	*10.9*	
Tourism					
No. of companies	33	90	162	242	527
% change	*120.0*	*172.7*	*80.0*	*49.4*	
% of total	*22.6*	*37.2*	*17.5*	*13.8*	
Free Zones					
No. of companies	17	21	63	81	182
% change	*53.5*	*23.5*	*200.0*	*28.6*	
% of total	*11.6*	*8.7*	*6.8*	*3.8*	
Total					
No. of companies	146	242	927	1,639	2,954
% change	*92.1*	*65.8*	*283.1*	*76.8*	

Source: GAFI, as reported in Marks and Gianni (1988).

a. Impact on Actual Investment - - Table 3.10 shows the impact of investment incentives in terms of the number of companies registered in Egypt. Although Law 8 was in effect during only part of 1997, the largest increase occurred in that year for all types of companies when compared with other years. The largest number of new establishments was created in industry, which accounted for nearly 70 percent of all companies in 1998, up from 62 percent in 1995. Data for companies involved in agriculture and construction also indicate increases in the number of companies and in their share in the total number of companies over the 1995-98 period. In contrast, while the number of companies involved in tourism and in free zones continued an upward trend, they did so at a slower pace than other sectors enjoying investment incentives.

The surge in number of new companies recorded in 1997 should probably be attributed to the improvement in administrative procedures rather than to the fiscal incentives, which were similar to those under previous legislation. For example, the automatic eligibility and approval process of Law 8 has removed discretionary and arbitrary decisions taken under the earlier legislation. The issue of transparency is important for both foreign and Egyptian investors, and was further improved by the clear focus of the eligibility criteria on 16 activities, compared with the vague eligibility criteria under the former legislation. Also, the automatic approval process replaced a costly, lengthy and cumbersome one that involved high-level investment committees. This improvement saves time and money for both the Government and potential investors

Table 3.11
Comparison of Investment Indicators Under Law 8 and Previous Legislation
(LE million and percent)

	Number of Companies				Total Investment				Foreign Investment			
	Previous Laws a/	Law 8 b/	Difference		Previous Laws a/	Law 8 b/	Difference		Previous Laws a/	Law 8 b/	Difference	
			No.	% change			No.	% change			No.	% change
Land Reclamation	9	113	104	1,156	205	5,457	5,252	2,562	1	363	362	36,200
Agriculture/Fisheries	33	76	43	130	733	367	(366)	(50)	25	22	(3)	(12)
Industry and Mining	438	1,398	960	219	11,750	17,291	5,541	47	1,063	774	(289)	(27)
Computer & Software	13	106	93	715	326	147	(179)	(55)	53	8	(45)	(85)
Tourism	138	313	175	127	7,921	12,496	4,575	58	678	452	(226)	(33)
Air Transport	1	8	7	700	10	122	112	1,120	-	18	18	--
Maritime Transport	-	3	3	--	-	13	13	--	-	-	-	--
Oil Service Support	4	25	21	525	98	1,658	1,560	1,592	12	53	41	--
Housing	-	10	10	--	-	163	163	--	-	-	-	--
Infrastructure/Construct.	4	42	38	950	147	7,720	7,573	5,152	24	1,434	1,410	5,875
Hospitals	11	100	89	809	113	357	244	216	21	16	(5)	(24)
Lease Financing	5	19	14	280	141	250	109	77	24	1	(23)	(96)
Share Subscription Guarantees	4	4	-	-	44	20	(24)	(55)	0	3	3	2,900
Venture Capital	1	2	1	100	70	280	210	300	10	205	195	--
Social fund for		2	2	--			-	--			-	--
Development Projects	-	-	-	--	-	0	0	--	-	-	-	--
Total	661	2,221	1,560	236	21,558	46,341	24,783	115	1,911	3,349	1,438	75

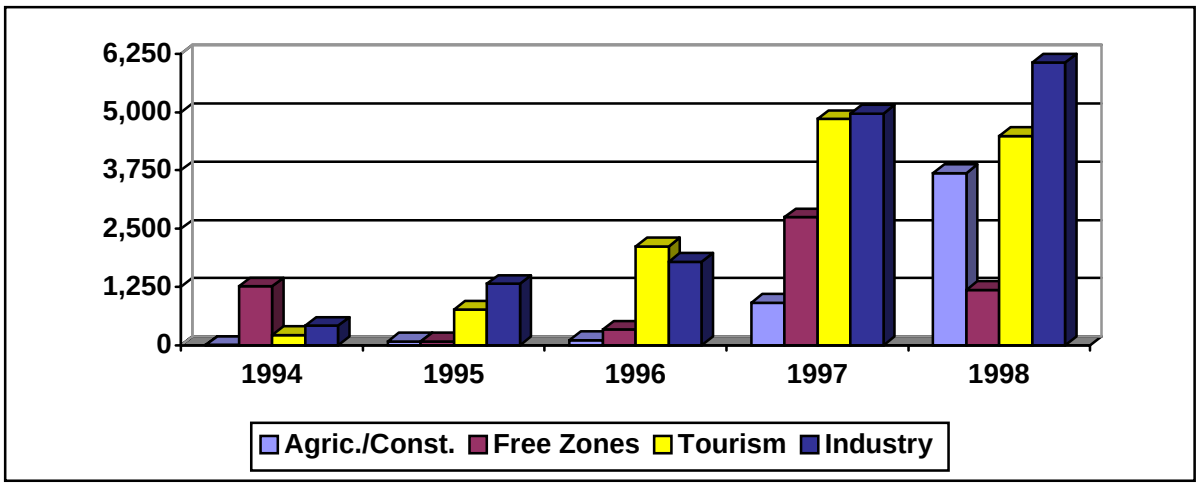
a/ Data are for the period January 1, 1996 to May 31, 1997.
b/ Data are for the period June 1, 1998 to September 30, 1998.
Source: GAFI, as reported in Marks and Gianni (1998).

a. Impact on Planned Investment -Table 3.11 indicates that the number of companies that were planned to be created under new investment legislation increased significantly (236 percent) compared with the number created under previous legislation. Likewise, total planned investment also expanded markedly, up 115 percent from the comparable period under previous legislation. Total planned investment expanded in most activities, especially in infrastructure, industry, land reclamation and tourism. Data for total planned investment indicate contractions for share subscription guarantees, computers and software, and agriculture. Although the value of planned foreign investment increased by 75 percent under the new investment law compared with the value under previous laws, its share to total planned investment decreased slightly (7

percent under Law 8 versus 9 percent under previous legislation as planned domestic investment increased even more sharply).

b. Impact on Planned Capital Issues - Large increases in the planned capital issues of companies eligible for investment incentives were recorded in 1997-98, as shown in Figure 3.2. Companies involved in agriculture and construction recorded the greatest expansion in capital, followed by industry. Despite the overall upward trend, however, the growth of capital expansion slowed considerably in 1998 and contracted for companies involved in tourism and those located in free zones.

Figure 3.2
Planned Capital Issues of Companies Eligible for Incentives, 1994-98
(LE million)



Source: Marks and Gianni (1998).

The primary beneficiaries of the new Investment Law in Egypt appear to be Egyptian companies involved in industry, as shown in Table 3.12. More than 80 percent of planned capital issues originated from Egyptian companies, compared with 7 percent for capital issues originating from Arab countries and 12 percent originating from other foreign companies. For Arab companies, most investment in 1992 occurred in tourism and industry. Other foreign companies dominated investment in agriculture and construction.

c. Impact on Free Zone Trade - According to ownership type of companies operating in free zones in Egypt, companies owned by Egyptians benefited the most from new investment legislation based on the value of capital stock recently issued (see Table 3.13). During 1997-98 more capital was invested in free zone areas by Egyptian-owned companies than foreign-owned and Arab-owned companies, despite the marked decrease in the overall investment of Egyptian-owned companies in 1998. In contrast, investment increased substantially for non-Arab foreign owned companies during that period, and accounted for 11 percent of total investment in 1998 compared with 2 percent one year earlier.

Recent data shown in Table 3.14 signal possible shifts in the major markets for companies operating in free zone areas that should be monitored on a longer term basis as data become

available. For example, exports to Western Hemisphere countries, which were the third most important export market in 1996 and 1997, expanded significantly during that period while those to its leading export market, the Arab countries, contracted. While the value of exports to European countries registered an important annual growth, in terms of their share to total exports they remained almost the same. For the import markets, or the countries that supply goods to companies operating in Egyptian free zones, the most important shifts occurred in Europe and the Western Hemisphere countries. Imports from Asia and Australia dominated the supplying countries in 1996 and 1997, although the growth in imports from these regions expanded only slightly.

Table 3.12
Planned Capital Stock Issued by Origin of Ownership and Sector, 1998

	Egyptian	Arab	Other Foreign	Total
	LE million			
Industry	5,316	439	310	6,065
Agriculture/ Construction	2,203	106	1,384	3,693
Tourism	3,966	469	53	4,488
Free Zones	1,008	47	129	1,184
Total	12,493	1,061	1,876	15,430
Share in Total:	Percent			
Industry	42.7	41.4	16.5	39.3
Agriculture/ Construction	17.6	10.0	73.8	23.9
Tourism	31.7	43.2	2.8	29.1
Free Zones	8.1	3.4	6.9	7.7
Total	80.1	6.9	12.2	100.0

Note: Data are for January to October 1998.
Source: GAFI, as reported in Marks and Gianni (1998).

Table 3.13
Capital Stock Issued by Companies Operating in Free Zones, by Origin of Ownership

	1997	1998	Difference	
	LE million		LE million	% Change
Egyptian	2,512	1,008	-1,504	-59.9
Arab	79	47	-32	-40.5
Other Foreign	64	129	65	101.6
Total	2,655	1,184	-1,471	-55.4
Share in total:	1997	1998		
	Percent		Difference	
Egyptian	93.6	85.1	-9.5	
Arab	3.0	3.0	1.0	
Other Foreign	2.4	10.9	8.5	

Note: Data refer to January-October of each year.
Source: GAFI, as reported in Marks and Gianni (1998).

Table 3.14
Recent Changes in Trade of Egyptian Free Trade Zone, 1996-97
(US$ million and percent change)

	Exports			Imports		
Market	**1996**	**1997**	**Change**	**1996**	**1997**	**Change a/**
Asia/Australia:						
US$ million	13	12	-7.7	487	598	22.8
Share in total (%)	*3.2*	*3.1*	*-1.1*	*49.5*	*52.7*	*3.2*
Europe:						
US$ million	87	114	31.0	368	327	-11.1
Share in total (%)	*28.1*	*29.6*	*1.5*	*37.4*	*28.8*	*-8.6*
W. Hemisphere:						
US$ million	61	94	53.1	102	186	82.4
Share in total (%)	*19.7*	*23.4*	*3.7*	*10.4*	*16.4*	*6.0*
Arab Countries:						
US$ million	148	163	10.1	21	22	3.8
Share in total (%)	*47.7*	*42.3*	*-5.4*	*2.1*	*1.9*	*-0.2*
Africa:						
US$ million	1	2	100.0	5	1	-80.0
Share in total (%)	*0.3*	*0.5*	*0.2*	*0.5*	*0.1*	*-0.4*
Total	**310**	**385**	**23.2**	**983**	**1,134**	**15.4**

a/ Change in value of investment refers to annual percentage change; change in share in total refers to change in percentage points.
Source: GAFI, as reported in Marks and Gianni (1998).

d. Impact on Employment **- -** During the last few years (1995-97) overall job creation followed an upward trend, and grew at a faster rate during the first years of operation of Law 8 than in earlier years when other investment legislation was in force (see Table 3.15). This trend especially holds for employment in industry, which expanded significantly in 1997/98. In agriculture and construction, the number of jobs continually expanded during the three-year period. It is likely that factors other than investment legislation contributed to increases in employment in 1997/98, such as fiscal and monetary policies, shifting market opportunities or financial flows. Nonetheless, given the data on expansion in capital formation for the years during which Law 8 was in operation as discussed above, it is likely that new legislation positively impacted on employment in Egypt.

Table 3.15
Employment Creation in Main Economic Sectors Eligible for Investment Incentives, 1995-98
(Fiscal Year Increases in Employment)

	1995/96	1996/97	1997/98
Industry	70,000	72,000	144,000
Agriculture	36,000	54,000	73,000
Construction	62,000	67,000	75,000
Tourism	4,000	5,000	0
Total New Jobs	**172,000**	**198,000**	**292,000**

Source: Ministry of Economy, Quarterly Economic Report, November 1998, *as* ***reported in Marks and Gianni (1998).***

3. Views on Investment Regime

Recent changes in the investment policies, as reviewed above, are for the most part viewed as improvements to previous legislation. The clearly defined eligibility criteria are one of the main features of Law 8, as is the automatic approval process. These two features result in a shortened time period required to establish businesses and the avoidance of arbitrary bureaucratic decisions in the approval process. Another positive characteristic of Law 8 is that it overlaps with Law 230, since investment incentives provided under Law 230 remain valid and expire under the conditions set when the investment was made. No minimum investment is required under Law 8, nor was it required under Law 230. The continued absence of this requirement in investment legislation widens the number of companies eligible to take advantage of the law, especially for small and medium size businesses. Further participation across the private sector is encouraged because all legal forms of businesses (e.g., sole proprietorship, partnership, joint stock company) are eligible to enjoy Law 8 benefits. Investment guarantees were also improved in Law 8, compared with those under Law 230. Furthermore, Law 8 allows companies to freely determine the market price of their products, which under Law 230 the Government permitted in certain circumstances.

The legislation has nonetheless drawn criticism, which from sources outside Egypt mainly focuses on the generosity in offering fiscal incentives to numerous activities, thereby forfeiting the tax revenue from companies that would have invested regardless of incentives (Marks and Gianni, 1998). This shortcoming is also related to the criticism that incentives should be targeted more closely to reaching national goals, and that other forms of fiscal incentives such as investment tax credits and accelerated tax holidays could be equally effective while generating much-needed revenue for the Government. The private sector within Egypt has complained that some activities that previously enjoyed investment incentives under Law 230 are excluded from Law 8 (e.g, those related to road transportation and export marketing and trading), and that additional investments are not allowed to benefit from new legislation, as previously stipulated under Law 230. Other complaints focus on the absence of addressing the labor law, which also impacts on an investor's decision, and the unclear guarantee of the ability of investors who withdraw from Egypt to repatriate profits and capital. Also, the fact that incentives take effect the first year after production and not the year of first profits realized is an important point of contention.

References

Al-Ahram Weekly, 1998 [Online], "A Foothold in African Markets", Issue No. 384, 2-9 July, Available: http://163.121.116.16/weekly/1998/384/ec5.html.

American Chamber of Commerce in Egypt, 1997a, *"Privatization in Egypt: 'An Update"*, May 1997.

American Chamber of Commerce in Egypt, 1997b, *Investments Guarantees & Incentives Law - "Law No. 8 of 1997"*, September.

American Chamber of Commerce in Egypt, 1996, *The Egyptian Labor Force.*

Arabic News, 1998 [Arabic News.Com online], "Egypt to Formally Join African Common Market", 6/20/98, available: http://208.206.42.13/ansub/Daily/Day/980620/1998062010.html.

Cassing *et al.*, 1998, *Enhancing Egypt's Exports*, report submitted to USAID, Cairo, Egypt, June.

DEPRA, 1997. *Egypt: A Comparative Study of Foreign Direct Investment Climates,* report submitted to US Agency for International Development, Office of Economic Analysis and Policy, Cairo, Egypt, August 20.

Egypt Guide, 1998 [Online], available: www.egyptguide.net/business/opportunities/trade.htm [No date].

IBTCI, 1999, *Quarterly Review for the Period 1 January to 31 March, USAID Privatization Project, Evaluation Services Contract,* report submitted to US Agency for International Development by International Business & Technical Consultants, Inc.

IBTCI, 1998, *Semi-Annual/Quarterly Review for the Period 1 July to 31 December, USAID Privatization Project, Evaluation Services Contract,* report submitted to US Agency for International Development by International Business & Technical Consultants, Inc.

IMF, 1998, *Egypt: Beyond Stabilization, Toward a Dynamic Market Economy,* May.

Marks and Gianni, 1998, *Egypt: Comparison of Cost Effectiveness of Investment Incentives*, report submitted to US Agency for International Development, Office of Economic Analysis and Policy, Cairo, Egypt, December 18.

Nathan Associates, *et al.*, 1998, *Effective Rates of Protection in Egypt*, report prepared for the Government of Egypt and submitted to the U.S. Agency for International Development.

Annex3 LEGISLATION IMPACTING ON INVESTMENT

A. Main Investment Incentive Legislation

Law 8 of 1997 on Investment Guarantees and Incentives, also known as the "Investment Law," is the fundamental legislation currently governing investment incentives in Egypt. It was adopted in response to a broad effort on behalf of both the Government and the private sector to rationalize the numerous and complex laws governing commerce and investment. Law 8 replaced Law 230 of 1989, which in turn replaced Law 43 of 1974. The law is automatically applied to certain activities identified in Box 3A.1, with the exception of businesses operating in free zones. Details on the features of the law are provided by Marks and Gianni (1998), and are summarized as follows.

1. Investment Guarantees

The investment guarantees covered in Law 8 include nationalization (Article 8), administrative seizure or sequestration (Article 9), pricing interference and determination of profits (Article 10), rescission of licenses (Article 11), land ownership rights (Article 12), and the right to import raw material and equipment directly or through intermediaries (Article 13). Various exemptions from certain corporate law and labor law requirements are also provided by the law (Articles 14 and 15).

2. Tax Incentives

Law 8 provides exemptions from several taxes, such as income tax, stamp tax and capital gains tax; it also reduces import duties. Details are as follows.

- ***Income tax exemption - -*** Articles 16 through 19 provide details on an income tax exemption, which is valid for up to five years from the first year following the initiation of production. The period of exemption is extended to ten years for investments made in specific remote areas such as new urban communities or new industrial zones. A 20-year exemption is granted to investments made outside the Old Nile Valley. Individuals, as well as corporations, enjoy this tax concession.

- ***Stamp tax exemption - -*** Article 20 provides exemption from payment of the stamp tax, notarization and registration fees for three years starting from the date of registration with the Registry of Commerce. These taxes are widely applied to the registration of business documents, such as contracts, minutes of company meetings and commercial papers. While the fees are generally nominal, they are considered an administrative burden and an important expense in terms of their

cumulative cost. Despite its low fee, the stamp tax is the third source of Egypt's indirect tax revenues, following customs duties and sales taxes.

Box 3A.1
Qualifying Activities that Benefit from Law 8 of 1997

- Reclamation and cultivation of barren and desert lands.
- Animal, poultry and fish production
- Industry and mining
- Hotels, motels, boarding houses, tourist resorts and tourist transportation
- Transportation of goods in cooling vans, cold storage installations for agricultural products, food and containers and silos for grain
- Air transport and directly related services
- Sea transportation of goods and passengers outside territorial waters
- Oil exploration services and transport and delivery of gas
- Housing projects other than housing for administrative purposes
- Infrastructure projects including potable water, sanitary drainage, electricity, roads and communication
- Hospitals and certain medical centers
- Financial leases
- Guarantee of subscription to securities
- Risk capital
- Production of computer programs and systems
- Projects financed by the Social Fund for Development

Note: These activities are automatically approved to receive benefits of Law 8. Other activities, such as those located in free zones, also benefit from incentives offered by Law 8 but require approval.
Source: Marks and Gianni (1998).

- ***Special income tax exemption*** **- -** Under Article 21, companies listed on the Egyptian Stock Exchange enjoy a special tax income exemption for an amount equal to a percentage of their paid-in capital. That percentage is determined by the Central Bank of Egypt discount and lending rates for the year of fiscal treatment.

- ***Exemption for tax on interest income*** **- -** Article 22 provides an exemption from tax on movable capital for income generated from registered bonds and other financial instruments issued by publicly listed companies. The tax on movable capital is a schedular tax that applies a rate of 32 percent to interest-type income.

- ***Reorganizations*** **- -** Articles 24 and 25 state that profits resulting from mergers, divisions or changes in the legal status of companies are exempt from taxes and duties. Such reorganizations will not prematurely end the tax incentive benefits, and will not extend the period for which the tax benefits were originally granted.

- ***Capital gains - -*** Article 26 provides exemption from capital gains realized on the transfer of assets to a new legal entity as a capital contribution.

- ***Customs taxes - -*** Article 23 stipulates that a flat 5 percent tax will be applied to all machinery and equipment imported for investment projects made under Law 8.

3. Land Allotment

According to Article 28 and Regulations Articles 22 through 27, state-owned land can be allotted free of charge or for a nominal rent for investments made in designated areas.

4. Labor Law and Social Security Requirements

Articles 14 and 15 provide exemptions from certain labor law requirements, such as restrictions on hiring Egyptian staff for those companies not enjoying the benefits of Law 8, and compulsory provisions set by other legislation regarding employees' participation in company management. However, Article 4 of the Executive Decree states that companies benefiting from incentives provided by Law 8 remain subject to the general requirement that 10 percent of the distributed profits be allocated to employees.

5. Free Zones

Law 8 provides many benefits to companies operating in free zones in Egypt. Article 35 states that profits are not subject to tax, except for a one percent tax on the value of goods stored or processed within the zone, or alternatively, a one percent tax on gross income if no input components are used (e.g., assembly projects). Article 32 highlights one of the main features of free zones: most raw materials imported that are to processed within the free zones are exempt from customs taxes and customs procedures. However, according to Article 32, goods produced within the free zones and sold in Egypt are subject to customs taxes and procedures. The American Chamber of Commerce (1997b) highlights that all tools, machines and transportation required to operate a free zone project are exempt from customs duties, sales tax and other taxes and fees, and that the fee for business licensing is waived.

6. Other

Article 2 states that the benefits and privileges of previous exemptions expire at the normal date set for their termination. Furthermore, Law 8 does not require a minimum investment, a certain nationality of the investor, or the choice of a certain business entity.

B. Other Important Legislation Impacting on Investment

1. Law 159 of 1981, Companies Law

Law 159 of 1981 is the main Egyptian corporate law and is important for investment since incorporation is generally the first step taken by a potential investor in any country. Law 159 does not directly provide investment incentives, but addresses provisions by making reference to other laws. For example, Article 183 includes a grandfather clause that states that investments made under Law 43 of 1974 will continue to enjoy the benefits granted under that law. Law 43 is Egypt's former investment law for Arab and foreign capital investment and was superseded by Law 230 of 1989. As previously stated, Law 230 has been replaced by Law 8 of 1997.

Legislation governing investment is also stipulated by Article 11 of Law 159 Regulations. That article states that at least 49 percent of the shares of a joint stock company formed with public offering of shares must be offered for subscription to Egyptian nationals for a one-month period. An exception to this general rule is for companies formed under Law 43 of 1974. Law 159 of 1981 also addresses requirements relating to incorporation, capitalization, types of shares, shareholder rights, responsibilities of directors, management and labor, disclosure, taxes and fees, and issues of control (DEPRA, 1997).

2. Law 157 of 1981, Tax Code

Egypt's Income Tax Code, Law 157 of 1981, contains tax incentive provisions for investment and reinvestment and is based on a schedular tax system. The corporate tax is assessed in a schedule known as "Revenues of Industrial and Commercial Activities." The current general tax rate for corporations is 42 percent, which is reduced to 34 percent for "industrial" companies and profits derived from export operations. Tax benefits provided by the Tax Code mainly relate to tax deferral, tax deduction and exemptions, and are detailed in Marks and Gianni (1998), highlights of which are as follows:

- ***Income tax deferral for reinvestment - -*** Article 117 suppresses the requirement that income be recognized when the proceeds from the sale of a capital asset are reinvested in a similar type of asset. Rather that acting as a tax exemption, the article provides for tax deferral, since the amount of the gain realized on the sale reduces the basis available for depreciation of the new asset acquired.

- ***Tax deduction - -*** Article 27 allows for a deduction from the basis of the corporate tax equal to 25 percent of the cost of assets used in "production" activities. This deduction can result in significant tax savings, even though depreciation allowances are computed on the reduced basis of assets.

- ***Tax exemptions - -*** Article 120 provides a five-year exemption from the corporate tax for new factories employing at least 50 persons. The exemption starts from the first

year following the beginning of production activities. Article 120 also provides for a special tax exemption for companies listed on the Egyptian Stock Exchange, which is equal to a percentage of their paid-in capital. The exemption is effectively equal to the theoretical return that investors could have earned by investing in bank deposits, which means that publicly listed companies are subject to corporate tax on the amount of profits beyond the theoretical return on paid-in capital. Article 120 also provides tax exemptions for less significant targeted investments, such as land reclamation and cultivation, bee breeding, poultry and cattle companies and fisheries.

3. Specific Investment Laws

Law 59 of 1979, known as the "New Urban Communities Law", provides incentives to encourage the development of specific geographic regions of Egypt. Most tax incentives provided by this law were repealed by Law 8 of 1997 and replaced with new incentives for new investment projects in the new urban committees. The exception is the ten-year exemption of property taxes, which was not repealed. Like most of the provisions set forth by Law 59, those in Law 1 of 1973, known as the "Hotels and Tourists Construction Law," were also repealed with the introduction of Law 8 of 1997. However, the incentives provided by Law 143 of 1981, the "Desert Land Law," which aimed to promote the rehabilitation and development of desert land, especially that for use in agriculture, were not repealed and presumably remain in effect. Those incentives provide for a ten-year exemption from the tax on commercial and industrial activities, an exemption from taxes on interest income from loans used to finance desert investment, a five-year exemption from customs taxes on imports, and an exemption from property tax. Law 5 of 1996 complements Law 143, and stipulates that investors can acquire ownership of desert land free or charge or under a renewable lease for a nominal fee and for up to 40 years. The law provides for repossession by the Government if the project is not implemented or production is not started within a certain time period.

4. Other Legislation Impacting on Investment

Other legislation impacting on an investor's decision to invest in Egypt includes commercial law, labor law, social security law, tax law, capital markets law and intellectual property, summarized as follows from Marks and Gianni (1998):

- ***Commercial Law*** **- -** The Civil Code of 1948 and the Commercial Code of 1883 govern commercial contracts, formation of companies, bankruptcy and securitization. Even though Law 95 of 1995 updated leasing transactions, it is generally considered that both codes require modernization.

- ***Labor Law*** **- -** Law 137 of 1981, along with some sections of the two codes governing commercial law, lay out the provisions for relationships between employers and employees in Egypt. The main provisions set forth regulations for: (i) written contract requirements; (ii) working hours, minimum wages, holidays, paid vacations and sick leave; (iii) termination of employment agreements; (iv) representation of workers in company management and entitlement to a ten-

percent share of the distributed profits; (v) restrictions on employment of repatriates, which is not to exceed ten percent of all employees and makes the training of an Egyptian counterpart compulsory; and (vi) the supervision of all issues arising from the relationship between employers and employees to the Labor Office of the Government.

- ***Social Security Law - -*** The main Egyptian social security law is Law 79 of 1975, which was amended in 1977 by Law 25 and in 1984 by Law 47. Both Egyptian employers and employees are required to pay social security contributions for medical coverage and retirement. The law sets contribution rates, and contributions from employees are withheld on a monthly basis.

- ***Tax Law - -*** Marks and Gianni also provide details on aspects of the Tax Code not discussed above that impact on investors' decisions on whether or not to invest in Egypt. In brief, the tax code provides for taxes on employees' salaries to be withheld at the source, exemptions from withholding taxes on dividends, royalty payments and real estate taxes. Law 11 of 1991 provides a general sales tax. Lastly, there are numerous bilateral tax treaties that also serve as important tools to attract foreign investors.

- ***Capital Market Law - -*** Law 95 of 1992 on the Capital Market governs the public offering of shares and the activities of the Egyptian Stock Exchange. Publicly traded companies are required to publish financial and other data, and protection of minority shareholders is provided. The Capital Market Authority oversees the capital markets, and is organized along the lines of the United States Securities Exchange and the French *Commission des Operations de Bourse*.

- ***Intellectual Property Law - -*** As a member of the WTO, Egypt is required to revise legislation to comply with standards on intellectual property under the Agreement on Trade-Related Aspects of Intellectual Property Rights ("TRIPS Agreement"). To comply with regulations on copyrights, Egypt has undertaken a number of revisions to its legislation and has adopted new laws. By January 2000 the environment for intellectual property rights will be strengthened, which will benefit the private sector and attract foreign investors. In 1993-94 Egypt revised its copyright laws and plans to strengthen protection against unauthorized recordings of live performances and broadcasts. By January 2000 the Trademark Law will be amended to protect the mark itself and also the rights of the owner; and the amendments will also improve licensing regulations for the trademark. Also by January 2000 Egypt plans to enact legislation to protect geographical indications of the origin of goods and new or original industrial designs. Egypt also plans to amend its patent law to provide patent protection for non-microbiological plants and animals, or adopt a new plant variety protection law. Other actions that must occur before January 2000 include enacting legislation to protect integrated circuit layout-designs and adopting amendments to protect proprietary information. By January 2005 Egypt is required to amend its patent

law to provide full subject matter protection, including protection of chemical products for foods and pharmaceuticals.

- ***Related Investment Legislation*** **- -** Box 3A.2 highlights recent legislation that affects investment in Egypt.

Box 3A.2
Related Investment Legislation

Prime Minister Decree 11 of 1996	Simplifies procedures for implementing flat 5 percent duty on imports of equipment for tourism projects
Prime Minister Decree 34 of 1996	Organizes offices in the Governorates to assist investors
Law 21 of 1996	Allows private sector companies to engage in maritime transport activities
Law 94 of 1996	Exempts ocean vessels from customs taxes and sales taxes
Law 101 of 1996	Facilitates licensing process for general contractors
Law 223 of 1996	Streamlines documentation required for notarization
Law 224 of 1996	Reduces notarization fees by 50 percent
Law 231 of 1996	Supresses the permit requirement for Egyptian nationals employed by foreign organizations and simplifies notification process
Law 97 of 1996	Allows foreign ownership of banks and liberalizing banking activities
Law 155 of 1996	Opens state-owned bank capital to private investors
Law 156 of 1998	Allows 100-percent foreign ownership in insurance and reinsurance activities

Source: Marks and Gianni (1998).

4 CONTRIBUTION OF PRIVATE MANUFACTURING TO GROWTH AND PRODUCTIVITY

A. Introduction

By 1997, Egypt's manufacturing sector had become the highest contributor to value added at the national level, followed closely by commerce and agriculture (see Table 4.1). In large part, the change in composition of value added has been accompanied by, and also is the result of, the increased role of the private manufacturing sector. The contribution of the manufacturing sector to growth, defined as the growth rate of the sector multiplied by its relative share in the economy, reached 25 percent in

Table 4.1 Composition of Value Added, by Sector, 1997-99 (percent and rank)

Economic Sector	1996/97		1997/98		1998/99 *	
	%	Rank	%	Rank	%	Rank
Agriculture	17.7	2	17.3	3	17.0	3
Manufacturing	17.9	1	18.3	1	18.9	1
Mining , petroleum & its products	6.8	6	6.9	6	6.2	
Electricity	1.8		1.8		1.8	
Construction	5.3		5.6		5.8	
Total commodity sectors	49.5		49.9		49.7	
Transportation	6.8	6	6.8		6.8	6
Suez Canal	2.7		2.6		2.4	
Commerce	17.3	3	17.4	2	17.4	2
Finance	4.9		4.1		4.3	
Insurance	0.1		0.1		0.1	
Restaurants	1.6		1.1		1.4	
Total productive services	32.4		32.1		32.4	
Real estate	1.8		1.8		1.9	
Public utilities	0.4		0.4		0.4	
Government services	7.9	5	7.9	4	7.8	4
Personal services	8.0	4	7.9	4	7.8	4
Total social services	18.1		18.0		17.9	
Grand total	100		100		100	

** Estimated.*

Source: Computed from Ministry of Planning Follow-Up Report 1998/99.

Table 4.2 Contribution of Private Sector to Total (Public and Private Sectors) Manufacturing Output, 1992-97 (percent)

	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
Food	53	54	57	59	60	75
Textiles	72	72	72	74	74	80
Chemicals	47	48	48	49	51	68
Basic Metals	53	53	54	56	58	62
Engineering	59	59	60	61	64	78
All Manufacturing Activities	58	59	60	61	62	74

Source: Ministry of Planning.

1998 and is expected to increase to 30 percent by the end of the decade. As Table 4.2 indicates, the private manufacturing sector contributed nearly three-fourths to total manufacturing output in 1996/97, up from 58 percent five years earlier. Important growth occurred in certain manufacturing activities, such as food and chemicals.

The present chapter aims to explore the contribution of Egypt's private manufacturing sector to the overall manufacturing sector of the country, and its role in promoting productivity and efficiency. The analysis covers the period 1988-96 and is based on fiscal data from 1987/88-1989/90 (referred throughout this chapter as the period 1988-90) and 1990/91-1995/96 (referred to the period 1991-96). The chapter comprises three main topics. The first topic is the contribution of the private manufacturing sector according to sector and activity. The second topic is the contribution of the private sector to value added, by activity. The third topic is the analysis of supply and demand sources of growth.

B. Contribution of Private Manufacturing Sector, by Sub-Sector and Activity

1. Contribution to Sectoral Growth

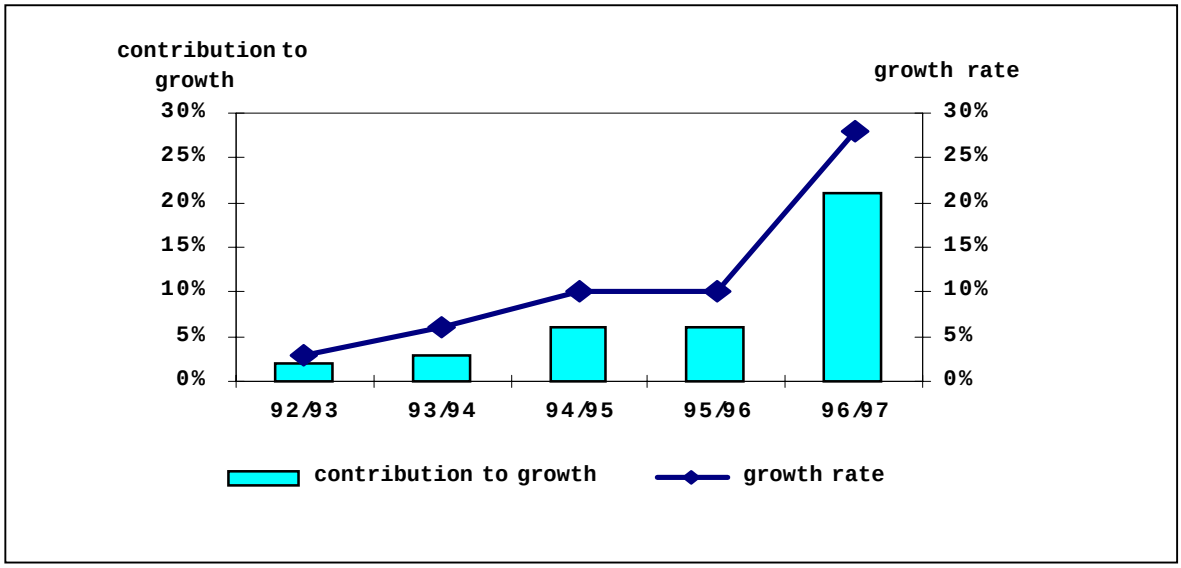
High growth rates of private manufacturing activities recently became the driving force for growth of the total manufacturing sector (see Table 4.3 and Figure 4.1). This performance outweighed the deterioration in production levels of the public manufacturing sector, resulting in a net positive effect for the sector overall. The favorable performance of the private sector is attributed to several factors, one of which is the improved efficiency of private productive operations. Another factor is Egypt's privatization program, which has also improved efficiency. These factors will be further elaborated in the following sections of this chapter and also in Chapters 5 and 6 of this report.

Table 4.3
Recent Performance of Manufacturing Sector, 1993-97 (percent)

	92/93	93/94	94/95	95/96	96/97
Growth rates:					
Overall Manufacturing	3	4	8	8	8
Private Sector	3	6	10	10	28
Public Sector	2	2	4	3	-25
Contribution to Growth:					
Private Sector	2	3	6	6	21

Note: See footnote in Table 4.1 for the definition of contribution to growth.
Source: Ministry of Planning.

Figure 4.1 Contribution of Private Manufacturing Sector to Growth and Growth Rates of Sector, 1993-97 (percent)



Source: Calculated from Ministry of Planning.

2. Contribution of Private Manufacturing Sector to Value Added, by Activity

The structure of Egypt's private manufacturing sector has changed considerably since 1988. Table 4.4 presents a comparison of the structure of value added generation between the two periods under review. During the first half of the 1990's, the sector became more diversified than in the late 1980's. Namely, Egypt has diversified away from traditional activites such as food and textiles to higher value-added activities like engineering. In fact, engineering was ranked as the top sub-sector (out of nine sub-sectors) in terms of contribution to value added during the first half of the 1990's, compared with a fourth-place ranking in the late 1980's.

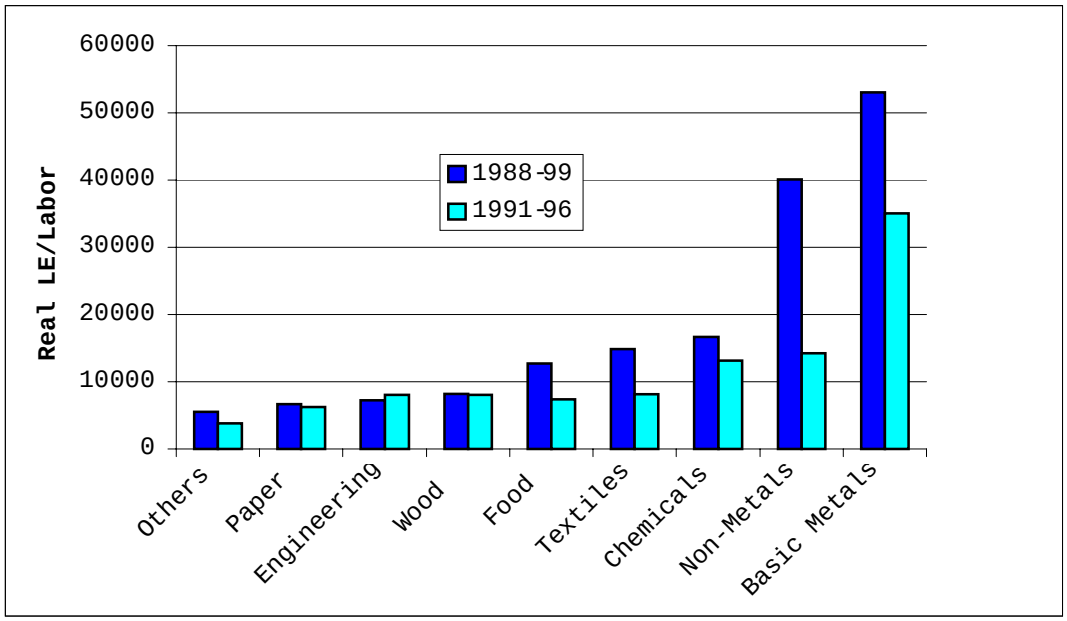
Table 4.4
Distribution of Private Manufacturing Sector Across Activities, 1988-90 versus 1991-96 (percent)

Activities	No. of Firms		Total Labor		Capital Stock		Total Intermediate Goods		Value Added	
	1988-90	1991-96	1988-90	1991-96	1988-90	1991-96	1988-90	1991-96	1988-90	1991-96
Food	50.0	49.0	28.0	25.0	22.0	19.8	25.8	25.3	22.0	19.8
Textiles	20.0	19.0	28.0	28.0	18.8	17.0	20.9	18.2	18.8	17.0
Wood	4.0	4.0	4.0	4.0	2.4	1.5	1.7	1.3	2.4	1.5
Paper	4.0	4.0	8.0	6.0	6.3	7.1	7.2	7.3	6.3	7.1
Chemicals	6.0	6.0	10.0	10.0	17.2	14.7	19.5	15.1	17.2	14.7
Non-metals	7.0	8.0	9.0	9.0	11.3	14.2	5.3	6.9	11.3	14.2
Basic Metals	1.0	2.0	2.0	2.0	8.3	5.5	5.6	6.9	8.3	5.5
Engineering	9.0	9.0	11.0	16.0	14.5	22.0	14.5	18.6	14.5	22.0
Other	1.0	1.0	1.0	1.0	0.3	0.4	0.6	0.4	0.3	0.4
Total Manuf.	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Notes: The period 1988-90 refers to 1987/88-1989/90 and the period 1991-96 refers to 1990/91-1995/96; numbers may not sum to 100 due to rounding.
Source: Calculated from CAPMAS data.

Despite the fact that engineering activities contributed the greatest share of the various manufacturing activities listed in Table 4.4 to total 1991-96 value added, the engineering sub-sector did not use as large a share of most factors of production as other manufacturing activities. For example, food and textile activities used more labor than engineering or any other activity, and food activities used more intermediate goods in their production processes than any other activity. In terms of the generation of employment opportunities for unskilled and semi-skilled labors, textiles and foods are important to a labor-abundant economy such as Egypt. Likewise, the chemical industries are more capital-intensive than the engineering industry, as depicted in Figure 4.2. Figure 4.2 also shows that all but one sub-sector (engineering) decreased their use of capital relative to labor in the first half of the 1990's compared with the last part of the 1980's, indicating that they became more efficient in terms of their use of capital relative to labor. The basic metals sub-sector is the most capital intensive, investing more capital per unit of labor than other sub-sectors, while non-metals reduced their capital intensity to about one third of their 1987/88 level.The value of capital stock was calculated in constant 1987/88 prices.

Figure 4.2
Capital Intensity in Egypt Manufacturing Activities, 1988-90 Versus 1991-96 (LE/Labor at constant 1987/88 prices)



Note: The period 1988-90 refers to 1987/88-1989/90 and the period 1991-96 refers to 1990/91-1995/96.
Source: Calculated from CAPMAS Industrial Output Statistics, Various Issues.

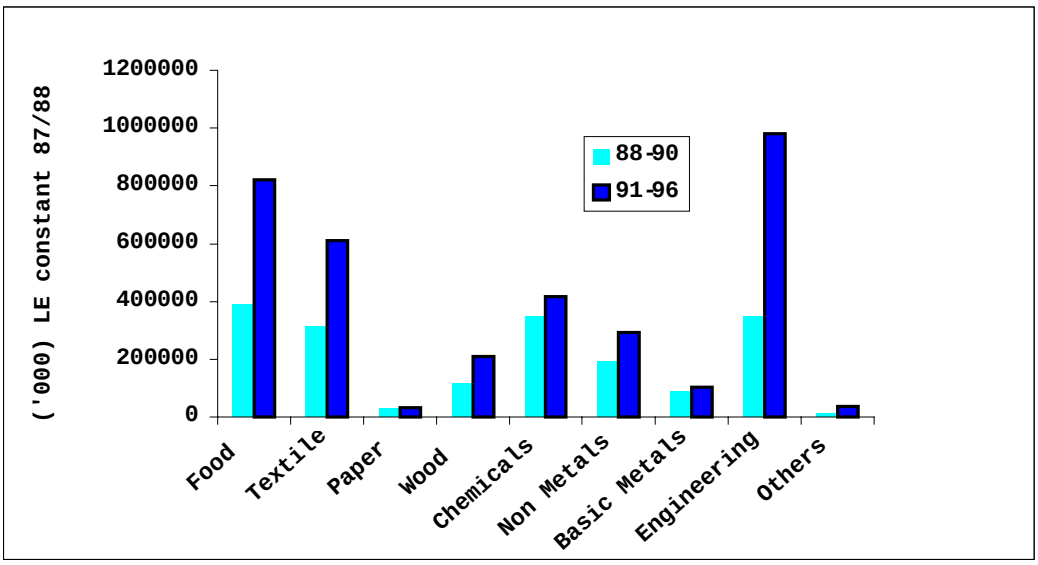
Table 4.5
Growth of Real Value Added per Unit of Labor, Real Capital and Real Intermediates in Private Manufacturing Sector Activities (percent change between 87/88-90/91 - 91/92-95/96)

Activities	VA/ Labor	VA/ Capital	VA/ Intermediates
Food	70.3	136.5	74.7
Textiles	44.5	163.4	65.4
Wood	-19	-24.1	18.7
Paper	79.8	33.5	46.0
Chemicals	-17.2	2.2	21.7
Non-metals	3.9	132.5	11.2
Basic Metals	-4.9	-23	-34.1
Engineering	42.5	30.6	55.2
Other	121.4	179.4	309.0
Total Manufactures	**29.5**	**112.8**	**40.7**

Note: Growth rates are between annual average of pre-reform 87/88-90/91 and post reform 91/92-95/96 at constant 87/88 prices.
Source: Calculated from CAPMAS Industrial Output Statistics, Various Issues.

The shift towards high value-added activities like engineering is mainly due to the strong growth in this sub-sector during 1990-96, which registered about 2.8 fold increase in value added (see Figure 4.3). This performance exceeded that of all other private sector manufacturing activities, and was mainly due to the large capital investments that took place during that period.

Figure 4.3
Value Added in Private Manufacturing Sector, 1988-90 Versus 1991-96 ('000 LE) in constant 1987/88 prices



Source: Calculated from CAPMAS Industrial Output Statistics, Various Issues.

Table 4.6 Structure of Exports and Imports of Private Manufacturing Sector, 1991-97 Average (percent)

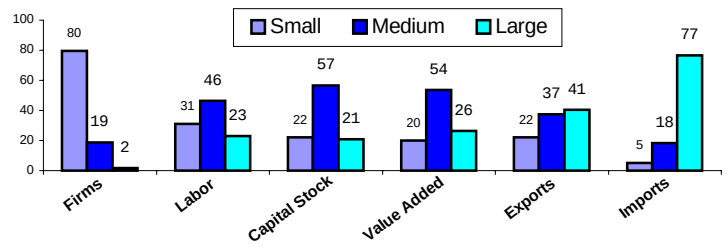
Activities	Food	Textiles	Wood	Paper	Chemicals	Non-Metals	Basic Metals	Engin-eering	Other	Total Manuf.
Exports: 1	11.60	41.10	0.60	1.00	12.30	12.90	13.60	6.30	0.60	100
Imports: 2	19.60	13.50	0.40	6.40	15.00	3.30	15.60	25.70	0.60	100
Exports/ VA: 3	0.07	0.26	0.05	0.01	0.10	0.09	0.29	0.04	0.20	0.11
Imports/ VA: 4	0.23	0.19	0.06	0.19	0.20	0.07	0.57	0.32	0.35	0.22
Net Trade Balance/VA: 3-4	-0.16	0.07	-0.01	-0.18	-0.10	0.02	-0.28	-0.28	-0.15	-0.11

Notes: VA refers to value added; numbers may not sum to 100 due to rounding.
Source: Calculated from CAPMAS Industrial Output Statistics.

In principle, the trend towards high value-added activities seems promising, since they usually generate income and promote growth at the national level. Moreover, the engineering sector is generally technology-based and should therefore be continuously capable of saving land resources and promoting more value added and growth. However, this conclusion is not applicable to engineering in Egypt, which is highly import-dependent and therefore constrained by the availability of foreign exchange.

As shown in Table 4.6, engineering accounts for approximately 26 percent of imports of raw materials and intermediates of the entire private manufacturing sector, while it only accounts for about 6 percent of total exports of the overall manufacturing sector. On average, the cost of generating one unit of output in engineering, in terms of imports, is higher than export proceeds from one unit, which results in a negative net trade balance for engineering products. This result is attributed mainly to the dominance of assembly activities in the production of engineering products. In fact, the net trade balance of the private manufacturing sector and all activities except textiles and non-metals is negative, implying that the import substitution polices that have been in effect in Egypt for many years continue to have an adverse impact on the manufacturing sector. Moreoever, the export-oriented strategies that have been adopted have not yet resulted in positive results for this sector.

Figure 4.4
Profile of Engineering Activity by Firm Size, 1991-96 Average (percent)

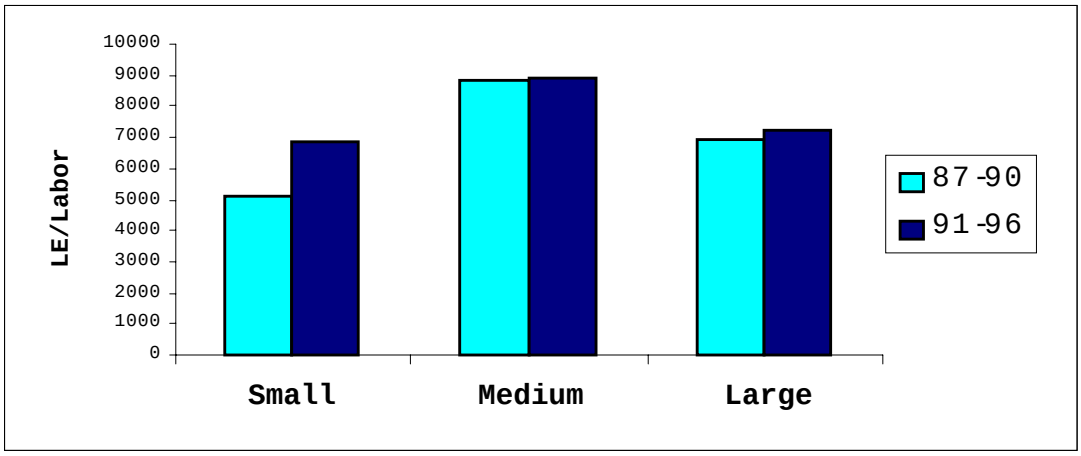


Note: Numbers may not sum to 100 due to rounding.
Source: Calculated from CAPMAS data.

However, aggregate analysis of the engineering sector obscures many promising sub-activities that are capable of generating both value added and exports, such as home appliances. In this case, issues related to the negative net trade balance could be

addressed by investment and production incentives in such a way as to promote the manufacturing of efficient local components. Figure 4.4 provides insights into the engineering sub-sector at the disaggregate level. Small-size firms dominate the Egyptian private manufacturing/engineering sub-sector by accounting for 80 percent of all firm sizes, yet medium-size firms use the most labor and capital and contribute the greatest amount to value added and exports compared with small and large-size firms.[1] In contrast, large-size firms, which account for only two percent of the total private manufacturing/engineering sub-sector in terms of number of firms, far outpace small and medium size enterprises in terms of imports. However, large-size engineering firms use less capital-intensive techniques than medium size enterprises. Small size enterprises use comparatively less capital intensive techniques than either medium or large engineering enterprises, but it is increasing over time, as shown in Figure 4.5.

Figure 4.5
Capital Labor Ratios of Engineering Sector, 1988-90 versus 1991-96 (LE/labor)



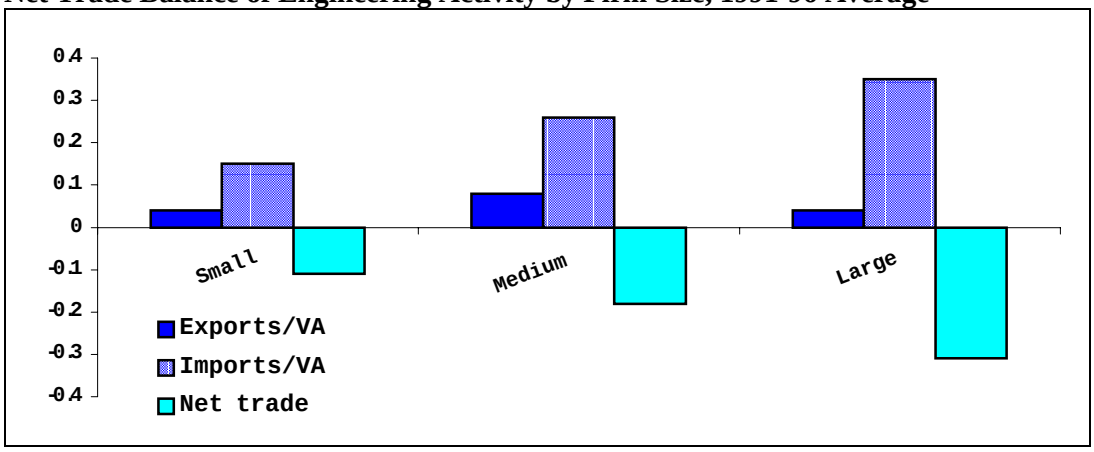
Note: The period 1988-90 refers to 1987/88-1989/90 and the period 1991-96 refers to 1990/91-1995/96.
Source: Calculated from CAPMAS Industrial Output Statistics.

The data presented in Figures 4.4 and 4.5 raise two important issues. The first is the weakness in the widely-accepted definition of SMEs according to number of employees, or labor. This definition neglects other variables that are equally important in defining the scale of operations at the firm level, such as turn-over or sales, which is used by the European Union. A revised definition requires detailed data at the firm level on sales value, labor, capital and production. However, published data are only available on the basis of the currently defined groupings, which hampers the process of re-aggregating the groupings according to a new definition of firm size. Given these limitations, this study has adopted the traditional definition of firm size according to number of employees, but it is recommended that CAPMAS data collectors revise the methodology of grouping data for better analysis in the future.

[1] For purposes of our analysis, firm size is classified according to number of employees whereby small firms employ from 10 to less than 50 persons, medium size firms employ from 50 to less than 500 persons and large size firms employ more than 500 persons.

The second issue is sector-specific and relates to the fact that large firms in the engineering sector are more involved in assembly activites than SMEs. Large-size firms also import the greatest amount of inputs. Therefore, despite the fact that these firms contribute the greatest share to exports of the private manufacturing sector, their net trade balance during 1991-96, expressed in terms of the ratio of exports and imports to value added, is negative (see Figure 4.6). To conclude, large firms involved in engineering contribute less to Egypt's positive net trade balance yet they export more than SMEs. These issues should be taken into consideration in the design of investment and production incentives.

Figure 4.6
Net Trade Balance of Engineering Activity by Firm Size, 1991-96 Average

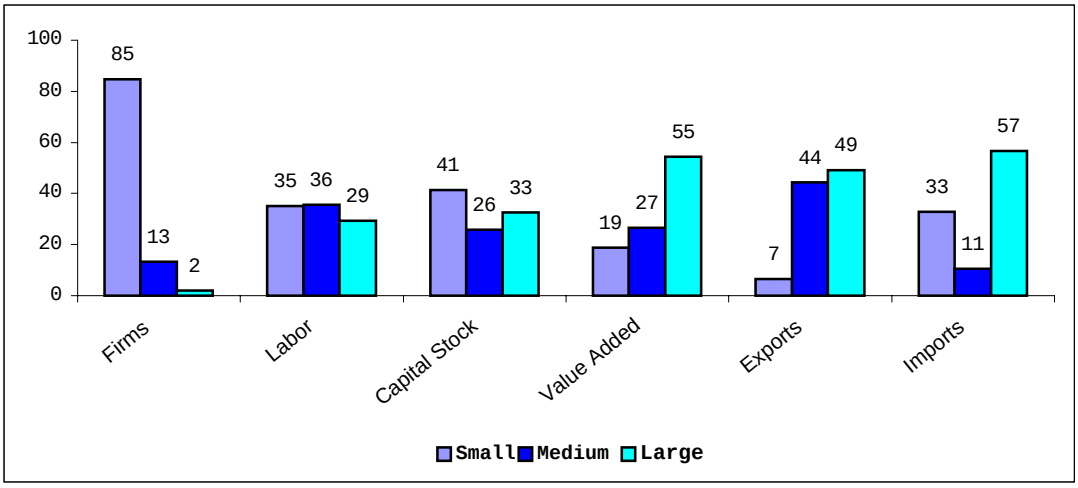


Notes: VA refers to value added; net trade balance is expressed in terms of the ratio of exports and imports to value added.
Source: Calculated from CAPMAS Industrial Output Statistics.

In addition to engineering, the non-metal sub-sector showed significant improvements during the early and mid-1990s. According to CAPMAS data, the value added generated by this sector nearly quadrupled during 1991-96 and export growth also improved markedly. During 1990-97, 13 percent of Egypt's total export proceeds were generated from sales of non-metal products (see Table 4.6 above). At the same time, this sector was not import-intensive, which resulted in a positive net trade balance. The reason attributed to the positive trade balance is the high concentration in the sub-activity of the manufacture of non-metallic mineral products. The increase in share of this sub-activity to the overall non-metal activity increased from about 60 percent during 1988-90 to 86 percent by 1996. This trend was mainly due to the development of ceramic products, which consequently led the non-metals sub-sector, on aggregate, to be more import-saving and export promoting than in the past. Other sub-activities of the non-metal sub-sector, especially the manufacture of china products, are more import-consuming and less-export promoting than the manufacture of non-metallic mineral products.

Figure 4.7 presents the profile of non-metal activity according to firm size during 1991-96. The activity is characterized by the dominance of small-size firms, with few medium and large-size firms. However, employment in this sector is fairly equally distributed across firm size. Large-size firms in this sub-sector contribute the

Figure 4.7
Profile of Non-Metal Sub-Sector by Firm Size, 1991-96 Average (Percent)



Source: Calculated from CAPMAS Industrial Output Statistics.

greatest share to value added, and export and import more than small and medium-size firms. An interesting issue in the overall private manufacturing sector is that despite the aforementioned shift in activities, this change has not been reflected in the structure of scale of operations. Table 4.7 shows the stagnation of this structure during 1991-96 compared with 1988-90, and Figure 4.8 presents the structure of the sector's activities according to firm size for the entire period 1988-96.

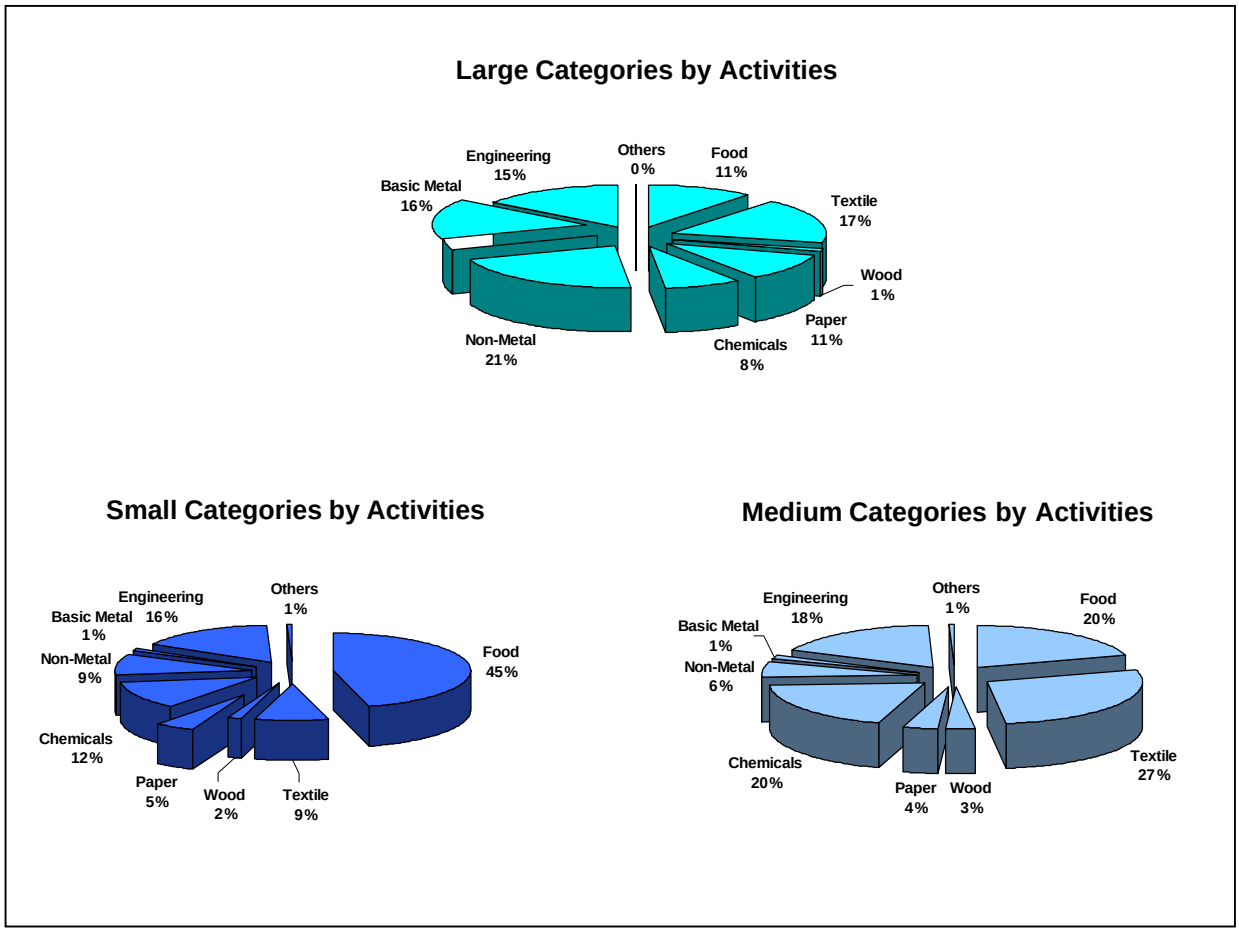
Table 4.7
Structure of Private Manufacturing Sector by Firm Size, 1988-90 versus 1991-96 (percent)

	1988-90	1991-96
Small	95.5	95.5
Medium	3.9	3.8
Large	0.6	0.6
Total	**100**	**100**

Note: The period 1988-90 refers to 1987/88-1989/90 and the period 1991-96 refers to 1990/91-1995/96; numbers may not sum to 100 due to rounding.
Source: Calculated from CAPMAS Industrial Output Statistics.

.

Figure 4.8
Structure of Private Manufacturing Sector by Firm Size and Activity, 1988-96 Average



Source: Calculated from CAPMAS Industrial Output Statistics.

3. Contribution to Sub-Sector Growth

The non-metal and engineering sub-sectors contributed the most to growth during the 1991-96 of the eight sub-sectors under review. The relatively high growth rates achieved by these sub-sectors have enabled them to acquire high shares in the structure of value added. This fact has resulted in an increase in their growth rates and in their relative contribution to the overall growth of the private manufacturing sector.

Table 4.8
Ranking of Private Manufacturing Sub-Sectors According to Contribution to Growth, 1988-90 versus 1991-96

Rank	1988-90	1991-96
1	Basic metals	Non-metals
2	Wood	Engineering
3	Paper	Food
4	Chemicals	Basic metals
5	Textiles	Chemicals
6	Engineering	Wood
7	Non-Metals	Textiles
8	Food	Paper

Note: The period 1988-90 refers to 1987/88-1989/90 and the period 1991-96 refers to 1990/91-1995/96.
Source: Calculated from CAPMAS Industrial Output Statistics.

Table 4.8 presents the ranking of different manufacturing activities according to their role in generating value added and contribution to growth during 1991-96 compared with 1988-90. During those two periods the structure of the contribution to growth of individual sub-sectors changed considerably. Except for chemicals, all sub-sectors have experienced important changes in the rank order of their contribution For example, food was ranked eight in the late 1980s, compared with third place in the first half of the 1990s.

Contribution to growth according to firm size is presented in Table 4.9. No general conclusion can be drawn from the data regarding the correlation between firm size and growth of manufacturing activities. Large firms seem to be better in some activities, small and medium firms better in others. It is interesting to note that small-size firms show favorable performance in particular sub-sectors, especially non-traditional activities such as non-metal products, which are among the highest activities contributing to growth. Moreoever, since small firms form the majority in all activities, more attention must be made in encouraging growth of these firms.

Table 4.9
Contribution to Growth of Private Manufacturing Sub-Sectors According to Firm Size, 1991-96 Average

	Small	Medium	Large
All activities	**	*	***
Food	*	**	***
Textiles	*	**	***
Wood	**	***	*
Paper	*	***	**
Chemicals	*	***	*
Non-Metals	***	*	**
Basic Metals	**	*	***
Engineering	**	*	***

Note: The greater number of asterisks (*) assigned to any particular sub-sector, the higher the contribution to growth of the private manufacturing sector.
Source: Calculated from CAPMAS Industrial Output Statistics.

C. Supply Sources of Growth

1. Signs of Productivity Growth

Table 4.10
Growth of Factor Accumulation in Private Manufacturing Firms, 1988-91 –1992-96 (percent)

	Growth of Factor Accumulation	*Growth of Inputs per LE of Value Added*
Capital	-16.1	-56.3
Labor*	8.1	-41.6
Intermediates	29.2	-30
of which Imports:	1589	815.8

Note: Percent Changes are calculated at constant 87/88 prices for all inputs and outputs between the two periods under study, viz. 1990/91-1995/96 and 1987/88-1989/90.

* *In terms of wages to express cost.*
Memo Item: Real growth rate of value added during the same period was 84.7

Two major components share the responsibility of growth from the supply side: the accumulation of factors of production and productivity growth. Table 4.10 shows the percent change in average annual value of factor accumulation in Egypt's private manufacturing sector between pre-reform 1987/88-90/91 and post reform 91/92-95/96 and other indicators related to costs of production. As shown, real value-added growth rate was higher than those of individual factor accumulation, (84.7%) except imports. At the same time, the cost intensity in terms of all factors of production declined, viz. real cost per LE of real value added. These trends highlight the presence of productivity and efficiency gains in the operations of private manufacturing activities in the early to mid-1990's. The data also indicate that the main beneficiaries from productivity growth are the government (in terms of taxes) and the stockholders (in terms of profits). However, an in-depth study would be useful to investigate the issue of the distributional gains of productivity growth. The share of wages in value added should be taken into consideration to explore the welfare effect of productivity growth (for details, see Harberger, 1998), as should real price trends of the final consumer goods being produced.

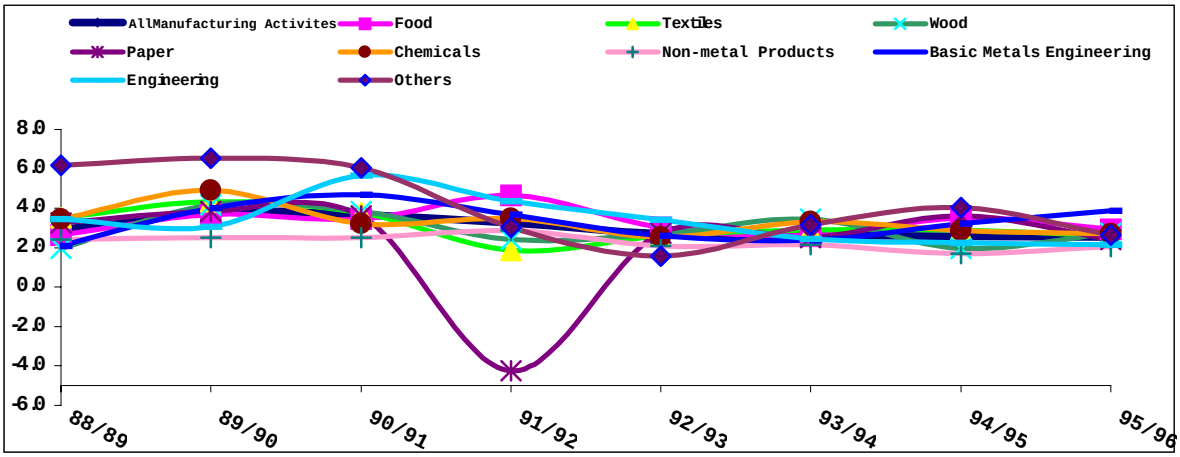
2. Effects of Devaluation

Despite the evidence of recent productivity and efficiency gains in Egypt, there are indicators that the calculation of cost efficiency could underestimate these advances, particularly those of productivity gains. This underestimation is due to the shock following the devaluation of the Egyptian pound in 1991 that impacted the costs of production. The resulting sudden increase in import prices raised costs to unprecedented levels. For example, the share of the cost of imported components in the structure of value added increased from 7 percent in 1989/90 to 22 percent in 1991/92. Many manufacturing activities were able to cope by diversifying their suppliers of intermediate goods and counted more on local components than on imported ones. However for other activities, the situation was the opposite. Therefore, three years after the devaluation, on aggregate the share of imported materials in the structure of cost of one unit of value added decreased only slightly to about 19 percent.

As Table 4.10 shows, the growth of accumulation of intermediate goods was the highest among all factors of production, despite the fact that the decline in real cost of

input per LE of real value added for those goods was less than for other factors of production. The data also indicate that imported components registered higher growth rates of factor accumulation than the growth in the share of one unit of value added. This issue highlights an important channel through which the devaluation of the exchange rate would be reflected in increasing cost per unit of value added.This price effect could induce greater adjustment towards efficiency via reducing cost, increasing output, and also encouraging exports due to the devaluation effect. The sudden high increase of the cost per unit of value added that took place at the onset of the 1990's is depicted in Figure 4.9.

Fig 4.9 Cost Per Unit of Value Added by Activity & in Manufacturing Level



N.B. The negative cost shares are attributed to negative value added for paper in 1991/92.
Source: Calculated from CAPMAS *Industrial Output Statistics.*

Nearly all activities were able to curb cost per unit of value added. These activities succeeded in reducing the percentage share of the import bill as a share of value added. Table 4.11 presents the ratio of imports to value added in these activities before the devaluation, in the year of devaluation, and three years after the devaluation. It indicates that all activities except non-metal, textiles, and chemicals were able to reduce import share in value added.

Table 4.11 Import Share of Value Added of Selected Sub-Sectors: Before, During and After the Devaluation of the Egyptian Pound
(Percent)

Activity	Before Devaluation	During 1991/92	After Devaluation
Food	3	27	21
Textile	4	6	28
Wood	3	41	20
Chemicals	6	33	35
Non-metals	6	33	35
Engineering	1	52	27

Note: The period 'before devaluation' refers to 1987/88-1989/90 and the period 'after devaluation' refers to 1992/93-1995/96.
Source: Calculated from CAPMAS Industrial Output Statistics.

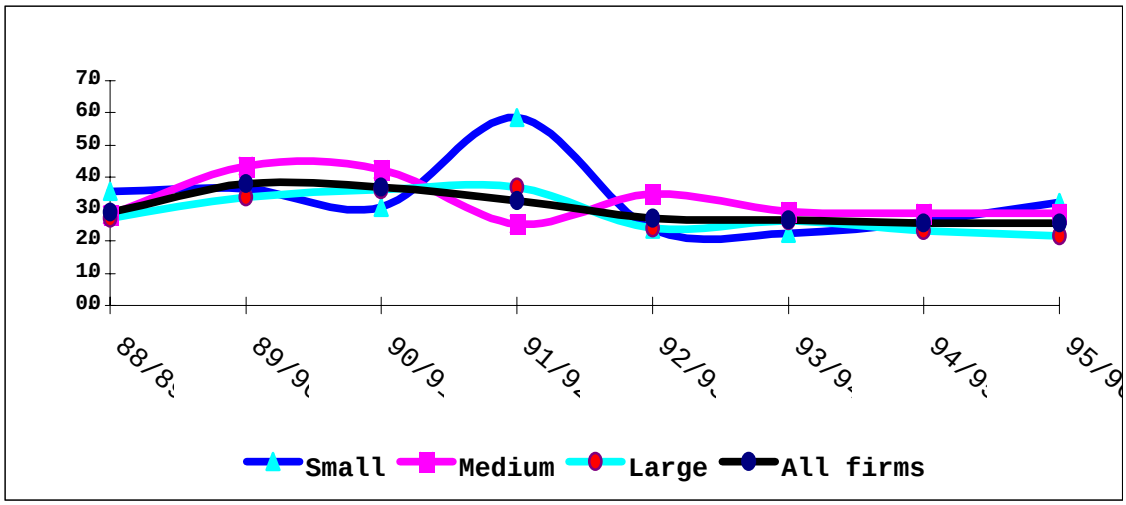
By 1995/96, costs began to increase again. Unfortunately, no data are available to analyze this rise or to trace its pattern or duration. Yet, it should be mentioned that the

percentage of imported components recently began to rise again and reached 25 percent in 1995/96. This can probably be attributed at least in part to the steady appreciation of the Egyptian pound, as imports became relatively cheaper. Together with the high growth of new fixed capital formation, especially during 1994-96, part of cost reduction during the first half of the 1990's could be due to the utilization of idle capacities that appeared in the economy by the late 1980's. The utilization of idle capacity preceded the growth of new capital formation. However, investment that took place was less capital intensive than in the past, as evidenced by a drop of 3.1 percent in the capital to labor ratio, and also imports expanded. These tendencies should be further studied once additional data become available.

3. Analysis According to Firm Size

Attention should also be paid to the fact that gains in productivity are not evenly distributed among firms. The scale of operations can be viewed as one of the factors that affects the firm's capability to use factors of production according to its needs. Figure 4.10 depicts the behavior of the cost per unit of value added according to the scale of operations at the firm level. Although small firms were the most affected by the1991/92 devaluation in terms of increase in imports prices, yet their ability to cope with the price shock was due to their flexibility in sourcing cheaper substitutes and expanding output. As for large firms their success in the adjustment process was greatly due to the fact that they are financially more stable, have a greater number of local subsidiaries, and better access to credit from private banks than small-size firms. This situation was particularly prevalent in the home appliance industry.

Figure 4.10 Cost per Unit of Value Added in Manufacturing According to Firm Size, 1988-96



Source: Calculated from CAPMAS Industrial Output Statistics.

Data for cost per unit of value added were indexed by the private manufacturing cost per unit using 1987/88 as the base year and were calculated for the period before the devaluation, during the devaluation, and after the devaluation. The differences between any two periods of the table indicate the growth of cost per unit of value added. The results are presented in Table 4.11 and indicate that small firms were the

most capable of defending the cost increase in 1991/92, the period during which the devaluation occurred, despite the fact that these firms experienced the highest increases in costs. Therefore, the cost per unit of value added for these firms was reduced. Large firms experienced the lowest increase 12 percent, but they reacted by decreasing cost share by 28 percent of its level before devaluation, and medium-size firms reduced their cost by 18 percent, after a rise of 41 per cent during 91/92 devaluation. However, looking at the cost side only ignores the ability of firms to cope with cost increases of imported inputs by improving efficiency, expanding output and increasing exports as domestic cost components become relatively cheap due to the currency devalution. This is depicted in Figure 4.12

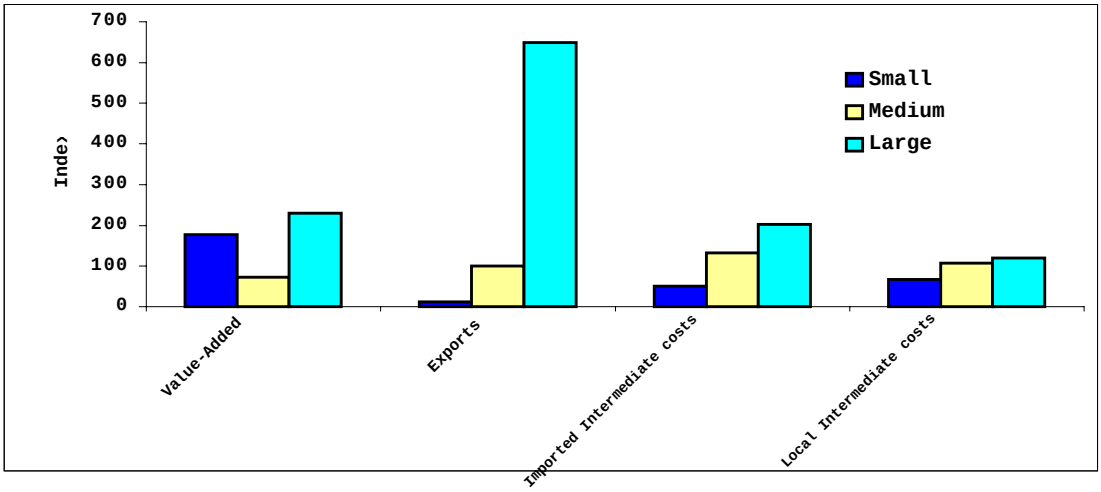
Table 4.12
Indexed Cost per Unit of Value Added for Firms According to Size: Before, During and After the Devaluation of the Egyptian Pound

Firm size	Before Devaluation	During 1991/92	After Devaluation
Small	100	167	74
Medium	100	141	82
Large	100	112	72

Note: The period 'before devaluation' refers to 1987/88-1989/90 and the period 'after devaluation' refers to 1992/93-1995/96..
** Index, base year average 1987/88-90/91.*
Source: Calculated from CAPMAS Industrial Output Statistics.

Figure 4.12 examines the performance of private manufacture by scale of operation with regard to their rate of adjustment to the 1991/92 devaluation and other reforms, during the period 1992/93-1995/96. It indicates that large firms in general were able to adjust via expanding their real exports by 549 percent, while keeping the increase in their real import costs down to 102 percent, while their real-value added increased by 129 percent. Small firms reacted by increasing their real value-added by 78 percent, most of which was directed to the local market, as they nearly lost their exports which were reduced by 88 percent, and by curbing real import costs by 49 per cent. Medium enterprises suffered from reduction in real value-added by 27 percent, with no increase in their real exports, and a rise in their real import costs of 46 per cent. The increase in real import costs for various firm scales exceeded their reliance on local intermediates, indicating the low level of substitutability between foreign and local intermediates inputs.

Fig. 4.11: Impact of Devaluation on Performance of Private Manufacturing by Scale of Operation (Index 1992/93-95/96, 1991/92 =100)



Source: Calculated from CAPMAS Industrial Output Statistics

Table 4.13
Private Manufacturing Activities Which Benefited from the 1991/92 Devaluation (Index 1992/93-1995/96, 1991/92 =100)

Large				Medium				Small			
Activity	VA	X	M	Activity	VA	X	M	Activity	VA	X	M
Food	229	727	418	Food	239	1891	117	Wood	106	1451	2
Textiles	744	550	117	Paper	219	1285	194	Chemicals	47	3052	58
Chemicals	131	535	187	Textiles	45	152	546				
Non-Metals	265	1144	262								
Engineering	393	127	78								

VA: Real Value Added; X: Real exports; M: Real Imports in LE.
Source: Calculated from CAPMAS Industrial Output Statistics.

The benefits generated from devaluation of the Egyptian pound vary according to individual private manufacturing activities by scale of operation. There was a high degree of variation among private enterprises in their response and extent of benefits. As Table 4.13 indicates, large firms managed to increase both value-added and exports substantially in five activities: food, textiles, chemicals, non metals, and engineering. Value-added increased by 644 percent in textiles, 293 percent in engineering, 165 percent in non-metals, 129 percent in food, and 31 percent in chemicals. Exports of non-metals increased by more than ten-fold, those of food by 627 percent, textiles and chemicals by 450 and 435 percent respectively, and engineering by 27 percent.

Private manufacturing medium sized firms were successful in food paper and textiles. In food activities, their real-value added increased by 139 percent, while their real exports increased by about eighteen-fold and experienced only a 17 per cent increase in their real import costs. In paper, the percentage increase in exports surpassed that of value-added by increasing almost 12 times, while their value-added increased by 119 per cent and their real import costs increased only by 94 percent. In textiles, exports increased by 52 percent and imports grew by 446 per cent, while they experienced a drop in their value-added of 55 per cent.

The only private manufacturing small enterprises which adjusted successfully to the 1991/92 devaluation were those engaged in wood and chemical industries. Wood exports increased by about 13.5-fold, and in chemical industries by more than 29-fold. In the chemical industry, domestic value-added declined by 53 per cent.

Hence, private manufacturing large and medium-size firms were better able to cope with the devaluation than the small-scale firms, via expanding value-added and increasing exports-- which rose faster than imports. This is due to the fact that these firms enjoy more financial, managerial and operational synergies, as well as economies of scale, have a greater number of subsidiaries, and better access to credit from banks compared to small-size firms.

The link between firm size and productivity trends and performance is an important issue to explore, especially in the investigation of the optimum firm size for any particular type of manufacturing activity. Inferences drawn from such analysis would be useful in the design of incentive packages aimed to promote a specific firm size, such as programs to enhance the capability of small enterprises. This issue is especially important for Egypt's private sector, since most of firms are small in size and are often operated by families. Given this situation, firm size is often influenced by funds available to families.

Table 4.14
Legal Structure of Enterprises in Private Manufacturing Sector (Average 1991-1996) (percent)

		Family-Owned Company	Companies Legalized Under Law 159	Companies Legalized Under Investment Law	Total
Structure by legal type		92.4	4.0	3.6	100
Structure by firm Size	Small	90.9	37.2	26.5	86.4
	Medium	8.4	52.7	56.7	11.9
	Large	0.7	10.1	16.8	1.7
	Total	100	100	100	100

Notes: Numbers may not sum to 100 due to rounding.
Source: Calculated from CAPMAS Industrial Output Statistics.

Table 4.14 presents the structure of private manufacturing sector according to the legal type of company. Companies operated by families dominate the legal structure of private manufacturing firms in Egypt. Of those companies, 91 percent are small in size. In other words, analysis of small size businesses is another means by which to analyze family-run businesses.

4. Labor Skills and Technology

Many technologies used in developing countries originate in developed countries, and as such are designed to make optimal use of the skills of these countries' expensive labor force. Due to differences in the supply of skills, some of the tasks performed by skilled workers in developed countries will be carried out by less skilled labor in developing countries. Since the technologies in these tasks are designed to be used by skilled workers, productivity in developing countries is expected to be less than the anticipated levels. In a recent study of the relationship among productivity, skills and technology, a formula for a production function that takes into consideration skills was applied to several developing countries, including Egypt, and compared with results for several developed countries. The results of the estimation indicate that for developing countries actual productivity is lower than estimated productivity, and in some cases, there is a large deviation between estimated and actual productivity. In the case of Egypt, that difference was about 50 percent. When the study took into account labor skills (approximated by years of schooling), the estimated data converged to actual data (Acemoglu and Zilbotti, 1999).

When skills and training are excluded from theoretical analysis, estimated labor productivity would be expected to be higher than actual labor productivity. In reality, however, labor productivity often results in levels lower than anticipated due to the transfer of technology from developed to developing countries. Also, differences in eduation and training will also lead to differences in skills between the two types of countries. Therefore, the less education and training in developing countries, the more difficult it will be for labor to achieve the anticipated productivity levels from using machinery supplied by developed countries. Moreover, developing countries are faced with the additional challenge of maintaining equipment and the obsolescence of technology. Due to the growing labor skills and usage of appropriate technology that are present and have not yet emerged as important sources of growth, there is a need to increase the use of locally adaptable technology and to invest in human capital development.

The results of this study are import for two reasons. First, the change in the structure of imported capital (machinery) is expected is have an impact on the productivity of labor. Unless this structure is taken into account in the productivity specification, the productivity gains will not be recognized. Second, this type of study highlights the importance of the concept of appropriate technology versus latest technology, and the implication of technology transfer programs.

Table 4.15 presents the structure of imported machinery and Table 4.16 shows the structure of the labor force. Due to the non-availability of data for categories of skills for the Egyptian labor force, literacy rates of the labor force were used as a proxy for skills.

Table 4.15
Distribution of Egyptian Workers in Manufacturing Sector, According to Educational Status

Educational Status	No. of Workers 1996	Percent	Percent Change 1986-96
Illiterate	534,905	24.7	-12.7
Read & write	536,916	24.8	.0.4
Primary	82,992	3.8	1.1
Below intermediate	96,904	4.5	1.6
Intermediate	718,689	33.1	9.4
Above intermediate	48,793	2.3	0.8
University	149,058	6.9	0.2
Total	**2,168,257**	**100**	

Source: CAPMAS, Population Census, 1997.

Table 4.16
Origin of Imported Machinery, 1988-90 versus 1991-96 (Percent)

	1988-90		1991-96		% Change	
Machinery Type	Developing Countries	Developed Countries	Developing Countries	Developed Countries	Developing Countries	Developed Countries
382	6.4	93.6	7.7	92.3	21.1	-1.4
383	9.6	90.5	22.7	77.3	139.8	-14.6
384	16.2	83.8	25.3	74.7	55.7	-10.9
385	3.5	96.5	7.9	92.1	126.9	-4.6

Notes: The period 1988-90 refers to 1987/88-1989/90 and the period 1991-96 refers to 1990/91-1995/96.
ISIC 382: metal products except machinery and equipment
ISIC 383: electrical machinery, apparatus and appliances;
ISIC 384:transort equipment; and
ISIC 385: professional and scientific equipment.
numbers may not sum to 100 due to rounding.
Source: Calculated from UNIDO data 1998, IDSB 4-digit ISIC.

The tendency to diversify the origin of machinery towards developing countries is obvious. It reflects the awareness of the private sector, as a profit maximizer, of the importance in selecting the most appropriate technology for the type of manufacturing activity at hand and to not insist on using the latest or sophisticated technology. Technology developed in developing countries is expected to match the local capabilities in Egypt more than technology originating in developed countries. However, this trend raises the issue of the potential for Egyptian manufacturing activities that produce machinery to serve the local market, in addition to other developing countries. However, both trends indicating increases in labor skills and the usage of technologies that appropriately fit these local skills are expected to have positive effects on the productivity of labor, and hence the efficiency and total factor productivity of the whole manufacturing process.

D. Demand Sources of Growth

The accounting framework of growth from the demand side takes into account the effect of three factors sharing the growth of value added (Chenery et al, 1986). These factors are (i) the growth of exports, (ii) the growth of local consumption from domestic production, and (iii) the change in linkage patterns of the relationships among local firms. In social accounting matrix notation, these three factors constitute the distribution of production for both intermediate and final uses.

1. Export Growth

Manufactured exports constitute more than 75 percent of total exports by the private sector (see Table 4.17). Of this amount, textiles, especially ready-made garments, and chemicals account for nearly 50 percent. In other words, together these two sub-sectors comprise about two-thirds of manufactured exports by the private sector.

Table 4. 17
Contribution of Private Exports to Manufactured Exports, 1995-98
(Percent)

Activities	Food	Textiles	Wood	Paper	Chemicals	Non-Metals	Basic Metals	Engi-neering	Others	Total
Structure of Private Manufactured Exports	8.7	42.6	2.6	1.8	22.2	9.5	9.1	2.6	0.9	100
Private Manufactured Exports/Total Private Exports	6.5	31.8	2.0	1.4	16.7	7.9	6.9	2.0	0.7	75.9

Note: Numbers may not sum to 100 due to rounding.
Source: Calculated from CAPMAS Industrial Output Statistics.

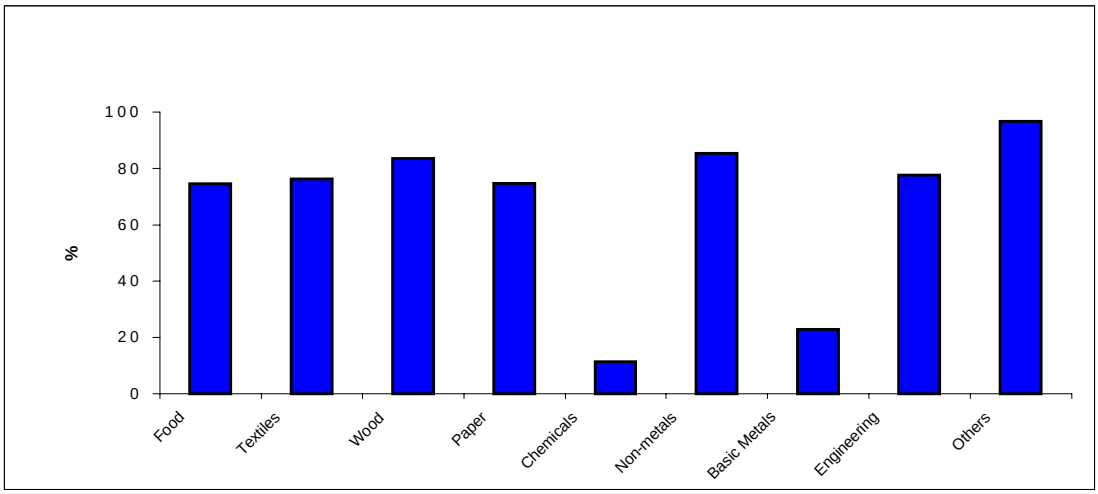
Figure 4.12 shows the share of private sector exports, by activity, in Egypt's total manufactured exports. It is interesting to note that despite the relatively large contribution of 22 percent of chemicals to private manufactured exports, this activity represents about one-half of that share in Egypt's total manufactured exports. In contrast, the share of basic metals in Egypt's total manufactured exports is 23 percent, which is much greater than the share of this sub-sector of 9.1 percent in overall private manufactured exports.

The data in Figure 4.12 also show that exports by the private sector dominate the structure of manufactured exports in many activities. The private sector is most active in the manufacture of wood and its products, non-metals and engineering products. While the shares of private exports of chemicals and basic metal products in total exports are relatively low, these sub-sectors are gaining importance. For example,

chemicals and basic metals products increased their shares in total exports by about 5 and 7 percentage points, respectively, between 1995 and 1998. However, the share of private manufactures to Egypt's total manufactured exports was about 23 percent during that same period. This relatively low share was due to the dominance of land-based products in the structure of manufactured exports.

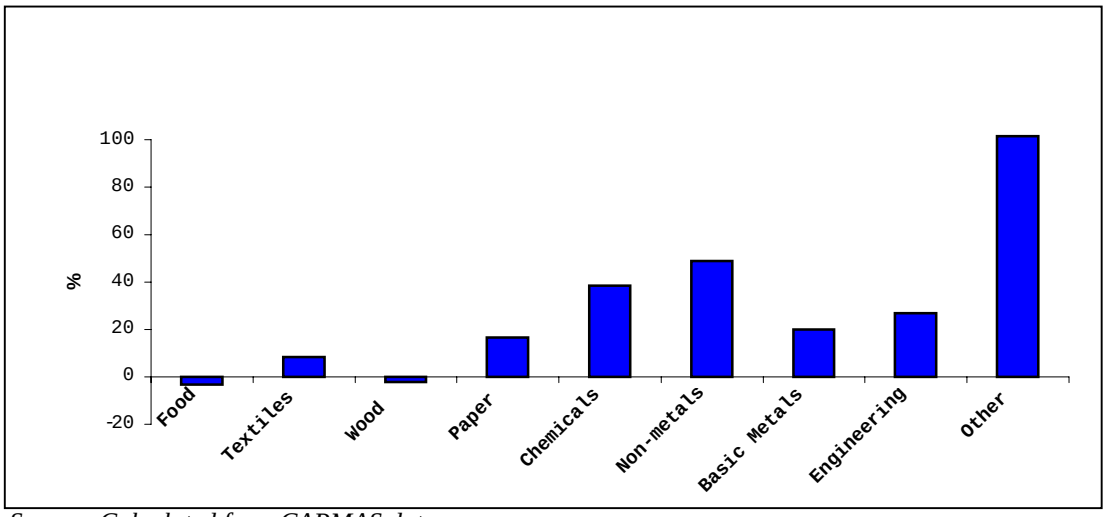
Many export activities that have been dominated by the private sector have achieved high growth rates, on aggregate (see Figure 4.13). Non-metal products registered the highest growth rate during 1995-98, while engineering products also performed favorably during that period.

Figure 4.12 Share of Private Sector in Egypt's Total Manufactured Exports by Activity, (1995-98 Average Annual)



Source: Calculated from CAPMAS data.

Figure 4.13
Average Annual Growth Rate of Private Manufactured Exports by Activity, (1995-98)

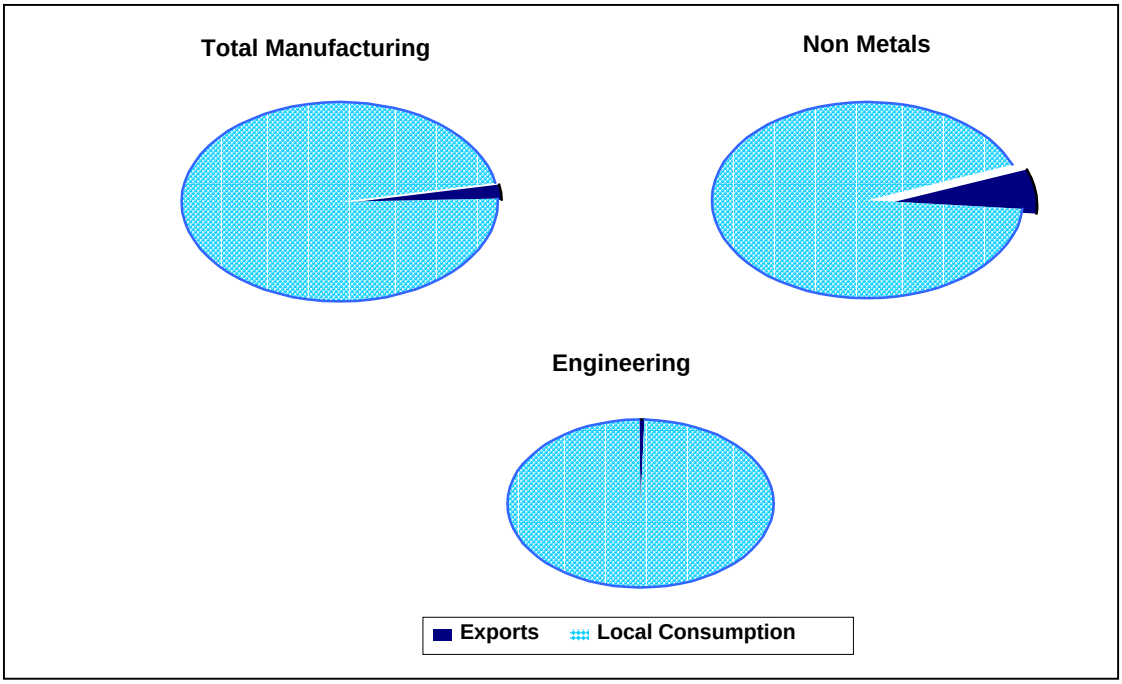


Source: Calculated from CAPMAS data

Total private manufactured exports grew at an average annual rate of 12 percent during 1995-98. However, due to the negative growth of public sector exports during that same period, total manufactured exports recorded a negative growth rate of about 1.7 percent. Despite the relatively strong growth of private manufactures, on average, the annual rates of growth have fluctuated widely. These fluctuations reveal no generally increasing trend, and emphasize the continued unstable performance of the private sector and the essential need for better government support plans to promote exports.

Regarding the role of private manufactured exports in stimulating total growth of the private manufacturing sector, no significant improvement is expected during the next several years. Despite the relatively high growth rates of private manufactured exports, their share in total output has been historically relatively low. The effective role that export growth would play in increasing output is limited due to the low share of exports in this output. Figure 4.14 presents the contribution of exports to growth of private manufacturing sector during 1995-98, as well as the contribution to exports of the two manufacturing activities with the highest growth rates of value added. The data indicated that the exports of manufactures have so far played a very weak role in promoting the growth of the private manufacturing sector, which implies that local consumption has been the major stimulus to growth of this sector up to now.

Figure 4.14 Exports Contribution to Growth, 1995-98 Average (percent)



Source: Calculated from CAPMAS data.

2. Growth of Local Demand for Domestic Output

In recent years, local demand has strengthened. Local markets are still strongly protected for domestic firms, even though the relaxation of non-tariff barriers and the binding of tariff rates of Egypt and other developing countries has increased the degree of market penetration in these countries. This trend reflects the new era of intense competition (MOI, 1999), whereby local markets must continuously integrate with international ones. Likewise, local firms must compete with foreign firms to maintain market shares in their domestic markets and also strive to benefit from the general increase in domestic consumption. Finally, the era of intense competition is characterized by a very high degree of product differentiation. Diversification of products is a major factor of demand sources of growth.

In Egypt, local production is the major supplier meeting domestic demand for manufactured products. This steady demand is the main driving force that stimulates the local production of manufactures. According to recent CAPMAS data, the correlation between these two variables is about 95 percent. Part of this high correlation is due to the fact that most of the production of local firms is targeted at the local market with no intention of exporting. Second, Egypt has relatively high nominal tariff rates and high effective rates of protection (Nathan Associates, 1998). All these factors increase the cost of exporting to Egypt. This fact has a negative impact on the growth of market penetration index of Egypt.

Table 4.18
Ratio of Imports to Local Consumption and Market Penetration Index, 1988-95

Activities	Imports to Local Consumption		Market Penetration Index (MPI)	
	1988-90	1991-95	1988-90	1990-95
Food	17.5	20.9	21.6	25.7
Textiles	4.9	11.8	4.7	9.8
Wood	64.5	74.2	193.8	298.4
Paper	20.5	36.4	26	56.2
Chemicals	21.5	23.4	27.6	28.2
Non-metals	22.8	10.7	34.2	11.7
Basic Metals	28.9	32.8	40.3	39.4
Engineering	42.3	53.4	83.4	110.0
Other	39.1	53.9	79.2	108.0

Notes: The period 1988-90 refers to 1987/88-1989/90 and the period 1991-96 refers to 1990/91-1995/96; MPI= Imports/Output.
Source: Calculated from UNIDO data (UNIDO, 1998).

Table 4.18 presents the ratio of imports to consumption of manufacturing products at the ISIC 2-digit level and the market penetration index. The data show that the weight of imports in satisfying local consumption is very high for certain products such as wood and engineering products. The high ratio of imports of wood is justified by the difference in natural resources among supplying countries. High imports of engineering products demonstrate that industrialization in Egypt is still in early stages since these types of products are based on high levels of technology, skills and innovation. These factors, generally speaking, are currently not well developed in Egyptian manufacturing sector.

The market penetration index shows that there is a general tendency among activities to intensify the share of the imported component in the structure of domestic consumption of manufacturing products. The exception is the non-metals sub-sector, which is mainly due to the large decrease in imports of ceramics. With the increase of liberalization in the Egyptian economy and the reduction of tariffs applied to most manufacturing products in 1998, these ratios were higher by the end of the 1990's than those presented in Table 4.18. This trend is expected to continue in the future, at an accelerated rate, especially with the complete application by 2005 of the GATT Agreement.

However, the overall situation remains vague and no concrete conclusion can be drawn from available data. It is not appropriate to conclude that local firms would not be able to stand the increasing trend of international competition. Reported data for manufactured imports do not differentiate between imports for final demand (consumption and investment) and imports for intermediate demand. In other words, the increase in the above ratios and indexes could be attributed to increased demand for parts and components for industrial purposes[2]. Nevertheless, there is insufficient evidence to arrive at such a conclusion. In such a case, the appropriate analysis would be based on an input/output (I/O) table with up-to-date information. I/O tables are useful because they provide import data for any industrial activity that can be related to data for total imports. However, the most recent published I/O table for Egypt is dated 1991/92 and it contains coefficients that have not been revised since 1983/84. Unfortunately, the absence of updated, harmonized and detailed sets of data hinder the completion of the analysis of growth of Egypt's manufacturing output for the satisfaction of local demand. Also, data are unavailable with which to analyze the role of diversification of products in stimulating the growth of value added generated from local production processes. Such data would include specific numbers of products and changes in products over time. The absence of these data also constrains the analysis of demand sources of growth.

[2] Increase of imports of parts & components is one sign of the recent phonomena of increase in intra trade and global production sharing (Yeats,1998).

3. Local Linkages of Manufacturing Sector

Data for dependency ratios highlight the technological pattern of interdependence of local firms on each other, as well as on the rest of the world. For any manufacturing activity, the sum of local components of these figures measures the local dependency ratio of this activity. Positive changes in these ratios over time would measure the structural development of relationships among local firms, and such changes are considered to be key in promoting international competitiveness. Moreover, increases in dependency ratios would result in reduced transaction costs for local firms, which in turn would lead to reduced lead-time to procure inputs for the production process. The ultimate impact, however, of improved dependency ratios would be the reduction in costs of generating value added in the production of manufactured goods.

Referring back to the unavailable I/O data, it is almost impossible to trace the change in the network of industrial relations in the Egyptian manufacturing sector. The unavailable information about new products, or their classification according to user (final or intermediate demand), prevents the treatment of the issue of linkages even at the lowest level of approximation.

Table 4.19 presents the results of calculations of local dependency ratios of local manufacturing firms on each other, grouped by 2-digit ISIC manufacturing activities. The absence of a pattern of dependency is evident from the table. In all, dependency ratios are very low. However, the general environment of manufacturing production processes at the present time gives the impression of the existence of a positive change in these ratios. Nonetheless, insufficient data do not permit either the assurance or denial of such a case.

Table 4.19 Dependency Ratios

Activities		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Food production	3	11.4	25.5	0.5	0	0.3	0	0	0	0.1	0	1.4	1.1	0	0	0	0	0	0	0	0	0
Beverages	4	0	3.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tobacco	5	0	0	45.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cotton ginning	6	0.4	0	0	0	23.4	0	0	0	0	0.8	0	0	0	0	0	0	0	0	0	0	0
Spinning & weaving	7	0	0	0	0.3	18.5	34.4	0.1	4	0.1	0.6	0.2	0.1	0	1.1	0.1	0.3	0	0	0.1	0	0.4
Ready gmnts.& tailr	8	0	0	0	0	0	5.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leather xcpt.shoes	9	0	0	0	0	0	0	31.5	42.6	0	0	0	0	0	0.2	0	0	0	0	0.1	0.4	4.1
Shoes	10	0	0	0	0	0	0	0	7.8	0	0	0	0	0	0	0	0	0	0	0	0	0
Wood xcpt.frntr.	11	0	0	0	0	0.1	0	0	0	0	6.5	4	0.8	0	0	0	1.7	0	0	0.3	0.1	14.5
Furniture	12	0	0.2	0.1	0	0.2	0.1	0	0	0	7.7	0	0	0	0.1	0.1	0.2	0	0.3	0.8	0.3	0.3
Paper &prnt.	13	1.5	1.4	5.4	0	1.2	2.3	0.7	3.3	0	0	8.8	1.5	0	0.7	2.4	6	1.4	0.2	1.4	0	1.9
Chm. Prod. Xcpt rfng	14	0.7	3.7	0	0	2	0.8	5.3	9	0.3	1.4	4.8	4	0.5	41.3	0	0	0.4	1.3	0.6	0.1	0.9
Oil derivatives	15	0.7	0.8	0.1	0.2	0.3	0.8	0.6	0.5	0	0.1	0.5	0.1	4.1	0.7	1.6	4.4	3.7	4.6	0.5	0.1	0.3
Rubber&Plastic Prod.	16	0.5	1.6	0.1	0	0.6	1.2	0.1	0.1	0	0.5	0.1	0.4	0.1	1.6	0.4	1	0.3	0.3	0.5	0	1.1
Prcln.&china	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glass prod	18	0	3.6	0	0	0	0	0	0	6.5	0.1	0	0.3	0	0	0	10.2	0	0	0	0	0
Other mnrl prod.	19	0	0	0	0	0	0	0	0	0	0	0.4	0.1	0	0	0	0	17.1	0.1	0.2	0	0
Irn.,stl. Mnrls.	20	0	0	0	0	0	0	0	0	0.2	0.2	0	0	0	1.7	0.6	0.2	0.8	47.2	19.5	2.1	0.9
Machnry&equip.	21	1.4	4.3	1.7	1.1	0.5	3.9	1.4	1.5	0.1	0.6	1	1.6	2	3.1	0.5	1.6	0.8	5	3.4	0.7	4
Transport. Means	22	0.2	0.3	0.3	0.1	0.9	1	0.6	0.1	0.2	0.9	0.5	0.5	0.6	0.6	1.4	2.7	1.8	0.8	1.8	3	0.5
Other manufacturing	23	0	0	0	0	0	3.2	0.5	0	0	0	0	0	0	0.1	0	2.4	0.5	0	0	0	5.1
Total manufacturing	24	17.2	44.7	53.8	1.7	48	53.5	40.8	69.1	7.6	19.5	21.6	10.6	7.4	51.3	7	30.6	26.8	59.8	29.2	6.9	34.1

Source: Calculated from CAPMAS, 1995, I/O Table

E. Conclusions and Recommendations

The present chapter has addressed issues related to analyzing and explaining the favorable performance of the private manufacturing sector in recent years. The sector was able to achieve high growth rates that activated the development and contribution of the whole manufacturing sector to the growth of Egypt's economy.

This chapter has made use of empirical relationships among sources of growth using data for the period 1988-96. The analysis of supply sources of growth shows that the accumulation of factors of production that accompanied the growth of productivity enabled the private manufacturing sector to reach unprecedented levels of growth during the period under review. However, the analysis of demand sources of growth shows that producing for the local market was the driving force underpinning these high rates of growth. Contribution of exports to growth was very limited, even in the case of the manufacturing activities with the highest rates of growth. In summary, future growth in Egypt's private manufacturing sector is uncertain. While supply sources of growth explain how to grow, demand sources of growth explain why to grow. Unless there is a continuous increase in the demand for manufactures of the private sector, notwithstanding the various supply sources of growth that are available, sustainable growth rates are unlikely.

The merit of the empirical analysis of the sources of growth is that it highlights the links among economic variables and makes it possible to identify the leading variables. Government policies aimed at promoting the leading variables would likely activate other economic variables. In contrast, policies whose focus is to promote less important variables would not be useful. Rather, such policies would not activate the national growth rate and would likely trap the economy in low equilibrium growth.

The following recommendations are the main focus of a proposed action plan to promote sustainable high growth levels of the private manufacturing sector.

- The government should set a strategy for supporting factors that would promote increase of the demand for Egyptian products in the international markets, such as development of technology, innovation, skills, compatible mix and match, accreditation, standardization, clusters, export channels.

- The government should reduce investment incentives given through tax exemptions since investment needs to be more responsive to demand than centrally managed resource allocations. Otherwise resources will not be efficiently allocated in the economy and will not contribute to sustainable growth.

- The promotion of small enterprises is important to maximize the target of a high growth rate for employment.

References

Acemoglu, D. and F. Zilbotti, 1999, "*Productivity Differences*", Working Paper No.W6879, January, National Bureau of Economic Research.

CAPMAS, *Industrial Statistics*, various issues.

CAPMAS, 1995, *Input-Output Table.*

CAPMAS, 1997**,** *Population Census.*

Cassing, James, et al., 1998,"Enhancing Egypt's Exports, DEPRA.

Chenery, *et al.*, 1986, *Industrialization and Growth: Comparative Study*, Oxford University Press.

Harberger, C. Arnold, 1998, "*A vision of the growth process*", American Economic Review 88, 1-32.

Ministry of Industry (MOI), Japan, 1999 [Online], "*The Vision of Japan's Textile Industry and Ideal Polices for the Industry*", No. 99-3 January, available: http://www.miti.go.jp.

Nathan Associates, 1998, "*Enhancing Egypt's Exports*", report submitted to USAID, Cairo, Egypt, June.

UNIDO, 1998, *IDSB*, 4-digit ISIC.

Yeats, A. J., 1998, "*Just How Big Is Global Production Sharing?*", World Bank Working Paper, January.

5 AN ANALYSIS OF EGYPT'S PRIVATE SECTOR MANUFACTURING PRODUCTIVITY AND EFFICIENCY GROWTH: 1987-1996[1]

A. Introduction

In this chapter we utilize complementary methodologies and analyze the growth of total factor productivity (TFP) and its decomposition into efficiency and technical change for Egypt's private manufacturing sector. Our analysis is based on a newly developed panel of 28 three-digit sectors using data from 1987/88 to 1995/96 with detailed data on inputs and outputs. We utilize this data to construct total output and capital, labor, energy, and materials input quantities and prices on which are based our total factor productivity estimates. Our analysis indicates that a substantial increase in measured productive efficiency is due to the loosening of impediments to competitive forces. We also find that growth in total factor productivity would be higher if technical progress embodied in new foreign and domestic investment were higher. Cost savings are found as a result of these increases in total factor productivity by way of modest growth in technical change and substantial efficiency growth.

The chapter is outlined as follows. This introduction, in Section B, discusses the important role that TFP growth plays in the economic development process. Section C provides an overview of trends in TFP growth for the private manufacturing sector. We first discuss the overall trends in aggregate manufacturing output and the factors of production that generate output. We construct estimates for growth in output of the private manufacturing sector not attributed to growth in inputs: TFP growth. Using duality theory we also impute the contribution of the factors of production —capital, labor, energy, and materials— to TFP growth at the aggregate level. Section D examines decompositions of TFP growth into technical change and efficiency change components using non-parametric and parametric methods. In order to explain in more detail the determinants of productivity growth we use index number procedures with our three-digit manufacturing panel to decompose TFP growth into sources of growth: technical change, allocative efficiency change and technical efficiency change. Stochastic frontier methods complement the non-statistical index number methods to estimate technical and allocative efficiency change and technical progress. Section E looks deeper into these decompositions by analyzing the composition and distribution of the determinants of TFP among sectors. Section F identifies impediments to TFP growth at the three-digit level and potential policy remedies. Section G provides a brief conclusion. Data sources and

[1] The authors would like to thank Dr. Suzanne Messiha and the CompTeam for their valuable suggestions, their contributions to Appendix 1 and to the collection and oversight of all the data series on which this chapter is based. Special thanks are extended to Won Ho Song of Rice University for his superb research assistance and to Ruwan Jayasuriya, also of Rice University, for his contributions to the parametric cost-based estimation of efficiency.

variable construction protocols are provided in Annex 5A. Annex 5B discusses in detail the estimation methodologies utilized in the study.

B. The Role of Total Factor Productivity in Economic Growth

Our examination of the performance of the Egyptian private manufacturing sector relies on the concept of total factor productivity. The analysis of TFP is important because productivity plays a central role in economic growth. Economic theory postulates that growth is prompted by the accumulation of factors of production and by increases in the productivity of all of those factors, that is, by total factor productivity growth. In its simplest form, the production function shows that some function of observable inputs, such as capital and labor, and a residual factor determine output. It is this 'Solow' residual or shift factor that proxies the level effects of productivity. From an identification of levels of TFP we can calculate changes in the level of TFP over time, or TFP growth, and model its determinants. To be more specific, assume that there are only two inputs, capital and labor, and that time is separable from these inputs. We can write the production frontier at time t as $y(t) = A(t)F[k(t), l(t)]$. Here $A(t)$ is exogenous technical progress and measures how output changes over time as the input factors are held constant; thus, it captures a shift in the whole production frontier. We can then view total factor productivity as an index of elements, other than the factor inputs, that contribute to output generation. Generally speaking: output growth = the labor share times labor growth + capital share times capital growth + TFP growth. TFP growth is thus the difference between output growth and the sum of the combination of capital and labor input growth.

TFP, as represented by $A(t)$, is a residual measure that captures all changes in output not explained by changes in factor inputs. For example, it embodies factors such as changes in input qualities that could be due to changes in education, changes in management and organization, embodied technical progress, diffusion of technology and changes in working methods. Other determinants of TFP growth include economies of scale, structural adjustment resulting from a reallocation of resources from less to more productive use, and trade. Among the source of increasing returns to scale is market size, which allows greater division of labor and the creation of intermediate goods. Structural adjustment leads to changes in the composition of factor inputs in different economic sectors. Trade creates different incentives and lowers the cost of intermediate inputs thereby improving TFP. It also changes the rate of capital accumulation by altering the relative prices between investment and consumption goods (Elias, 1993).

Of particular importance in TFP growth are changes stemming from its two components: technological and efficiency increases. Productivity performance in developing countries can be particularly understood by distinguishing between these two sources of TFP change. Given a level of technology, it is often possible to increase technical efficiency over time to reach the best practice frontier. TFP gains through efficiency increases can be substantial in developing countries, often outweighing technological progress (Nishimizu, 1982). It is useful, therefore, to identify inefficiency and its sources so that

ways of reaching the frontier can be implemented. Once such efficiency gains are exhausted, attention can be given to ways of increasing technological progress. In light of this, the identification of efficiency levels and patterns is part of this study.

The ongoing debate about the sources of the rapid growth in the East Asian economies also makes evident the relevance of TFP analysis within the context of developing countries. Beginning with Young's study in 1992, one group of researchers, the so-called fundamentalists, claimed that growth in the region is mainly due to the accumulation of factors of production and nothing more. Popularized by Krugman (1994), and hence dubbed the 'Krugman thesis', this line of argument finds TFP growth to be zero or negligible in the region. Another so-called assimilationists group of researchers, in contrast, argues that productivity gains in the region, due to the development of new skills and efficient adoption of imported technology, are responsible for the observed phenomenal growth in the region. They claim that technological adoption is a long and tacit process achieved by many countries of the region through the catch-up phenomenon. At the center of the arguments made by each side are TFP growth estimates that vary from study to study. This reveals the importance of accurate measurements of TFP growth, whether through the index number approach of the growth accounting method or econometric estimation of production functions, such as the Cobb-Douglas production function, both of which are carried out in this chapter. Measurement issues aside, it also indicates the important role played by productivity growth in determining economic growth. This is an idea expressed even by skeptics of TFP studies, such as Felipe (1999). He maintains that TFP growth rate is not a sufficient statistic in drawing conclusions about economic growth, but by focusing attention on the growth process TFP analysis raises awareness about the importance of productivity in advancing economic development.

Many empirical studies have attempted to quantify the role played by both TFP and factor input growth in prompting economic growth. One early study by Chen (1977) points to a number of interesting parallels with issues we discuss in this chapter regarding Egypt's development progress. Chen analyzed the role of factor inputs and TFP on economic growth in five Asian economies, Japan, Korea, Taiwan, Hong Kong, and Singapore, for the period covering 1955-70. He found that overall TFP accounted for 53 percent of growth in output. The remaining 47 percent of output growth appeared to be due to capital deepening. He also found that the contribution of TFP to growth ranges from 3.6 percent to 6 percent a year for the five countries.

Chen also examined the sources of growth in three sectors of the five economies; namely, the agricultural, manufacturing and service sectors. In contrast to the overall economies of the five countries, TFP growth contributed almost two-thirds to the growth rate of output in the agricultural sector. The contribution of TFP to output growth in the service sector is also significant at 50 percent. In contrast, TFP contributes between 20 to 40 percent to the growth of output in the manufacturing sector, although its contribution rose steadily throughout the study period. As a result, Chen postulated that for the service and agricultural sectors, TFP promotion is most important and that movements of resources from low to high productive sub-sectors of these sectors need to be encouraged. On a

related note, the classic study by Denison (1967) finds the reallocation of labor from agricultural to non-agricultural sectors and economies of scale, along with advances of technical knowledge, to be very important in advancing TFP growth. It is also interesting to note that the growth rate of labor largely determined the rate of growth of output in the manufacturing sector. This is in contrast to the greater contribution made by capital input growth in promoting economic growth at the aggregate level.

In his study, Chen reports that TFP growth appeared to be greatest for developed countries, in one study it accounts for 64 percent of growth in output for a group of nine developed countries. This is followed by its importance for the five Asian economies and then by other less developed countries where it generally accounts for 34 percent of growth in output. Nevertheless, among the developing countries, those that have higher TFP growth rates also had faster rates of economic growth.

Another important, and recent, study also looks at the roles of TFP and factor accumulation in the growth process. This is a study on investment and growth in Egypt by Bisat and El-Gamal (1999). They estimate per capita output growth by decomposing it into its autonomous component, which is TFP growth, and growth in the accumulation of capital per worker. Their results focus on two sub-periods: the early period covering 1970/71-1985/86, and the late period covering 1981/82-1996/97. The overlap in both periods of the years 1981/82-1985/86 is due to hybrid performance of investment and output growth, where the former is decreasing while the latter grew, and the need for greater degrees of freedom in the econometric analysis.

Using the growth accounting model, they estimate the two parameters that account for per capita output growth. Their coefficient estimate for capital per worker is 0.3. Given that Egypt has set a goal of an annual growth rate of 5 to 6 percent for per capita GDP, if the accumulation of capital per worker grows at 10 percent a year, then TFP growth needs to be 2 to 3 percent a year to achieve this goal. At the aggregate level, they find that TFP growth over the entire period is 2.4 percent, while it is 5 percent over the early period and less than 2 percent over the late period. The growth in per capita output is mostly due to TFP growth in the early period while such growth is the outcome of higher investment in the late period. The authors do indicate, however, that a change in the nature of capital investments, mainly from more to less durable forms of capital, accounts for the apparent decline in the role of TFP growth in the late period. In particular, the rapid transformation of the less durable capital into output downplays the role of productivity enhancement from the technology embodied in capital. Hence, output growth is mostly attributed to increases in capital accumulation instead of TFP growth.

The authors also conduct a similar study at the sector level. They examine the role of TFP growth and accumulation of capital per worker on per capita output growth in the petroleum, construction, distribution, industrial, electricity, agricultural and service sectors. In general, the construction, industry and petroleum sectors have enjoyed high per capita output growth, due to both healthy TFP and factor input growth. Performance in the industry sector, which includes manufacturing, is most relevant for our study. Particularly in the late period, they find that industry becomes a leader in per capita

output growth, and investment growth. TFP growth in the industry sector was a healthy 3.8 percent per year. They note, however, that these impressive results are due to the positive externalities industry received from other sectors. They conduct cross-sectoral analysis, where other sectors' growth in capital per worker is added as explanatory variables in the econometric analysis. This reveals that the high TFP growth rate and investment contribution to output growth in the industrial sector are due to positive externalities from the agricultural, distribution and service sectors.

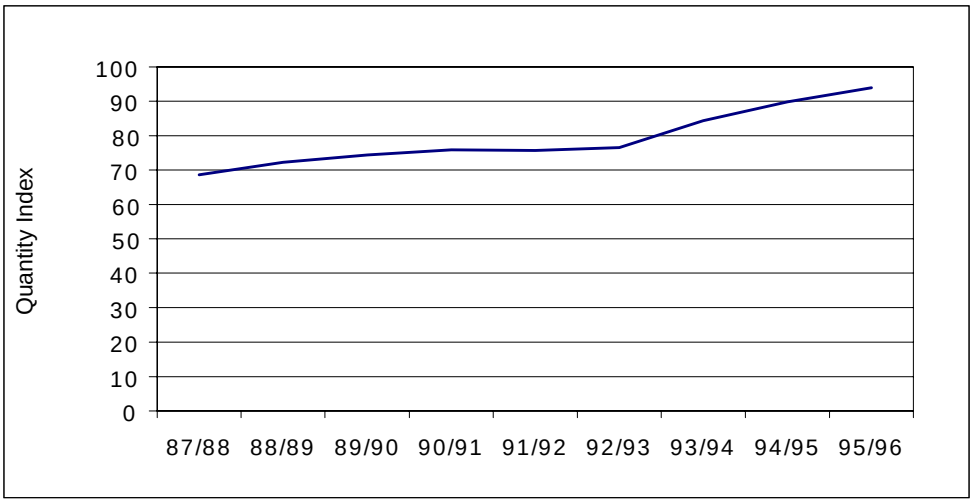
Clearly, the analysis of total factor productivity is important in understanding the nature and extent of economic growth in all economies. It is also apparent that it is important within the context of developing countries. Although, there is some evidence that factor input accumulation does play just as important, if not greater, a role as TFP growth, studying the latter and finding ways to improve it will substantially facilitate the process of economic growth. Understanding the role of TFP growth at the less aggregated level of the economy, as is done for the private manufacturing sector in this study, is important in leading to improvements in output growth within that sector and hence increasing its contribution to overall GDP growth. In light of the greater commitment to a move towards a market economy and economic reforms to bring it about, TFP analysis of the private manufacturing sector will have a particularly relevant role to play.

C. Aggregate Trends in Private Manufacturing Sector

During the period considered in this study, 1987/88-1995/96, the quantity index of output for the private manufacturing sector grew at a rate of about 4 percent a year (see Figure 5.1). Its value, in 1987/88 prices, grew at a rate of about 17 percent a year during the same time period (see Figure 5.2). During this period the quantity indices of capital, labor, energy and materials, grew at annual rates of 9.5 percent, 5.7 percent, 3.4 percent and 3.6 percent, respectively. While these growth rates were quite robust, growth in partial labor productivity appears to be rather flat until the reforms, followed by a relatively short period of adjustment between 1991/92 and 1993/94, first declining and then rising back to pre-reform levels, before falling in the last two years of the sample period (see Figures 5.3 and 5.4).

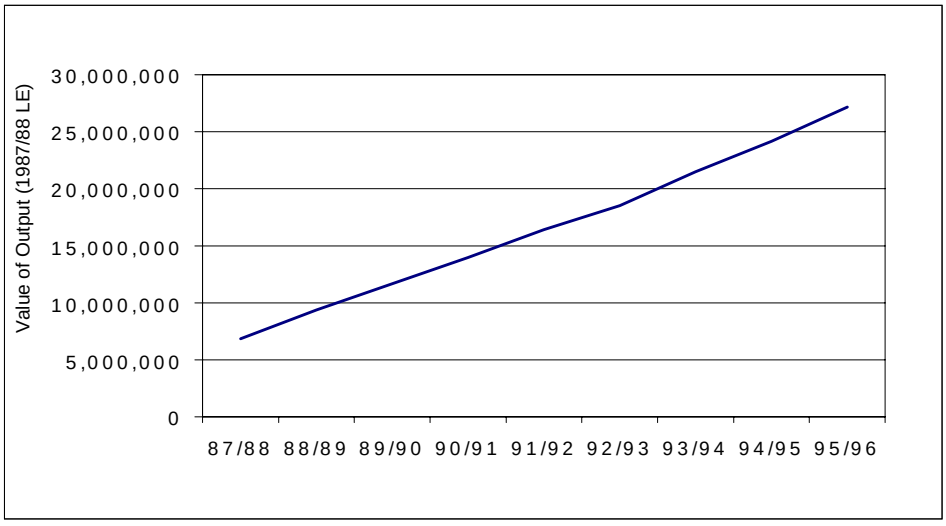
To understand the substantial increases in aggregate private manufacturing sector output, despite the reduction in the relative role for labor in the growth process, requires that we construct measures of TFP and its growth over the sample period. The methods for constructing the TFP measures we use in this section are provided in Annex 5B. The TFP profile for the period under review is displayed in Figure 5.5.

Figure 5.1
Total Output of Private Manufacturing Sector, 1987/88- 95/96



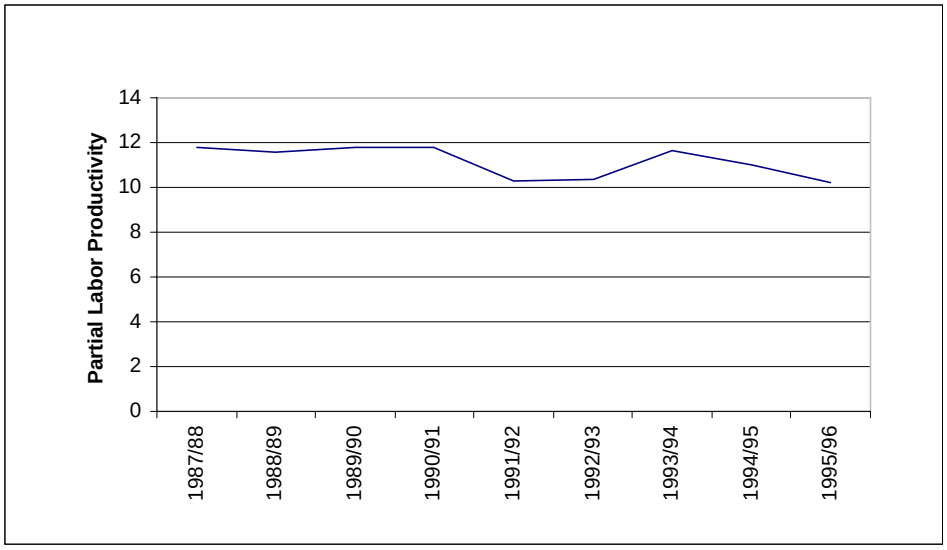
Source: Calculated from CAPMAS data.

Figure 5.2
Real Value of Private Manufacturing Sector Output, 1987/88 –95/96



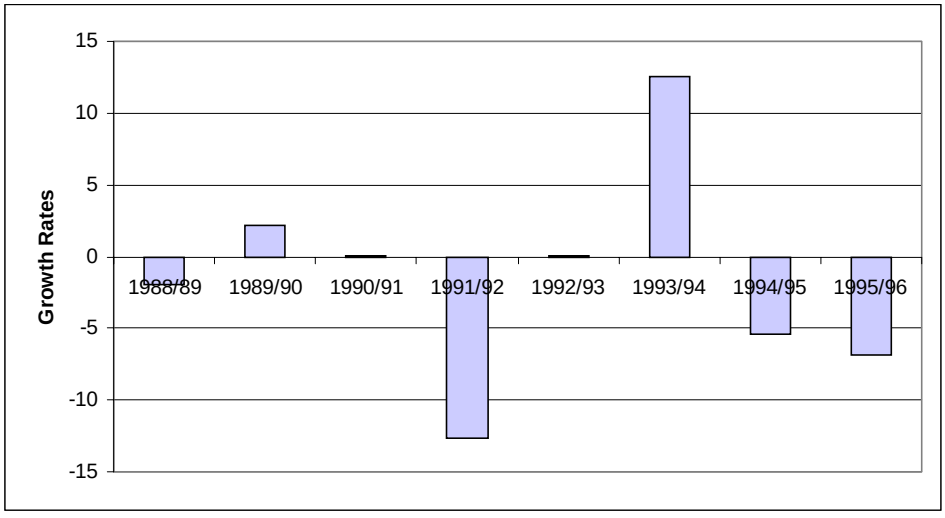
Source: Calculated from CAPMAS data.

Figure 5.3
Index of Manufacturing Output / Index of Labor Input



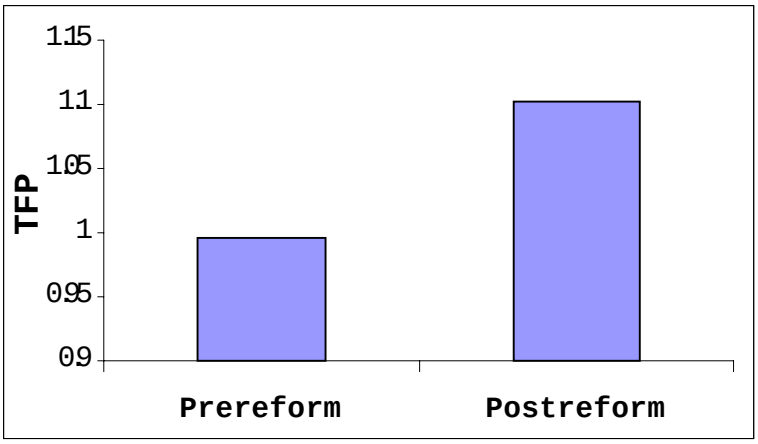
Source: Calculated from CAPMAS data.

Figure 5.4
Growth Rates of Partial Labor Productivity in Private Sector Manufacturing



Source: Calculated from CAPMAS data.

Figure 5.5 Total Factor Productivity in Private Manufacturing Sector, 1987/88 – 95/96



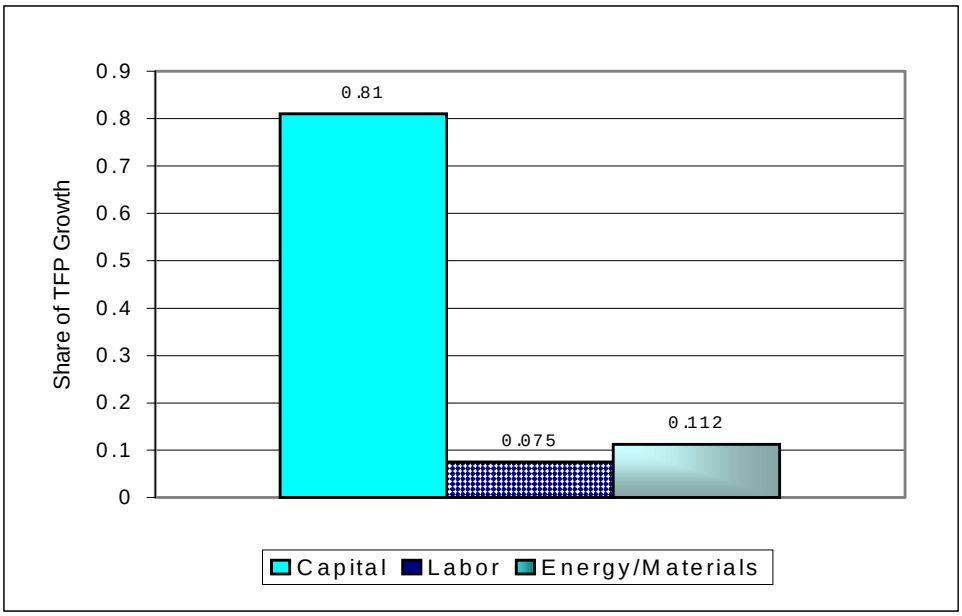
Although some of the gains from the reforms of the early 1990's appear to have lessened toward the end of the sample period, the gains in total factor productivity are nonetheless quite strong. We can adopt the methods utilized by Harberger (1998) to estimate the cost savings that such TFP growth has meant to the Egyptian private sector and by extension to the economy in general. Note that for a constant returns to scale technology, which all evidence uncovered in this study indicates is the case for the private manufacturing sector, the rate of *growth* in TFP is equal to the rate of *decline* in costs. Based on an initial value of about LE 6 billion for the private manufacturing sector in 1987/88, TFP growth of 11 percent between the two epochs appears to have saved the Egyptian economy on the order of LE 660 million over the nine-year period. This is one of the significant benefits of TFP growth and provides a transparent measure of the benefits of the economic reforms of the early 1990's.

Before exploring in depth the sources of productivity growth, we utilize duality relationships discussed in Annex 5B to examine the aggregate contributions of the four input groups —capital, labor, energy, and materials— on aggregate manufacturing TFP growth. Static factor demand models can be used to separate out the effect of different factors of production on total factor productivity growth. Total factor input is a weighted-average of inputs where the weights depend on the underlying production function and thus TFP growth can be related to changes in the efficiency and technology embodied in the various factors of production. Figure 5.6 highlights these aggregate determinants. As we can see, the capital input has had a substantial impact on TFP growth at the aggregate level, explaining on average 81 percent of the more than 2 percent average annual growth in TFP between the midpoints of the two epochs. Labor's contribution lags somewhat at about 8 percent, while the contribution of the energy/materials aggregate is about 11 percent. These aggregate results suggest substantial potential for leveraging new growth policies on new capital formation, the efficiency with which capital is used, and the new technology embodied in it. It also points to the importance of accelerating investments in human capital to improve labor's contribution to growth by way of programs and management practices that enhance its efficiency and productivity.

The aggregate results we have discussed in this section are illuminating. They are, however, unable to identify the extent to which efficiency changes, and at a more detailed

level its components of technical and allocative efficiency, and innovations in the form of new technology have impacted TFP and its growth during the reforms initiated in the early 1990's. To do this requires much more information. In the next section we thus turn to our panel of twenty-eight sectors in private manufacturing and analyze in more detail the determinants of TFP growth.

Figure 5.6
Contribution of Factor Inputs to the Growth in Total Factor Productivity of Private Manufacturing Sector, 1987/88 –95/96



Source: Author's estimates based on CAPMAS data.

D. Determinants of TFP Growth for Private Manufacturing Sector

1. Methodology

Fare et *al.* (1994) note that with panel data on firms or sectors, the geometric mean of two Malmquist total factor productivity indices can be decomposed into a component that indicates pure technology change and a component that indicates pure change in technical efficiency. We will use this methodology, discussed in detail in Annex 5B, to examine the sources of TFP growth at the three-digit sector level in terms of these two aspects of growth. Efficiency change denotes the movement over time to the best practice use of the existing technology while technological change indicates the movement over time in the best practice technology due to adoption of new frontier technologies. It is the total of these that provide us with total factor productivity growth. Annex 5B outlines how linear programming techniques can be used to further decompose inefficiency into a radial index of technical efficiency and a cost-based measure of allocative efficiency relative to a sector that, given its factor prices, allocates its resources optimally. Both of these are given in percentages from the optimal level, which is an efficiency level of 100 percent.

The use of complementary parametric methods provides further information on the nature and source of TFP growth. From the production side, our parametric estimates of the sources of TFP growth are based on a Cobb-Douglas production function. We estimate this function using two different techniques applicable to panel data: fixed effects and random effects. The details of these methods appear in Annex 5B. Generally, the former assumes that the sector-specific effects, which capture the level of technical efficiency, are correlated with the inputs while the latter assumes they are not.

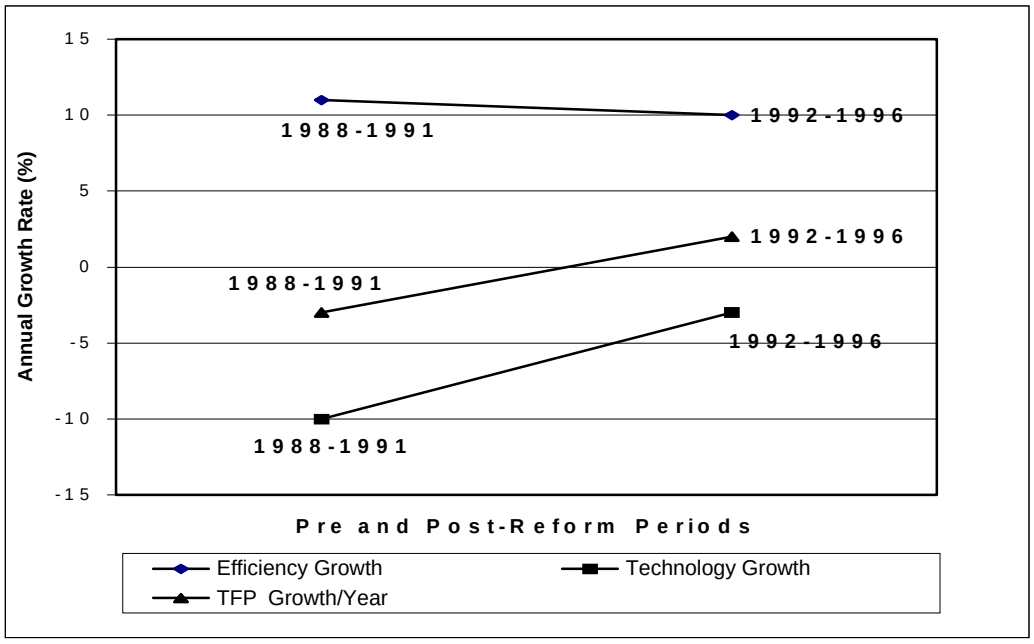
A methodology for testing which estimation technique is applicable to the data at hand, also discussed in Annex 5B, reveal that the random effects estimation method is appropriate. Using the fitted residuals from the random effects procedure, we applied the Cornwell, Schmidt, Sickles (1990) estimation method in order to find sector specific efficiency levels across the nine year time period. The specifics of this method that we adopt for our study are also discussed in Annex 5B.

From the cost side, we also apply a parametric method to estimate the dual cost function. Cost efficiency in the Egyptian manufacturing industry is modeled using a modified version of the Cobb-Douglas cost function and the input share equations proposed by Christensen and Greene (1976). The modification of the conventional Cobb-Douglas cost function follows the method presented in Schmidt and Lovell (1979) and Bauer (1990). Technical and allocative inefficiencies are incorporated in this approach in which cost inefficiency measures are obtained relative to a stochastic parametric cost frontier. Detailed discussion of the model and estimation method used can be found in Appendix 5B.

2. General Findings

Estimates of the two sources of productivity growth during 1987/88-95/96, found using the non-parametric method, are given in Figure 5.7. Two aspects of the recent growth trends seem quite apparent from these results. The first is that the impact of economic reforms on the economy has been substantial in the degree of efficiency change. Pre-reform levels of efficiency stood at about 65 percent while post-reform levels of efficiency stood at about 80 percent, maintaining its impressive per year growth of about 10 percent between the pre- and post-reform periods. The second is that decline in technological innovation slowed dramatically. Consequently, total factor productivity growth returned to a healthy level of about 2 percent after suffering a period of decline in the pre-reform period.

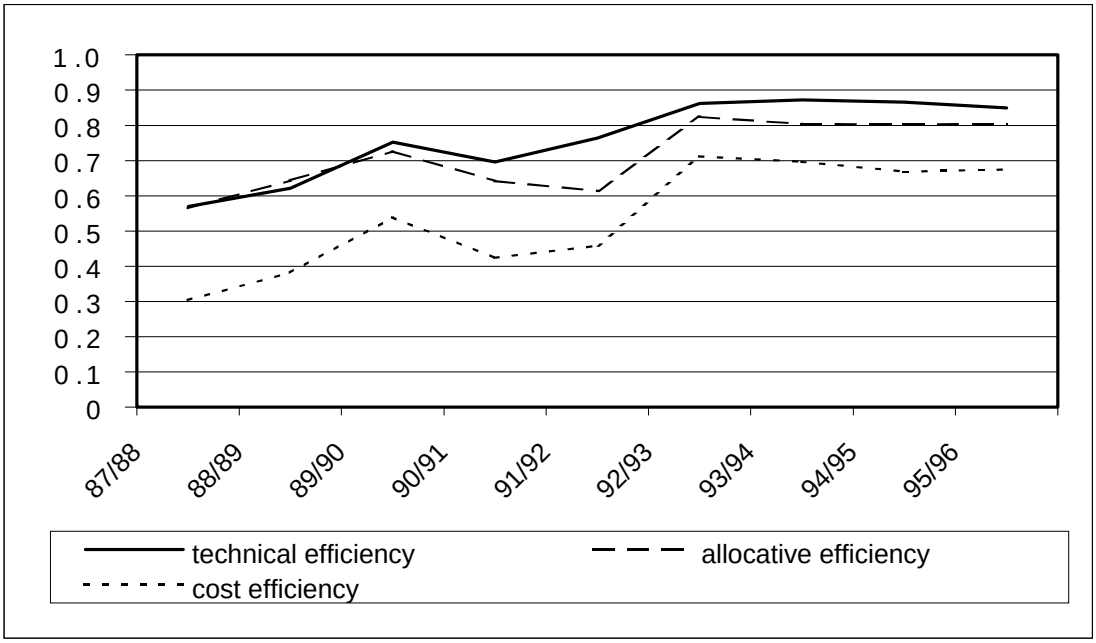
Figure 5.7
Decompositions of Malmquist Rates of TFP Growth into its Sources: Efficiency and Technology Growth



Source: Author's estimates based on CAPMAS data.

Since the change in efficiency appears to have had a large role in the effectiveness of reforms, we also examine in more depth the sources of efficiency growth over the period. Allocative and total cost efficiency have been trending up steadily during the period. Technical and allocative efficiencies have increased 28 percent and 24 percent respectively, consistent with rates of growth of 3.1 and 2.7 percent a year, for a total growth rate of 6.8 percent a year (see Figure 5.8).

Figure 5.8
Efficiency Decomposition for Private Manufacturing Sector, 1988-96



Source: Author's estimates based on CAPMAS data.

The increase in allocative efficiency of about 7 percent implied by regression-based cost function estimation is somewhat less than these, while changes in technical efficiency of 25 percent are quite comparable.

Figures 5.9A-I provide the absolute efficiency finding based on the parametric estimation of the production function at the 2-digit ISIC level. Coefficient estimates on the time variable indicate an average increase of 1 percent in technological growth over the nine-year period. By this method the level of efficiency, which embodies all the various sources of efficiency, has increased by 65 percent over the study period. This implies an annual 7 percent growth rate for productive efficiency, which is close to the 6.8 percent annual growth rate noted above for the less aggregated 3-digit level private manufacturing sectors. The marginal contributions of capital, labor, energy, and materials to total output are 0.024, 0.136, 0.034, and 0.814 while their average expenditure shares are 0.136, 0.094, 0.030, 0.74, respectively. The marginal contribution of energy is commensurate with its share in total expenditure, while that of capital is lower and labor and materials somewhat higher than their respective shares in total expenditure.

Overall we employed a variety of panel techniques in our modeling efforts to control for unobserved heterogeneity. We also tested a number of specifications for the appropriate form of panel stochastic frontier using methods developed by Schmidt and Sickles (1984), Cornwell, Schmidt and Sickles (1990), and Park, Sickles, and Simar (1997). These analyses lead us to the conclusion that the private manufacturing sector exhibits no evidence of scale economies. Furthermore, the Cobb-Douglas functional forms provide a robust and parsimonious vehicle for modeling the production process while at the same time allowing for the identification of the efficiency and technology determinants of

productivity growth. Finally, although production heterogeneity exists among sectors, no evidence of correlation exists between the unobserved production heterogeneity and the factor inputs used in the production modeling exercise. The results of these analyses were broadly supportive of the trends and magnitudes revealed by the complementary index number approaches.

E. Composition and Distribution of the Determinants of Intra-Sector Total Factor Productivity Growth

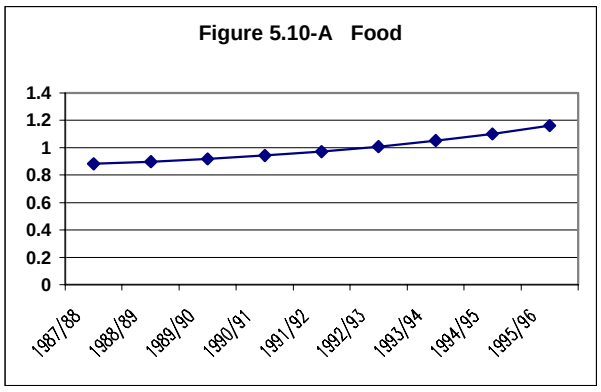
1. Results based on Parametric Methods

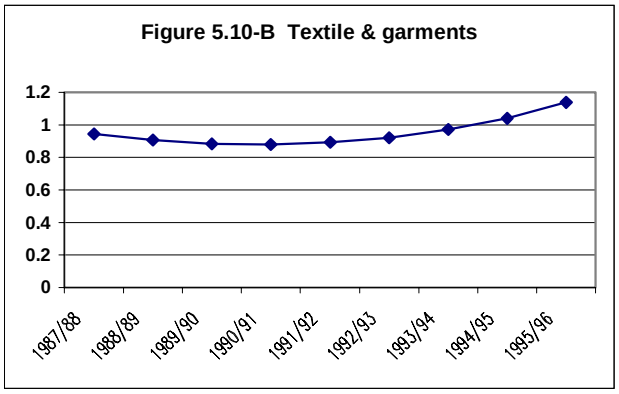
The seven percent increase in efficiency found using the parametric estimation of the production function is an average figure. Examination of the pattern of efficiency sector by sectors both at the two and three-digit levels reveal the variations in the performance of individual sectors that the average masks. Evolution of absolute efficiency at the two-digit level shows that the food, textiles and garments, manufacturing of non-metal products, and other manufacturing industries (sector 39) have experienced overall gains in efficiency; we see 31 percent, 20 percent, 7 percent, and 5 percent increases in efficiency in each respective sector. These increases are over the entire study period (see Figures 5.9A-I). Closer examination, however, indicates that those sectors exhibiting clear gains in efficiency are the food, textiles & garments, and non-metal products sectors.

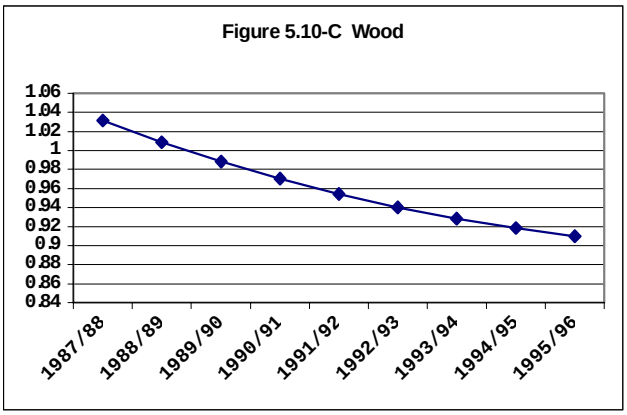
We are also interested in examining results based on two sub-periods: 1987/88-89/90, period 1, and 1990/91-95/96, period 2. Using this breakdown we see that, in period 2, efficiency increase in the food sector is due to improvements in the beverage and liquor, and tobacco sub-sector. The food manufacturing and the other food manufacturing industries, on the other hand, exhibit declines in efficiency in period 2. The rise in efficiency in textiles and garments and non-metal products sectors began in year 5 (1991/92) after having experienced declines before that time. In the former, the textiles and wearing apparels sub-sectors account for the period 2 increase in efficiency in the textiles and garments industry.[2] In the latter, the non-metallic mineral sub-sector is responsible for this increase (see Table 5.1).

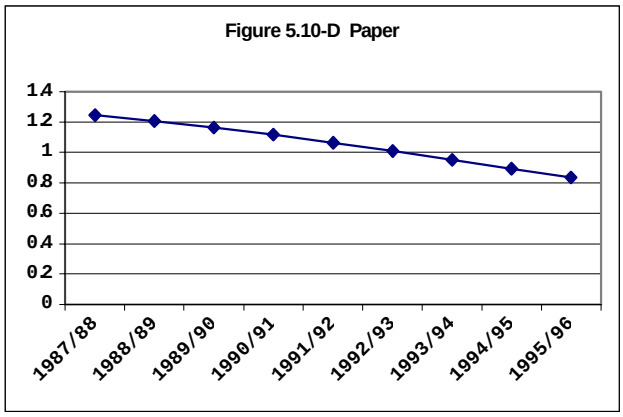
[2] Unlike the Malmquist efficiency index that shows the leather sub-sector to have experienced gains in efficiency, discussed later, the estimation here shows the opposite.

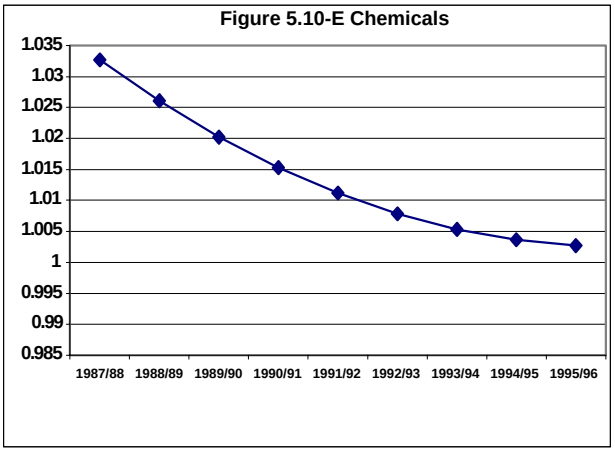
Figure 5.10A-I. Absolute Efficiencies for two digit ISIC Sectors

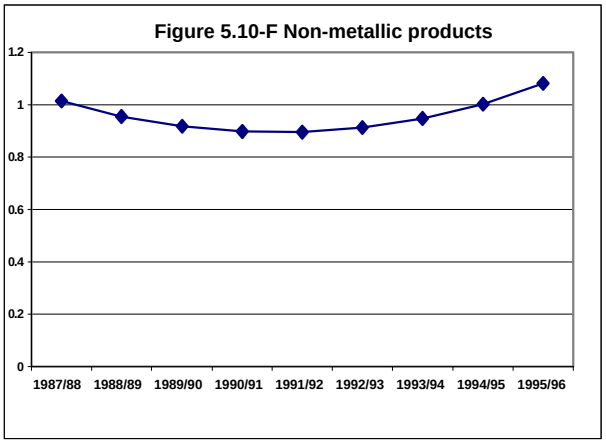












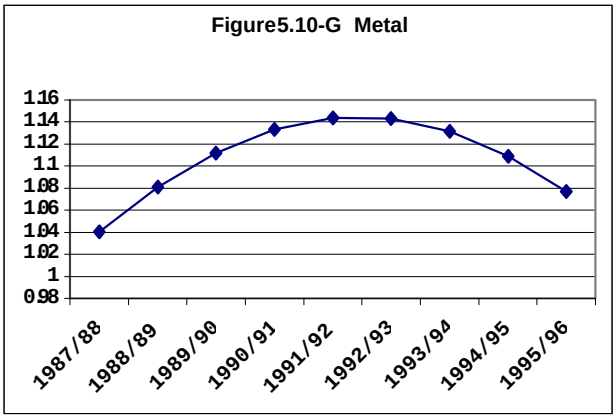


Figure5.10-G Metal
1.16
1.14
1.12
1.1
1.08
1.06
1.04
1.02
1
0.98
1987/88
1988/89
1989/90
1990/91
1991/92
1992/93
1993/94
1994/95
1995/96

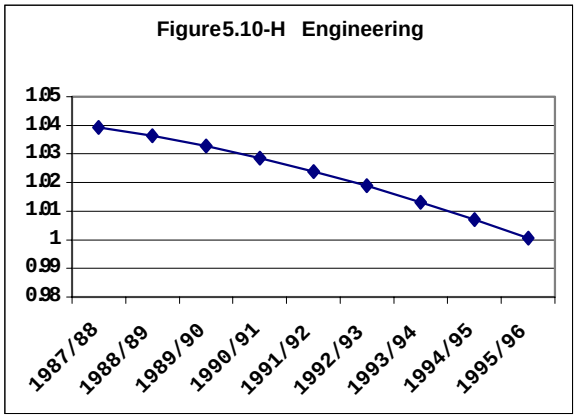


Figure5.10-H Engineering
1.05
1.04
1.03
1.02
1.01
1
0.99
0.98
1987/88
1988/89
1989/90
1990/91
1991/92
1992/93
1993/94
1994/95
1995/96

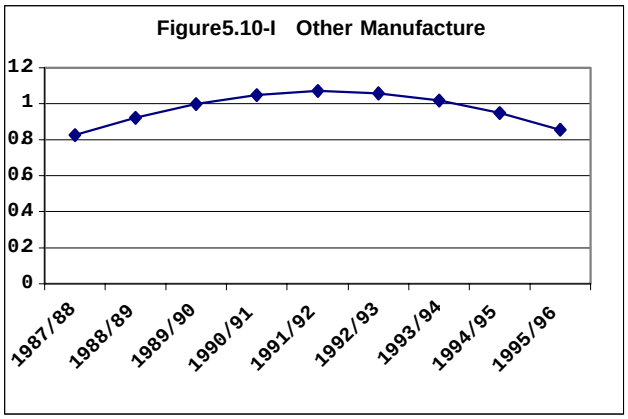


Figure5.10-I Other Manufacture
1.2
1
0.8
0.6
0.4
0.2
0
1987/88
1988/89
1989/90
1990/91
1991/92
1992/93
1993/94
1994/95
1995/96

Table 5.1
Absolute Efficiency at the Three-Digit Level

Sector	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9
Food	0.91	0.93	0.95	0.97	0.98	0.99	0.99	0.99	0.98
Other Food	0.72	0.84	0.94	1.02	1.07	1.08	1.05	0.99	0.90
Beverages & Liquor	0.79	0.81	0.83	0.88	0.93	1.01	1.11	1.23	1.39
Tobacco	1.25	1.07	0.97	0.91	0.89	0.92	0.98	1.10	1.29
Textiles	0.96	0.94	0.93	0.92	0.92	0.93	0.95	0.97	1.00
Wearing Apparel	0.90	0.89	0.89	0.91	0.93	0.97	1.03	1.10	1.18
Leather	0.91	0.93	0.95	0.95	0.95	0.94	0.92	0.89	0.86
Footwear	1.12	1.03	0.97	0.93	0.91	0.91	0.92	0.96	1.01
Wood	0.83	0.88	0.93	0.96	1.00	1.02	1.04	1.05	1.06
Furniture & Fixtures	1.12	1.15	1.16	1.14	1.10	1.04	0.96	0.87	0.77
Paper	2.33	2.01	1.72	1.46	1.23	1.03	0.86	0.71	0.58
Printing & Publishing	0.69	0.81	0.93	1.03	1.11	1.15	1.15	1.12	1.05
Industrial Chemicals	0.81	0.90	0.97	1.02	1.06	1.07	1.07	1.04	0.99
Other Chemicals	0.93	1.00	1.05	1.08	1.09	1.08	1.05	1.00	0.93
Other Petroleum & Coal	0.74	0.82	0.90	0.97	1.01	1.03	1.03	1.01	0.96
Rubber	0.87	0.85	0.84	0.85	0.88	0.93	1.01	1.11	1.24
Plastic	1.08	1.02	0.97	0.94	0.92	0.92	0.92	0.94	0.97
Pottery & China	1.08	1.01	0.96	0.93	0.93	0.96	1.00	1.08	1.19
Glass	1.08	1.05	1.03	1.03	1.03	1.03	1.05	1.08	1.12
Other Non-Metallic Minerals	1.25	1.15	1.08	1.03	1.00	0.99	1.00	1.02	1.07
Iron & Steel	0.97	1.05	1.11	1.15	1.18	1.19	1.19	1.16	1.12
Non-ferrous	1.05	0.96	0.90	0.87	0.86	0.87	0.90	0.95	1.04
Fabricated Metals	1.11	1.07	1.04	1.01	0.99	0.97	0.96	0.96	0.96
Machinery	0.93	0.95	0.96	0.97	0.98	0.97	0.96	0.94	0.92
Electrical Machinery	0.85	0.92	0.99	1.03	1.06	1.07	1.05	1.02	0.96
Transport	1.54	1.33	1.18	1.06	0.98	0.92	0.89	0.87	0.88
Professional Equipment	1.09	1.07	1.04	1.02	1.01	1.00	1.00	1.00	1.00
Other Manufacturing	0.79	0.91	1.01	1.08	1.12	1.11	1.08	1.00	0.91

Source: Author's estimates based on CAPMAS data.

The metal and other manufacturing industries sectors, even if registering overall efficiency gains, exhibit declines of 5 percent and 20 percent, respectively, from their peaks in the early 1990's. Therefore, their period 2 efficiency growth is lower than in period 1. In addition, the wood, paper, chemicals and engineering sectors exhibit declines in efficiency of 12 percent, 33 percent, 3 percent and 1.3 percent, respectively (see Figures 5.9 A-I). Further breakdown of these sectors, shown in the three-digit level industries in Table 5.1, reveals the sub-sectors that have experienced significant losses in efficiency in period 2. In the wood sector, the manufacture of wood and related product sub-sector registers modest gains in efficiency in period 2 while that of the manufacture of furniture posts declines in efficiency. In the paper sector, both the manufacturing of paper and paper products, and the printing and publishing sectors show efficiency declines in period 2, although the latter experienced efficiency increases in the first period. That chemicals and engineering sectors post only modest declines in their overall efficiency is due to the differing experiences of their various sub-sectors. The

manufacturing of industrial and other chemicals, and petroleum and coal sectors show rises in efficiency in period 1 and then declines in efficiency starting in the early 1990's, which covers period 2. The other two sub-sectors of the chemicals sector, the manufacturing of rubber and plastic products, show increases in efficiency starting in year 5 (1991/92), again covering period 2. In engineering, the manufacturing of fabricated metal products, transport equipment, professional equipment, machinery and electrical machinery sub-sectors all post modest declines in efficiency in period 2.

Table 5.2
Relative Efficiencies

Sector	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9
Food	0.71	0.74	0.79	0.83	0.85	0.88	0.93	0.99	1.00
Textiles & Garments	0.76	0.75	0.76	0.78	0.78	0.81	0.86	0.94	0.98
Wood	0.83	0.84	0.85	0.86	0.83	0.82	0.82	0.83	0.78
Paper	1.00	1.00	1.00	0.99	0.93	0.88	0.84	0.81	0.72
Chemicals	0.83	0.85	0.88	0.90	0.88	0.88	0.89	0.90	0.86
Non-Metallic Minerals	0.81	0.79	0.79	0.79	0.78	0.80	0.84	0.90	0.93
Metal	0.84	0.90	0.96	1.00	1.00	1.00	1.00	1.00	0.93
Engineering	0.84	0.86	0.89	0.91	0.90	0.89	0.90	0.91	0.86
Other Manufacturing	0.66	0.76	0.86	0.93	0.94	0.93	0.90	0.85	0.74

Source: Author's estimates based on CAPMAS data.

An interesting picture emerges when we look at relative efficiency performance, as shown in Table 5.2. Generally, until year 7 (1993/94) the sectors showing overall declines in their absolute efficiency levels, such as the wood, chemicals, and engineering sectors, are relatively more efficient than those registering overall gains in absolute efficiency. The chemical and engineering sectors remain leaders in relative efficiency until about year 7 (1993/94) while the paper sector is a leader only until year 3 (1989/89). Although the metal sector maintains its lead in relative efficiency until year 8 (1994/95), beginning in year 7 (1993/94) those exhibiting absolute gains in efficiency, including food, textiles and garments, and the manufacture of non-metal products sectors, also become leaders in relative efficiency.

From the estimation of the cost function, we are also able to observe efficiency performance in the two periods and in the different sectors. Total cost inefficiency, measured against an industry cost frontier, is divided into allocative and technical components. Allocative inefficiency is the outcome of inappropriate input mix usage given input prices. Technical inefficiency results from inability to produce the maximum output that input use allows or to use the minimum input that output production allows. If these types of inefficiencies do not exist, we expect a value of zero and, thus, the higher the numbers for each category the greater the inefficiency that exists. In our study, we find that the average allocative inefficiency over all sectors is lower in period 2, where it fell an average of 5 percent per year, than in period 1, where it fell 2 percent on average. Similarly, technical inefficiency is lower in period 2, where it fell an average of 4 percent per year as compared to an average decline of 1 percent per year in period 1 (see Table 5.3).

Table 5.3
Technical and Allocative Inefficiencies Over Time

Allocative Inefficiency*				Technical Inefficiency*			
YEAR	A	Percent Change	Average	YEAR	T	Percent Change	Average
1	17.24			1	12.23		
2	15.54	-10	-2	2	11.05	-10	-1
3	16.50	6		3	11.70	6	
4	16.32	-1		4	11.67	0	
5	14.10	-14	-5	5	10.38	-11	-4
6	13.81	-2		6	10.12	-2	
7	14.17	3		7	10.47	3	
8	13.82	-2		8	10.35	-1	
9	12.17	-12		9	9.37	-9	

** Calculated by taking mean for each sector over all time periods.*
Source: Author's estimates based on CAPMAS data.

In general the top five sectors with relatively small technical and allocative inefficiencies are rubber, the manufacture of other non-metallic mineral products, the manufacture of beverage and liquor, wood, and printing and publishing. The bottom five sectors, in contrast, are tobacco, leather, the manufacture of other food, transport equipment, and pottery and china (see Table 5.4). However, the fifth top performer, the printing and publishing sub-sector, has experienced deterioration in both counts of cost efficiency in period 2. The tobacco sub-sector, in contrast, has undergone significant cost efficiency improvements in period 2. The poor performance of the pottery and china sub-sector, though not reflected by the production function estimation, is also reflected by the non-parametric method, discussed later.

2. Results Based on Non-Parametric Methods

Next, we examine intra-sector TFP growth and its determinants based on non-parametric index number techniques. As we pointed out above and discuss in more detail in Annex 5B, the Malmquist TFP index has a natural decomposition into efficiency and technology indices. Thus growth in TFP can be decomposed into technical and efficiency changes without resorting to statistical assumptions and assumptions concerning the parametric form for technology. The Malmquist index is applied to all sectors jointly. We also analyze TFP growth using the Tornqvist index, which is applied to each sector separately. We illustrate the distribution and composition benefits of these measures of economic performance using graphical devices promoted by Harberger (1998) in his Presidential Address to the American Economic Association.

Table 5.4
Technical and Allocative Inefficiencies By Sector

Sector	Technical Inefficiency*	Sector	Allocative Inefficiency*
Rubber	6.687	Other Non-Metallic	8.358
Wood	6.852	Beverages & Liquor	8.427
Beverages & Liquor	6.888	Rubber	8.685
Non-Metallic	7.093	Wood	8.866
Printing & Publishing	7.377	Printing & Publishing	8.994
Textiles	7.963	Textiles	9.647
Glass	8.246	Fabricated Metal	10.540
Fabricated Metal	8.387	Glass	10.569
Other Petroleum & Coal	8.423	Food	10.857
Food	8.789	Other Petroleum & Coal	11.635
Plastic	9.095	Plastic	11.755
Footwear	9.124	Other Chemicals	11.817
Other Chemicals	9.226	Iron & Steel	12.054
Iron & Steel	9.312	Electrical Machinery	12.125
Electrical Machinery	9.341	Footwear	12.404
Industrial Chemicals	9.529	Industrial Chemicals	12.855
Other Manuf. Industries	9.769	Paper	13.084
Furniture & Fixtures	9.879	Furniture & Fixtures	13.285
Paper	9.891	Other Manuf. Industries	13.326
Machinery	10.856	Machinery	14.575
Wearing Apparel	10.993	Wearing Apparel	14.861
Non-Ferrous Metals	11.318	Professional Equipment	16.036
Professional Equipment	11.481	Non-Ferrous	16.227
Tobacco	14.240	Tobacco	20.430
Leather	15.041	Other Food	21.752
Other Food	15.331	Leather	22.201
Transport Equipment	17.615	Transport Equipment	25.491
Pottery & China	35.813	Pottery & China	54.982

** Calculated by taking mean for each sector over all time periods.*
Source: Author's estimates based on CAPMAS data.

Harberger emphasized that the most important and transparent impact of TFP growth on economic development is in terms of real cost reduction (RCR), and that an analysis of RCR associated with TFP growth enables us to solve many puzzles and complexities that surround the process of economic growth. In spite of its complexity, real cost reduction can be reduced to a single metric and can be made additive. Moreover, graphical techniques to display its intra-sector composition and distribution provide an intuitive and comprehensive tool for summarizing the process of economic development and its sources.

Results using these techniques are provided in Tables 5.5-5.12. In each table, column (1) presents the measure of the percentage by which TFP grew, or real costs were reduced, during the period in question. To arrive at the growth rates in column 1, we calculate

Table 5.5
TFP Tornqvist Index, 1988-90 Average Annual Growth

	Sector	TFP Growth (%)	RCR*	Cumulative Sum of (2)	Initial Output	Cumulative Sum of (4)	Percentile of Output
				(LE '000)			
		(1)	(2)	(3)	(4)	(5)	(6)
36	Pottery & China	82.90	44560	44560	53751	53751	0.01
33	Furniture & Fixtures	37.93	39155	83715	103230	156981	0.02
33	Wood Products	27.76	4622	88337	16650	173631	0.03
34	Printing & Publishing	22.58	55796	144133	247104	420735	0.06
38	Electrical Machinery	10.78	22457	166590	208320	629055	0.09
36	Glass Products	9.08	11528	178118	126960	756015	0.11
35	Other Petroleum & Coal	5.74	546	178663	9504	765519	0.11
35	Other Chemical Products	5.45	28556	207219	523968	1289487	0.19
31	Food	4.88	42397	249617	868800	2158287	0.31
32	Textiles	3.98	39289	288906	987169	3145456	0.46
39	Other Manufactures	3.96	1890	290797	47736	3193192	0.47
35	Industrial Chemicals	1.99	3013	293809	151392	3344584	0.49
31	Beverage & Liquor	0.98	1588	295397	162000	3506584	0.51
37	Iron & Steel	0.44	650	296047	147760	3654344	0.53
38	Machinery	-0.14	-327	295720	233856	3888200	0.57
32	Wearing Apparel	-0.84	-1534	294185	182651	4070851	0.59
35	Rubber Products	-3.03	-401	293784	13248	4084099	0.60
38	Fabricated Metal Products	-4.71	-22097	271687	469152	4553251	0.66
32	Footwear	-6.36	-3128	268559	49179	4602430	0.67
35	Plastic Products	-8.00	-37770	230789	472128	5074558	0.74
38	Professional Equipment	-8.06	-5354	225434	66432	5140990	0.75
37	Non-Ferrous	-8.06	-503	224932	6240	5147230	0.75
36	Other Non-Metallic Mineral	-8.69	-28949	195982	333132	5480362	0.80
31	Other Food	-8.84	-25385	170597	287160	5767522	0.84
38	Transport Equipment	-12.91	-50132	120465	388320	6155842	0.90
31	Tobacco	-13.75	-9488	110978	69000	6224842	0.91
34	*Paper Products*	-28.19	-172983	-62005	613632	6838474	1.00
32	Leather Products	-45.81	-11287	-73292	24638	6863112	1.00

*Notes: * RCR = real cost reduction: RCR = initial output x TFP growth. Numbers in the first column are the two first digits of the three-digit code of each respective sector.Data are for fiscal years, whereby 1988 refers to 1987/88 and 1990 refers to 1989/90.*
Source: Author's estimates based on CAPMAS data.

annual TFP growth rates and takes an average of them: we call this average annual growth. To convert these percentages into dollar amounts of real cost savings over the period. the growth rates are multiplied by base-period real GDP [column (4)]. The results

are shown in column (2). Column (3) and column (5) are the cumulative sums of column (2) and column (4), respectively. Working with these figures we can answer the following question: what percent of total real cost reduction can be accounted for by what percent of the industries, ranked from top to bottom, as measured by initial value?

From the table constructed using such ranking, we can obtain Lorenz-type curves like the one in Figure 5.13. With this type of figure one can see easily the concentration of the real cost reduction to be within a few sectors in the private manufacturing industry. For instance, in this figure, the total real cost reduction is set to 100 percent so that a number relative to 100 percent represents cumulative real cost reduction, shown in column (3) of Table 5.6. Here, one can check the point where the rising curve crosses 100 percent on the vertical axis. The interpretation is that, for example, in a given period the cumulative real cost reduction of just 13 percent of manufacturing industries, measured by initial value added, was equal to the total RCR for manufacturing as a whole. After that there are other industries producing another 44 percent of the total which have also reduced costs, but their contribution is offset by still other industries with negative RCR during the period. The maximum point of the curve shows that about 57 percent of the sectors enjoyed real cost reduction during the period with the remaining 43 percent suffering real cost increases, or declining TFP. As a result, only 57 percent of the sectors were able to account for the full amount of real cost reduction during the period (see Table 5.6 and Figure 5.13).

Figures 5.10 to 5.15 show the quasi-Lorenz curves for the 28-sector Egyptian private manufacturing industries over two sub-periods of 1987/88-1989/90, period 1, and 1990/91-1995/96, period 2. The cumulative sum of RCR is negative in period 1 (Figure 5.10) while it is positive in period 2 (see Figure 5.13). Thus we also examine RCR by deleting the top and bottom 2 and 3 sectors from the analysis. This allows us to represent the RCR by numbers relative to the total RCR, with a normalization of this latter set to 100. In particular, this procedure is followed for figures showing the profile of TFP growth based on the Tornqvist index.

Figure 5.10. Profile of TFP Growth (1987/88-89/90), Based on Tornqvist Index, Average Annual Growth

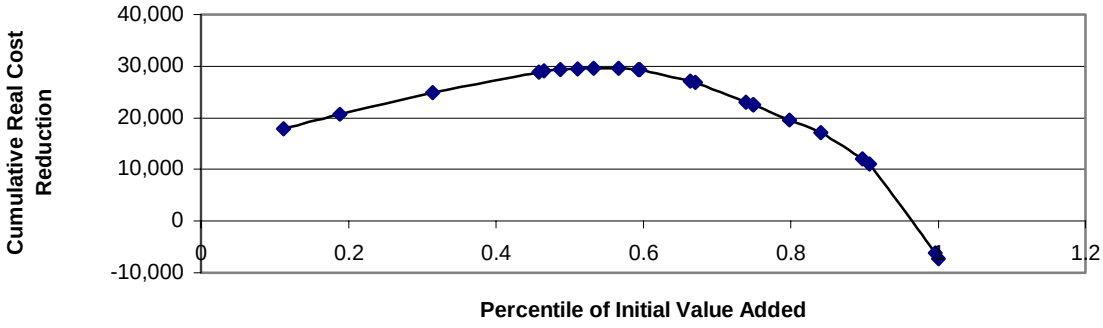


Figure 5.11. Profile of TFP Growth (1987/88-89/90), Based on Tornqvist Index, Top/Bottom 2 Sectors Deleted, Averge Annual Growth

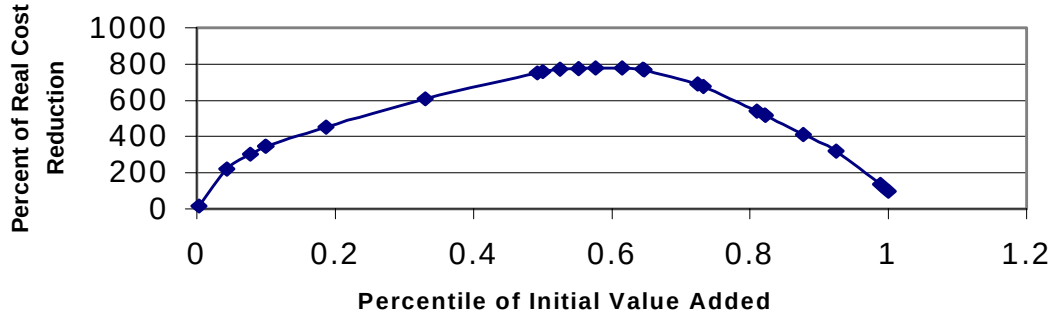


Figure 5.12. Profile of TFP Growth (1987/88-88/90), Based on Tornqvist Index, Top/Bottom 3 Sectors Deleted, Average Annual Growth

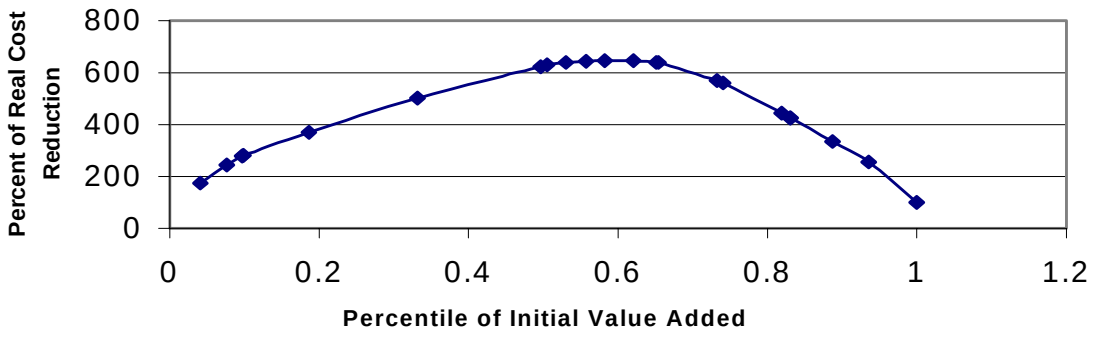


Figure 5.13. Profile of TFP Growth (1990/91-1995/96), Based on Tornqvist index, Average annual growth

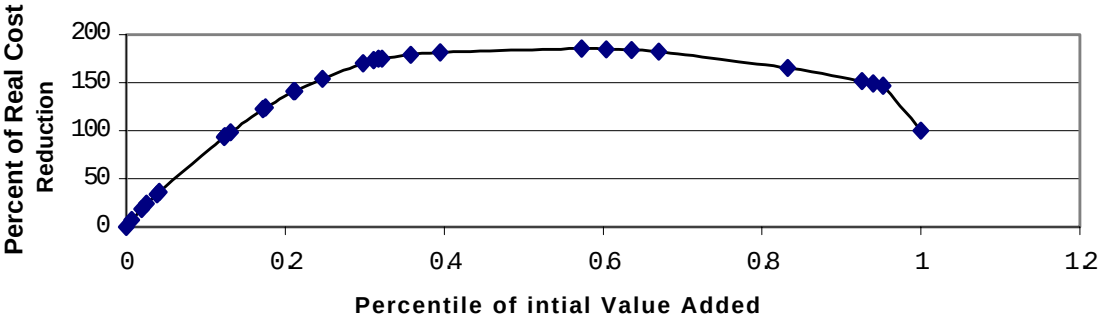


Figure 5.14. Profile of TFP Growth (1990/91-1995/96), Based on Tornqvist index, Top/Bottom 2 Sectors Deleted. Average annual growth

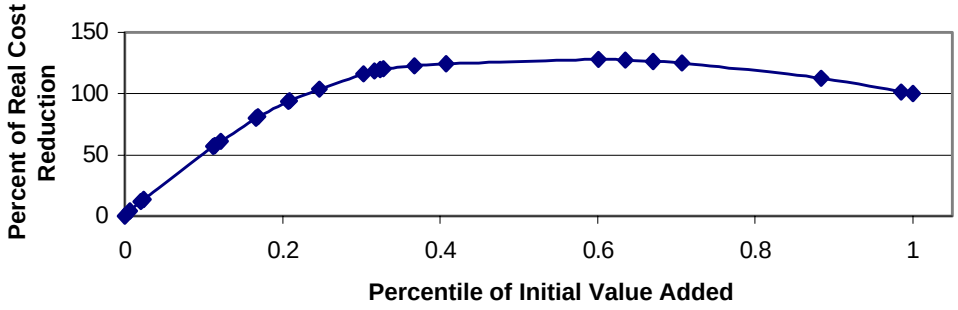
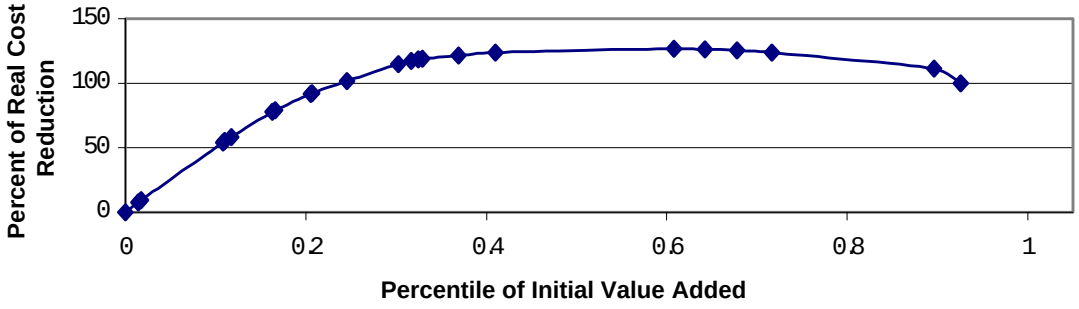


Figure 5.15. Profile of TFP Growth (1990/91-95/96), Based on Tornqvist index, Top/Bottom 3 Sectors Deleted. Average annual growth



Using the Tornqvist index, Figures 5.10 and 5.13, corresponding to Tables 5.5 and 5.6, show that 53 percent of the sectors enjoyed RCR in period 1 whereas 57 percent of the sectors enjoyed RCR in period 2. Furthermore, the number of sectors with negative RCR, indicating real rising costs, is less in period 2 than in period 1. When we examine 'overshooting,' the amount by which the maximum RCR exceeds the total RCR as captured by the degree of concavity of the curves, it is more pronounced in period 1 than in period 2. In period 1, the maximum RCR is between 8 to 6 times as high as the total RCR, after deleting the top and bottom 2 and 3 sectors respectively. In contrast, in period 2, maximum RCR is only 1.3 times as high as the total RCR. These results indicate that more sectors enjoyed real cost reduction, and hence TFP growth, in period 2 than in period 1. In addition, the large real cost reductions are concentrated in the top six sectors in period 1, which is not the case in period 2. This also indicates that more sectors achieved real cost reductions in period 2 than in period 1.

The Malmquist index shows similar outcomes. By this measure, only 37 percent of the sectors enjoyed RCR in period 1 while 49 percent enjoyed RCR in period 2 (see Tables 5.7 and 5.8). Even after deleting the top and bottom 3 sectors, cumulative sum of RCR is negative in period 1 whereas it is positive in period 2. In addition, overshooting is greater in period 1 than in period 2 by the Malmquist measure.

The above indices also allow us to examine sectoral performance of the TFP growth rates in the two sub-periods. In particular we can identify which sectors have experienced TFP growth and which have lost ground on this front. Using the Tornqvist index, we see in Table 5.5 that the top performers in period 1 are pottery and china, furniture and fixture, wood products, and printing and publishing. In period 2, on the other hand, the top performers were tobacco, beverage and liquor, wood products, and pottery and china.[3] The overall pattern indicates improvements in the food, and textiles and garments sectors, and losses in the total wood and paper sectors in period 2. The other manufacturing industries sector also registers a decline. The remaining three sectors, namely chemicals, engineering and non-metals, have experienced mixed performance in TFP growth in period 2: some of their sub-sectors have gained TFP growth in period 2 while others have experienced declines in TFP growth (see Table 5.6).

In particular, in the chemical sector, the rubber and plastic sub-sectors are clear winners reversing the negative TFP growth they experienced in period 1 to positive growth in period 2. They also moved from 17th to 7th and 20th to 14th positions, respectively, in TFP growth performance in period 2. The industrial chemical and other petroleum and coal sub-sectors experienced modest gains in TFP growth in period 2. The other chemicals sub-sector was a clear loser in this sector going from a positive TFP growth in period 1 to negative growth in period 2 and losing its position as the 8th top performer in period 1 to the 25th position (see Tables 5.5 and 5.6).

[3] As we will note below, however, the pottery and china sub-sector has experienced significant decline in its TFP growth, in period 2, even if its TFP growth ranking remains high.

Table 5.6
TFP Tornqvist Index, 1991-96 Average Annual Growth

Sector		TFP Growth (%) (1)	RCR*	Cumulative Sum of (2)	Initial Output	Cumulative Sum of (4)	Percentile of Output
			(LE '000)				
			(2)	(3)	(4)	(5)	(6)
31	Tobacco	17.79	18060	18060	101518	101518	0.01
31	Beverages & Liquor	16.39	28596	46656	174472	275990	0.02
33	Wood Products	15.13	12531	59187	82820	358810	0.03
36	Pottery & China	14.13	24974	84161	176746	535556	0.04
32	Leather Products	13.18	5798	89959	43992	579548	0.04
37	Iron & Steel	12.48	141611	231570	1134705	1714253	0.12
35	Rubber Products	10.93	2367	233938	21659	1735912	0.12
38	Professional Equipment	10.77	10436	244374	96900	1832812	0.13
36	Other Non-Metallic Minerals	10.74	61064	305437	568562	2401374	0.17
37	Non-Ferrous	9.25	3860	309297	41730	2443104	0.18
34	Printing & Publishing	8.29	41113	350410	495936	2939040	0.21
35	Other Petroleum & Coal	7.07	1139	351549	16110	2955150	0.21
32	Wearing Apparel	6.32	30453	382002	481844	3436994	0.25
35	Plastic Products	5.61	40228	422230	717074	4154068	0.30
35	Industrial Chemicals	4.70	8632	430861	183654	4337722	0.31
32	Footwear	4.03	3622	434483	89864	4427586	0.32
39	Other Manufactures	2.47	1449	435932	58682	4486268	0.32
38	Electrical Machinery	1.66	8316	444249	500990	4987258	0.36
38	Fabricated Metal Products	1.29	6708	450957	520030	5507288	0.40
31	Food	0.40	9912	460869	2477927	7985215	0.57
31	Other Food	-0.24	-1036	459833	431741	8416956	0.60
38	Machinery	-0.74	-3288	456544	444380	8861336	0.64
38	Transport Equipment	-0.90	-4321	452224	480080	9341416	0.67
32	Textiles	-1.82	-41128	411096	2259760	11601176	0.83
35	Other Chemical Products	-2.70	-35107	375989	1300256	12901432	0.93
36	Glass Products	-2.81	-5358	370631	190682	13092114	0.94
33	Furniture & Fixtures	-3.52	-6079	364552	172710	13264824	0.95
34	Paper Products	-17.36	-116018	248534	668304	13933128	1.00

*Notes: * RCR = real cost reduction: RCR = initial output x TFP growth. Numbers in the first column are the two first digits of the three-digit code of each respective sector. Data are for fiscal years, whereby 1988 refers to 1987/88 and 1990 refers to 1989/90.*
Source: Author's estimates based on CAPMAS data.

The one clear winner in the engineering sector is the manufacturing of professional equipment sub-sector, experiencing reversals in its negative TFP growth rate to positive and going from the 21st to the 8th position in its TFP ranking. The manufacturing of fabricated metal products and the manufacturing of transport equipment sub-sectors only gained modest improvements in their TFP growth in period 2, where the latter did not

reverse its period 1 negative TFP growth rate in period 2. The other two sub-sectors, the manufacturing of machinery and electrical machinery sub-sectors, experienced declines in TFP growth and ranking in period 2. In the non-metal products sector, the other non-metal mineral products sub-sector enjoyed clear gains in TFP growth in period 2, increasing from -8.69 percent in period 1 to 10.07 percent TFP growth rate in period 2. Both the manufacturing of pottery and china, and glass products sub-sectors experienced significant declines in their TFP growth rates in period 2, and the latter went from being the top 6th performer in period 1 to being in the 26th position in period 2 (see Tables 5.5 and 5.6).

Turning to the sectors that lost ground in period 2, we see that the other manufacturing industries sector experienced modest decline in period 2.[4] The total wood sector also experienced a loss in TFP growth in period 2, particularly owing to the significant decline in TFP growth in the manufacturing of furniture and fixture sub-sector. The latter enjoyed a TFP growth rate of 37.9 percent in period 1 and registered a TFP growth rate of -3.3 percent in period 2. It also went from being a leader in TFP performance, occupying the 2nd position, to being one of the worst performers, occupying the 27th position, in period 2. In the paper sector, the printing and publishing sub-sector also fell from its leadership position and experienced decline in its TFP growth rate in period 2. The other sub-sector, the manufacturing of paper products, experienced negative TFP growth rate in period 2, as it did in period 1, although this negative rate was lower than it was in period 1 (see Tables 5.5 and 5.6).

Of the sectors that experienced marked improvements in TFP growth in period 2, the findings of improvements for the metal sector are questionable. The Tornqvist index shows that both the iron and steel basic industries, and the non-ferrous basic industries have experienced significant increases in their TFP growth rates in period 2; the latter increasing from -8.06 percent to 9.25 percent. However, the Malmquist index shows the metals sector to have experienced significant declines in TFP growth in period 2 (see Tables 5.7 and 5.8). Moreover, the sector has also experienced a marked decline in technological growth, as shown in Tables 5.11 and 5.12. All three methodologies also indicate a decline in efficiency growth in the iron and steel sub-sector in period 2; the output of this sub-sector was 60 times greater than that of non-ferrous in period 2. As a result, it seems likely that the sector has experienced TFP growth decline and not improvement in period 2.

All the sub-sectors in tables 5.7 and 5.8, except one, in the food and textiles and garments sectors have undergone improvements in their TFP growth rates in period 2. The "other food" sub-sector experienced a decline, the "food" sub-sector a modest increase, and both tobacco and beverage and liquor sub-sectors have experienced significant improvements. In fact, the tobacco sub-sector appears to be the best performer among all sub-sectors

[4]Using the Malmquist index, though, we see that the other manufacturing sector has, in fact, experienced TFP growth. The technological growth index, as discussed below, indicates that this sector has experienced gains in this area. We also noted earlier that the parametric production function and, as we will note below, the non-parametric methods both indicate declines in efficiency growth in period 2 for this sector. As a result, even if we accept the Malmquist TFP growth results, TFP growth performance is not likely to be strong for this sector.

going from 26th position in period 1 with -13.75 percent growth rate to the top position in period 2 with 17.79 percent TFP growth rate. Similarly, the leather sub-sector, the best performer in its sector, along with wearing apparel and footwear, have experienced increased TFP growth rates, with only the textiles sub-sector experiencing a decline in period 2 (refer to Tables 5.5 and 5.6).

The Tornqvist index allows for the use of different technological methods by the sectors, which is a plausible assumption, while the decomposition of the Malmquist TFP index into efficiency and technology components requires the sectors share a common technology. The next set of results uses the Malmquist index and analyzes efficiency and technological performance.

Tables 5.11 and 5.12 show results for technology growth rates in periods 1 and 2 respectively. These tables reveal that a large number of industries experienced negative technological growth rates in both periods. One striking feature, however, is that although technological growth remains negative for most industries in period 2, it exhibits improvements for all industries except the other food manufacturing sub-sector and the metals sectors. As a result, real cost increases have been curbed in period 2. In addition, whereas only the iron and steel basic industries exhibit a small, but positive technological growth in period 1 of 0.3 percent, eight 3-digit sectors experience positive technological growth above 1 percent in period 2. The sector exhibiting the most gain in this respect is the manufacturing of professional equipment sector followed by the manufacturing of pottery and china, and glass sectors (see Table 5.12). The other leaders include the manufacturing of other non-metal products, wearing apparel, other manufacturing industries, printing and publishing and the manufacturing of machinery sub-sectors.

Results for efficiency growth rates, which are based on the non-parametric method, appear in Tables 5.9 and 5.10. Overall, when we look at the Lorenz curves for efficiency in both periods, we note the remarkable absence of overshooting (see Figures 5.11-5.16). This result implies that most of the sectors enjoyed real cost reduction and only a few suffered real cost increases in the two periods. The tables also show that about 78 percent of the industries as measured by initial value added, enjoyed real cost reduction in both periods. We should remark, however, that the magnitude of efficiency growth rates is lower in period 2 than in the first period by this measure. Thus, based on the non-parametric method, only 5 out of the 28-digit sectors exhibit higher efficiency growth rates in period 2 than in period 1. Those that experience growth rates in efficiency, as measured by all three methodologies, are tobacco and other non-metallic mineral products. Second period growth in efficiency rates is also noted for the textiles, wearing apparels, footwear, and other food, beverage and liquor, rubber, plastic and wood products by the two of the three methods used. The losers on the efficiency front, as given by all three methodologies, are printing and publishing, and iron and steel.

Table 5.7
TFP, Malmquist Index, 1988-90 Average Annual Growth

	Sector	TFP Growth (%) (1)	RCR*	Cumulative Sum of (2)	Initial Output	Cumulative Sum of (4)	Percentile of Output
			(LE '000)				
			(2)	(3)	(4)	(5)	(6)
33	Furniture & Fixtures	24.70	25498	25498	103230	103230	0.02
31	Food	17.75	154212	179710	868800	972030	0.14
38	Electrical Machinery	13.35	27811	207521	208320	1180350	0.17
34	Printing & Publishing	11.10	27429	234949	247104	1427454	0.21
36	Glass Products	8.75	11109	246058	126960	1554414	0.23
37	Iron & Steel	6.85	10122	256180	147760	1702174	0.25
35	Other Chemical Products	4.00	20959	277138	523968	2226142	0.32
35	Rubber Products	3.90	517	277655	13248	2239390	0.33
35	Industrial Chemicals	2.95	4466	282121	151392	2390782	0.35
32	Wearing Apparel	1.75	3196	285317	182651	2573433	0.37
36	Pottery & China	-1.85	-994	284323	53751	2627184	0.38
32	Textiles	-1.90	-18756	265567	987169	3614353	0.53
39	Other Manufactures	-2.80	-1337	264230	47736	3662089	0.53
31	Beverage & Liquor	-4.65	-7533	256697	162000	3824089	0.56
37	Non-Ferrous Metals	-5.35	-334	256363	6240	3830329	0.56
35	Other Petroleum & Coal	-7.60	-722	255641	9504	3839833	0.56
38	Machinery	-8.85	-20696	234945	233856	4073689	0.59
35	Plastic Products	-10.40	-49101	185844	472128	4545817	0.66
38	Fabricated Metal Products	-10.60	-49730	136113	469152	5014969	0.73
33	Wood Products	-11.20	-1865	134249	16650	5031619	0.73
38	Professional Equipment	-11.65	-7739	126509	66432	5098051	0.74
38	Transport Equipment	-12.90	-50093	76416	388320	5486371	0.80
32	Footwear	-16.80	-8262	68154	49179	5535550	0.81
31	Tobacco	-18.05	-12455	55699	69000	5604550	0.82
36	Other Non-metallic Minerals	-20.30	-67626	-11926	333132	5937682	0.87
31	Other Food	-20.45	-58724	-70651	287160	6224842	0.91
32	Leather Products	-23.15	-5704	-76354	24638	6249480	0.91
34	Paper Products	-27.20	-166908	-243262	613632	6863112	1.00

*Notes: * RCR = real cost reduction: RCR = initial output x TFP growth. Numbers in the first column are the two first digits of the three-digit code of each respective sector. Data are for fiscal years, whereby 1988 refers to 1987/88 and 1990 refers to 1989/90.*
Source: Author's estimates based on CAPMAS data.

Table 5.8
TFP, Malmquist Index, 1991-96 Average Annual Growth

Sector		TFP Growth (%) (1)	RCR*	Cumulative Sum of (2)	Initial Output	Cumulative Sum of (4)	Percentile of Output
			(LE '000)				
			(2)	(3)	(4)	(5)	(6)
38	Professional Equipment	19.34	18740	18740	96900	96900	0.01
36	Pottery & China	15.46	27325	46065	176746	273646	0.02
35	Rubber Products	13.98	3028	49093	21659	295305	0.02
33	Wood Products	12.66	10485	59578	82820	378125	0.03
31	Beverages & Liquor	11.48	20029	79608	174472	552597	0.04
35	Other Petroleum & Coal	8.68	1398	81006	16110	568707	0.04
39	Other Manufactures	5.86	3439	84445	58682	627389	0.05
36	Glass Products	5.54	10564	95009	190682	818071	0.06
35	Plastic Products	5.32	38148	133157	717074	1535145	0.11
38	Electrical Machinery	5.28	26452	159609	500990	2036135	0.15
36	Other Non-Metallic Minerals	4.80	27291	186900	568562	2604697	0.19
38	Fabricated Metal Products	3.84	19969	206869	520030	3124727	0.22
31	Tobacco	3.70	3756	210626	101518	3226245	0.23
32	Textiles	3.66	82707	293333	2259760	5486005	0.39
35	Industrial Chemicals	3.60	6612	299944	183654	5669659	0.41
32	Footwear	3.38	3037	302982	89864	5759523	0.41
32	Leather Products	2.94	1293	304275	43992	5803515	0.42
32	Wearing Apparel	2.28	10986	315261	481844	6285359	0.45
34	Printing & Publishing	1.58	7836	323097	495936	6781295	0.49
31	Food	-0.60	-14868	308229	2477927	9259222	0.66
38	Machinery	-0.76	-3377	304852	444380	9703602	0.70
35	Other Chemical Products	-1.10	-14303	290549	1300256	11003858	0.79
33	Furniture & Fixtures	-3.20	-5527	285022	172710	11176568	0.80
37	Non-Ferrous Minerals	-6.62	-2763	282260	41730	11218298	0.81
38	Transport Equipment	-10.58	-50792	231468	480080	11698378	0.84
37	Iron & Steel	-13.82	-156816	74651	1134705	12833083	0.92
34	Paper Products	-17.78	-118824	-44173	668304	13501387	0.97
31	Other Food	-21.44	-92565	-136738	431741	13933128	1.00

*Notes: * RCR = real cost reduction: RCR = initial output x TFP growth. Numbers in the first column are the two first digits of the three-digit code of each respective sector. Data are for fiscal years, whereby 1988 refers to 1987/88 and 1990 refers to 1989/90.*
Source: Author's estimates based on CAPMAS data

The sectors and sub-sectors that have lower second-period efficiency growth by one of the three methods include: industrial products and other chemicals, all five sub-sectors in engineering, the non-ferrous sub-sector, paper, furniture and fixtures, the other manufacturing industries sector, leather, glass and pottery and china.

Table 5.9
Efficiency, Malmquist Index, 1988-90 Average Annual Growth

Sector		Eff. Growth (%) (1)	RCR*	Cumulative Sum of (2)	Initial Output	Cumulative Sum of (4)	Percentile of Output
			(LE '000)				
			(2)	(3)	(4)	(5)	(6)
38	Electrical Machinery	51.40	107076	107076	208320	208320	0.03
34	Printing & Publishing	47.25	116757	223833	247104	455424	0.07
36	Glass Products	46.85	59481	283314	126960	582384	0.08
33	Furniture & Fixtures	41.00	42324	325638	103230	685614	0.10
36	Pottery & China	39.35	21151	346789	53751	739365	0.11
32	Textiles	35.45	349951	696741	987169	1726534	0.25
35	Industrial Chemicals	34.60	52382	749122	151392	1877926	0.27
35	Other Chemical Products	33.70	176577	925699	523968	2401894	0.35
31	Food	32.70	284098	1209797	868800	3270694	0.48
31	Beverage & Liquor	29.85	48357	1258154	162000	3432694	0.50
35	Rubber Products	29.10	3855	1262009	13248	3445942	0.50
35	Plastic Products	27.05	127711	1389720	472128	3918070	0.57
39	Other Manufactures	25.15	12006	1401725	47736	3965806	0.58
38	Fabricated Metal Products	24.10	113066	1514791	469152	4434958	0.65
33	Wood Products	23.80	3963	1518754	16650	4451608	0.65
35	Other Petroleum & Coal	20.60	1958	1520712	9504	4461112	0.65
32	Apparel	12.60	23014	1543726	182651	4643763	0.68
32	Footwear	10.60	5213	1548939	49179	4692942	0.68
36	Other Non-Metallic Mineral	10.05	33480	1582418	333132	5026074	0.73
38	Machinery	9.60	22450	1604869	233856	5259930	0.77
37	Non-Ferrous Metals	6.15	384	1605252	6240	5266170	0.77
37	Iron & Steel	5.80	8570	1613822	147760	5413930	0.79
32	Leather Products	0.45	111	1613933	24638	5438568	0.79
31	Other Food	0.00	0	1613933	287160	5725728	0.83
34	Paper Products	0.00	0	1613933	613632	6339360	0.92
38	Transport Equipment	0.00	0	1613933	388320	6727680	0.98
38	Professional Equipment	0.00	0	1613933	66432	6794112	0.99
31	Tobacco	-6.85	-4727	1609207	69000	6863112	1.00

*Notes: * RCR = real cost reduction: RCR = initial output x TFP growth. Numbers in the first column are the two first digits of the three-digit code of each respective sector. Data are for fiscal years, whereby 1988 refers to 1987/88 and 1990 refers to 1989/90.*
Source: Author's estimates based on CAPMAS data

Table 5.10
Efficiency, Malmquist Index, 1991-96 Average Annual Growth

	Sector	Eff. Growth (%) (1)	RCR*	Cumulative Sum of (2)	Initial Output	Cumulative Sum of (4)	Percentile of Output
			(LE '000)				
			(2)	(3)	(4)	(5)	(6)
36	Other Non-Metallic Minerals	32.44	184442	184442	568562	568562	0.04
36	Pottery & China	27.16	48004	232446	176746	745308	0.05
35	Rubber Products	21.56	4670	237115	21659	766967	0.06
33	Wood Products	21.12	17492	254607	82820	849787	0.06
31	Beverages & Liquor	20.44	35662	290269	174472	1024259	0.07
36	Glass Products	17.78	33903	324172	190682	1214941	0.09
35	Plastic Products	16.20	116166	440338	717074	1932015	0.14
32	Textiles	14.26	322242	762580	2259760	4191775	0.30
35	Other Petroleum & Coal	13.80	2223	764803	16110	4207885	0.30
38	Fabricated Metal Products	11.50	59803	824607	520030	4727915	0.34
38	Electrical Machinery	10.64	53305	877912	500990	5228905	0.38
32	Leather Products	9.70	4267	882179	43992	5272897	0.38
31	Tobacco	5.42	5502	887682	101518	5374415	0.39
35	Industrial Chemicals	5.42	9954	897636	183654	5558069	0.40
31	Food	5.30	131330	1028966	2477927	8035996	0.58
32	Footwear	5.22	4691	1033657	89864	8125860	0.58
35	Other Chemical Products	4.04	52530	1086187	1300256	9426116	0.68
39	Other Manufactures	3.54	2077	1088264	58682	9484798	0.68
37	Non-Ferrous	2.16	901	1089166	41730	9526528	0.68
33	Furniture & Fixtures	1.94	3351	1092516	172710	9699238	0.70
32	Apparel	1.48	7131	1099648	481844	10181082	0.73
38	Professional Equipment	0.18	174	1099822	96900	10277982	0.74
31	Other Food	0.02	86	1099908	431741	10709723	0.77
37	Iron & Steel	0.00	0	1099908	1134705	11844428	0.85
38	Transport Equipment	0.00	0	1099908	480080	12324508	0.88
34	Printing & Publishing	-0.18	-893	1099016	495936	12820444	0.92
38	Machinery	-1.68	-7466	1091550	444380	13264824	0.95
34	Paper Products	-3.82	-25529	1066021	668304	13933128	1.00

*Notes: * RCR = real cost reduction: RCR = initial output x TFP growth. Numbers in the first column are the two first digits of the three-digit code of each respective sector. Data are for fiscal years, whereby 1988 refers to 1987/88 and 1990 refers to 1989/90.*
Source: Author's estimates based on CAPMAS data

Table 5.11
Technology, Malmquist Index, 1988-90 Average Annual Growth

	Sector	Tech Growth (%) (1)	RCR*	Cumulative Sum of (2)	Initial Output	Cumulative Sum of (4)	Percentile of Output
			(LE '000)				
			(2)	(3)	(4)	(5)	(6)
37	Iron & Steel	0.30	443	443	147760	147760	0.02
33	Furniture & Fixtures	-9.10	-9394	-8951	103230	250990	0.04
37	Non-Ferrous	-9.35	-583	-9534	6240	257230	0.04
32	Apparel	-9.50	-17352	-26886	182651	439881	0.06
31	Food	-11.20	-97306	-124192	868800	1308681	0.19
38	Professional Equipment	-11.65	-7739	-131931	66432	1375113	0.20
31	Tobacco	-12.10	-8349	-140280	69000	1444113	0.21
38	Transport Equipment	-12.90	-50093	-190373	388320	1832433	0.27
38	Machinery	-16.80	-39288	-229661	233856	2066289	0.30
35	Rubber Products	-20.35	-2696	-232357	13248	2079537	0.30
31	Other Food	-20.45	-58724	-291081	287160	2366697	0.34
35	Other Petroleum & Coal	-20.45	-1944	-293025	9504	2376201	0.35
35	Other Chemical Products	-21.50	-112653	-405678	523968	2900169	0.42
39	Other Manufacture	-22.35	-10669	-416347	47736	2947905	0.43
32	Leather Products	-22.80	-5617	-421964	24638	2972543	0.43
38	Electrical Machinery	-24.20	-50413	-472378	208320	3180863	0.46
34	Printing & Publishing	-24.30	-60046	-532424	247104	3427967	0.50
35	Industrial Chemicals	-24.60	-37242	-569666	151392	3579359	0.52
36	Glass Products	-24.60	-31232	-600899	126960	3706319	0.54
32	Footwear	-25.00	-12295	-613193	49179	3755498	0.55
38	Fabricated Metal Products	-26.05	-122214	-735407	469152	4224650	0.62
31	Beverages & Liquor	-26.50	-42930	-778337	162000	4386650	0.64
36	Other Non-Metallic Minerals	-26.95	-89779	-868117	333132	4719782	0.69
34	Paper Products	-27.20	-166908	-1035024	613632	5333414	0.78
32	Textiles	-27.40	-270484	-1305509	987169	6320583	0.92
33	Wood Products	-28.05	-4670	-1310179	16650	6337233	0.92
36	Pottery & China	-28.45	-15292	-1325471	53751	6390984	0.93
35	Plastic Products	-28.90	-136445	-1461916	472128	6863112	1.00

*Notes: * RCR = real cost reduction: RCR = initial output x TFP growth. Numbers in the first column are the two first digits of the three-digit code of each respective sector. Data are for fiscal years, whereby 1988 refers to 1987/88 and 1990 refers to 1989/90.*
Source: Author's estimates based on CAPMAS data

Table 5.12 Technology, Malmquist index, 90/91-95/96, Average annual growth

	sector	Tech Growth (%)	RCR*	cum sum of (2)	Initial Output	cum sum of (4)	percentile of output
		(1)	(2)	(3)	(4)	(5)	(6)
38	professional equipment	17.06	16531	16531	96900	96900	0.01
36	pottery & china	4.68	8272	24803	176746	273646	0.02
36	glass products	4.04	7704	32506	190682	464328	0.03
39	Other Manufacture	3.48	2042	34549	58682	523010	0.04
32	Wearing Apparels	2.44	11757	46306	481844	1004854	0.07
36	other non-metallic mineral	2.36	13418	59724	568562	1573416	0.11
34	Printing & publishing	1.58	7836	67559	495936	2069352	0.15
38	machinery	1.50	6666	74225	444380	2513732	0.18
35	industrial chemicals	-0.48	-882	73344	183654	2697386	0.19
32	footwear	-0.82	-737	72607	89864	2787250	0.20
35	rubber products	-1.82	-394	72212	21659	2808909	0.20
31	Tobacco	-2.58	-2619	69593	101518	2910427	0.21
32	Leather products	-2.88	-1267	68326	43992	2954419	0.21
35	Other petroleum & coal	-3.48	-561	67766	16110	2970529	0.21
33	furniture & fixture	-3.86	-6667	61099	172710	3143239	0.23
31	Food	-3.90	-96639	-35540	2477927	5621166	0.40
35	other chemical products	-3.96	-51490	-87030	1300256	6921422	0.50
38	electrical machinery	-4.18	-20941	-107972	500990	7422412	0.53
38	fabricated metal products	-4.24	-22049	-130021	520030	7942442	0.57
35	plastic products	-4.64	-33272	-163293	717074	8659516	0.62
32	Textile	-5.10	-115248	-278541	2259760	10919276	0.78
31	Beverage & Liquor	-5.82	-10154	-288695	174472	11093748	0.80
33	Wood products	-6.10	-5052	-293747	82820	11176568	0.80
37	Non-ferrous	-9.38	-3914	-297661	41730	11218298	0.81
34	Paper products	-10.50	-70172	-367833	668304	11886602	0.85
38	Transport equipment	-10.58	-50792	-418626	480080	12366682	0.89
37	Iron & steel	-13.82	-156816	-575442	1134705	13501387	0.97
31	Other Food	-21.28	-91874	-667317	431741	13933128	1.00

3. Summary of Results

In general, real cost reduction, or TFP growth, is higher for the private manufacturing sector in the second part of the study period. Similarly, we note improvements in efficiency, as measured by production and cost efficiencies. We also observe higher technological growth rates in the second period. In particular, 16 out of 28 sectors, 25 out of 28, and 11 out of 28 sectors enjoyed higher TFP, technological and efficiency growth rates, respectively, in period 2. This indicates that about 57 percent had higher TFP growth rates, about 90 percent had higher technological growth rate, of which 29 percent were positive, and 39 percent had higher efficiency growth rates. Since the overall efficiency growth rate was higher in period 2 than in period 1, the winners on this front

enjoyed substantial increases in their second- period efficiency growth rates. A summary of sectoral performance in the second period on all three fronts is presented in Table 5.13.

As we can see from the results, nine sectors had growth rates in all three areas: (i) beverages and liquor, (ii) tobacco, (iii) wearing apparel, (iv) footwear, (v) textiles, (vi) wood, (vii) rubber, (viii) plastic, and (ix) other non-metallic minerals. In contrast, two sectors experienced decreases in all three areas: iron and steel, and non-ferrous products. In addition, only one sector had a lower TFP growth rate, in the face of a higher efficiency growth rate and lower technological growth rate in period 2. There are, however, nine sectors with lower TFP growth rates, accompanied by lower efficiency and higher technological growth rates. The remaining seven sectors had increases in their TFP growth rates, with lower efficiency rates and higher technological growth rates. Of these, though, five had only modest TFP increases. All these imply that the impact of efficiency performance on TFP growth has been quite substantial. The winners are those not only with higher technological growth rates in period 2, but also with strong efficiency growth rates. For the losers and those with only modest TFP growth performances, the impact of lower efficiency growth rates in period two is clear. Only in one instance do we see a declining TFP growth rate despite an increase in efficiency growth rate in period 2. This is in the other food sector, which is also one of only three sectors experiencing a lower technological growth rate. In summary then, in all cases except one where we observe lower TFP growth rate we also note lower efficiency growth rates in period 2.

F. Impediments to Sectoral TFP Growth and Recommended Remedies

The empirical evidence from our analysis of TFP growth and its determinants for the private manufacturing sector highlights several potential constraints to the economic development process. Among these potential constraints are insufficient numbers of skilled workers, a lack of capital investment, shortages of raw and intermediate materials, misallocation of resources to inefficient sectors due to trade protection, poor marketing, management and organizational practices, and improper inventory management. However, no comprehensive and comparable data exist to measure the impact of these constraints on TFP growth at the three-digit level. From our exhaustive analysis, one empirically significant relationship we have been able to establish is between the initial size of the sector in private manufacturing and its growth in TFP. It appears that sectoral growth patterns mimic those found in many studies on convergence of countries' aggregate growth rates: growth is significantly and negatively related to the initial level of sales. In other words, smaller firms, perhaps because they are more flexible and responsive to new opportunities provided by new technology and changing market conditions, tend to grow faster than larger firms. This would indicate that an enlightened public policy to focus resources on providing investment opportunities to emerging technologies and start-up enterprises, at the expense of large entrenched industrial sectors, would have the largest positive impact on the growth in TFP. For a number of

Table 5.13
Summary of Second Period Growth Performance

Sectors	TFP Growth	Technological Growth	Efficiency Growth
Food	down	up	down***
Other Food	down	down	up***
Beverages & Liquor	up	up	up***
Tobacco	up	up	up
Wearing Apparel	up	up**	up***
Leather Products	up	up	down***
Footwear	up	up	up***
Textiles	up*	up	up***
Furniture & Fixtures	down	up	down***
Wood Products	up	up	up***
Printing & Publishing	down	up**	down
Paper Products	up****	up	down***
Rubber Products	up	up	up***
Other Petro. & Coal	up****	up	down
Other Chemicals	down	up	down***
Industrial Chemicals	up****	up	down***
Plastic Products	up	up	up***
Glass Products	down	up**	down***
Other Non-Metallic	up	up**	up
Pottery & China	down	up**	down***
Iron & Steel	down	down	down
Non-Ferrous Metals	down	down	down***
Professional Equipment	up	up**	down***
Transport Equipment	up****	up	down***
Machinery	down	up**	down***
Electrical Machinery	down	up	down***
Fabricated Metals	up****	up	down***
Other Manufacturing	down****	up**	down***

Note: Author's estimates based on CAPMAS data.
* *By the Malmquist index only*
** *Positive*
*** *By two of the three measures*
**** *By a small amount*

reasons, those industries with a relatively large initial share in the private manufacturing sector are likely to benefit more from effective trade barriers and low competitive pressures, while the faster growing small firms can take better advantage of and benefit more from the opportunities provided from free trade and open competition. As a result, greater market-oriented trade and investment policies should result in more rapid economic growth. Among these would be the removal or reduction of existing public support for such firms in order to strengthen financial constraints and thereby encourage the more efficient and extensive use of inputs. Particular focus should be directed at industries that have not enjoyed efficiency growth, including those in the chemical, non-metal products, metal, engineering and other manufacturing industries.

Turning to technological growth, which results in a shift of the production frontier, we find that such a transformation is under way in almost all private-manufacturing industries of Egypt. This indicates that policies that facilitate the adoption of foreign technology have been working. Such efforts should be strengthened further so that more sectors will achieve positive and higher technological growth rates. Among policies that facilitate technological progress are the adoption of market-oriented practices such as the withdrawal of import licenses and bans. Moreover, simply importing the best and latest technology from abroad does not improve TFP and output growth. Consequently, instituting private industry links with government sponsored research and development (R & D) organizations would be useful. Along this line, the private manufacturing sector should also make every effort to build in-house R & D facilities so as to find the best way to adopt foreign technology for local use.[5] These remedies are much needed in light of the significant contribution of capital to TFP growth, as we discussed in Section C of this chapter.

In addition, since Egypt, like most developing countries, is a labor abundant country, it should promote capital-saving technological growth. New technology should aim to increase the efficiency of the scarce capital so that a unit of capital produces greater output (Salim, 1999) and creates more employment. Capital-intensive sectors have been negatively affected by a lack of efficiency growth in the second period. Capital-saving technologies would benefit these sectors while increasing employment.

Capital-saving technology also enhances total labor productivity. This is important since our study indicates falling labor productivity over the study period. Labor-intensive sectors enjoyed relatively higher efficiency growth than capital-intensive sectors in the second period. More efficient and thus competitive sectors such as these would be reworded for their efforts by an increasingly more labor force.

G. Conclusions

Our study points to clear gains to the Egyptian economy and to the Egyptian people due to the economic reforms began in the early 1990's. Our results suggest that market forces have made the private sector much more efficient and thus much more competitive in the late 1990's than it was in the late 1980's. This is a major explanation for the strong performance of the private sector in total factor productivity growth. Our results also suggest that more rapid capital formation in the form of existing and in new technologies, particularly of the capital–saving labor-intensive variety, and particularly if promoted in smaller firms, will enhance the prospects for growth in the decade ahead.

[5]As most firms are small, however, the former route seems more realistic than the latter.

8. References

Aigner, Dennis, C.A. Knox Lovell and Peter Schmidt, 1977, "Formulation and Estimation of Stochastic Frontier Production Function Models," Journal of Econometrics, 6:21-37.

Atkinson, S.E. and C. Cornwell, 1994a, 'Parametric-Estimation of Technical and Allocative Inefficiency with Panel-Data,' *International Economic Review*, 35: 231-243.

Atkinson, S.E. and C. Cornwell, 1994b, 'Estimation of Output and Input Technical Efficiency Using a Flexible Functional Form and Panel-Data,' *International Economic Review*, 35: 245-255.

Baltagi, B. and J. Griffin, 1988, 'A General Index of Technical Change,' *Journal of Political Economy*, 96: 20-41.

Bauer, P. W., 1990, "Recent Developments in the Economic Estimation of Frontiers," *Journal of Econometrics* 46: 39-56.

Berndt, E.R., 1991, *The Practice of Econometrics: Classic and Contemporary*, Wokingham, U.K. and Sydney: Addison-Wesley Publishing Company.

Berndt, E.R. and D. O. Wood, 1975, 'Technology, Prices, and the Derived Demand for Energy,' *Review of Economics and Statistics*, 57: 259-68.

Caves, D., L. Christensen and W. Diewert, 1982, 'Output, input and productivity using superlative index numbers,' *Economic Journal*, 92: 73-96.

Caves, D., L. Christensen and M. Tretheway, 1983, 'Productivity Performance of U.S. Trunk and Local Service Airlines in the Era of Deregulation,' *Economic Inquiry*, 21: 312-324.

Charnes, A., W.W. Cooper and E.L. Rhodes, 1978, "Measuring the Efficiency of Decision Making Units," European Journal of Operational Research 2, 429-444.

Chen, V. J., 1977, "Factor Inputs, Total Factor Productivity and Economic Growth: The Asian Case," *The Developing Economies*, 15.

Christensen, L. and W.H. Greene, 1976, "Economies of Scale in the US Electric Power Generation," *Journal of Political Economy* 84: 655-76.

Christensen, Laurits R. and Dale W. Jorgenson, 1969, "The Measurement of U.S. Real Capital Input," Review of Income and Wealth, 15: 293-320.

Collins, S. M., and B. P. Bosworth, 1996, "Economic Growth in East Asia: Accumulation versus Assimilation," *The Brookings Papers on Economic Activity*, 2.

Cornwell, C., P. Schmidt and R. C. Sickles, 1990, 'Production Frontiers with Cross-Sectional and Time-Series Variation in Efficiency Levels,' *Journal of Econometrics*, 46: 185-200.

Debreu, Gerard, 1951, "The Coefficient of Resource Utilization," Econometrica 19: 273-292.

Denison, E.F., 1967, *Why Growth Rates Differ*, New York: Brookings Institution.

Diewert, W. E., 1976, 'Exact and Superlative Index Numbers,' *Journal of Econometrics*, 4: 115-145.

Diewert, W. E., 1982,'Duality Approaches to Microeconomic Theory,' in K. J. Arrow and M. D. Intriligator, eds., *Handbook of Mathematical Economics*, Vol. 2, Amsterdam: North-Holland.

Elias, V, J., 1993, "The Role of Total Factor Productivity on Economic Growth," *Estudios-de-Economia*, Special Issue, June.

Felipe, J., 1999, "Total Factor Productivity Growth in East Asia: A Critical Survey," The *Journal of Development Studies*, April.

Fare, Rolf, Shawna Grosskopf, and C.A. Knox Lovell, 1994, *Production Frontiers*, Cambridge, Cambridge University Press.

Farrell, M.J., 1957, "The Measurement of Productive Efficiency," Journal of the Royal Statistical Society, series A, v120, part III: 253-278.

Ferrier, C.D. and C.A. Knox Lovell, 1990, "Measuring Cost Efficiencies in Banking: Econometric and Linear Programming Methods," *Journal of Econometrics*, 46: 229-245.

Fisher, I., 1927, *The Making of Index Numbers*, Boston: Houghton-Mifflin.

Good, D., I. Nadiri and R.C. Sickles, 1991, 'The Structure of Production, Technical Change and Efficiency in a Multiproduct Industry: An Application to U. S. Airlines,' National Bureau of Economic Research Working Paper # 3939: Cambridge.

Greene, W.H., 1993, *Econometric Analyses*, 2nd edition, New York: Macmillian Publishing Company.

Harberger, C. A., 1998, "A vision of the Growth Process," *American Economic Review* 88, 1-32.

Hulten, C.R. and R.M. Schwab, 1984, 'Regional Productivity Growth in U.S. Manufacturing: 1951-1978,' *American Economic Review*, 74: 152-162.

Jorgenson, D.W., 1995, *Productivity-Volumes 1 and 2*, Cambridge, MA: MIT Press.

Jorgenson, D.W., F. Gollop and B. Fraumeni, 1987, *Productivity and US economic growth*, Cambridge, MA: Harvard University Press.

Jorgenson, D.W., and Zvi Griliches, 1971, "Divisa Index Numbers and Productivity Measurement," Review of Income and Wealth, 17: 227-29.

Kendrick, J., 1961, *Productivity Trends in the United States*, Princeton: Princeton University Press for the National Bureau of Economic Research.

Kendrick, J., 1973, *Postwar Productivity Trends in the United States: 1948-1969*, New York: National Bureau of Economic Research.

Krugman, P., 1994, "The Myth of Asia's Miracle," *Foreign Affairs*, November/December.

Nadiri, M.I., 1970, 'Some Approaches to Theory and Measurement of Total Factor Productivity: a Survey,' *Journal of Economic Literature*, 8: 1135-1177.

Nadiri, M.I., 1982, 'Producers Theory,' in K.J. Arrow and M.D. Intriligator, eds., *Handbook of Mathematical Economics, vol. II*, Amsterdam: North- Holland.

Nishimizu, M., and J. M. Page, 1982, 'Total Factor Productivity Growth, Technological Progress and Technical Efficiency Change: Dimensions of Productivity Change in Yugoslavia,' *The Economic Journal*, Volume 92, Issue 368, December.

Norsworthy, J.R. and D.H. Malmquist, 1983, 'Input Measurement and Productivity Growth in Japanese and U.S. Manufacturing,' *American Economic Review*, 73:947-967.

Park, B.U, R.C. Sickles and L. Simar, 1998, "Stochastic Panel Frontiers: A Semiparametric Approach," Journal of Econometrics, 84: 273-301.

Salim, R.A., 1999, *Capacity Realization and Productivity Growth in A Developing Country: Has Reform Had Impact?* Hants, England: Ashgate Publishing Ltd.

Schmidt, P. and Lovell, C.A.K., 1979, "Estimating Technical and Allocative Inefficiency Relative to Stochastic Production and Cost Frontiers," *Journal of Econometrics*, 9: 343-363.

Schmidt, P., and Sickles, R.C., 1984, 'Production Frontiers and Panel Data,' *Journal of Business and Economic Statistics*, 2: 367-374.

Shephard, R.W., 1953, *Cost and Production Functions*, Princeton: Princeton University Press.

Sickles, R.C., 1985, 'A Nonlinear Multivariate Error Components Analysis of Technological Change and Specific Factor Productivity Growth with an Application to the U.S. Airlines,' *Journal of Econometrics*, 27: 61-78.

Sickles, R.C., D. Good and R.L. Johnson, 1986, 'Allocative Distortions and the Regulatory Transition of the U.S. Airline Industry,' *Journal of Econometrics*, 33: 143-163.

Solow, R., 1957, 'Technical Change and the Aggregate Production Function,' *Review of Economic and Statistics*, 39: 312-320.

Toda, Y., 1976, 'Estimation of a Cost Function When the Cost is Not Minimum: The Case of Soviet Manufacturing Industries, 1958-1971,' *Review of Economics and Statistics*, 58: 259-268.

Young, A., 1992, 'A Tale of Two Cities: Factor Accumulation and Technical Change in Hong Kong and Singapore,' *National Bureau of Economic Research: Macroeconomics Annual*.

Annex 5A DATA CONSTRUCTION FOR TOTAL FACTOR PRODUCTIVITY ANALYSIS

Private sector manufacturing data were obtained from the Central Agency for Public Mobilization and Statistics (CAPMAS) in Egypt from the publication *Industrial Production Statistics*. This publication is based on firm-level data collected according to questionnaire No. 150. Normally data are collected during the fiscal year starting July 1st to June 30th for companies following this accounting system and calendar year for companies following that accounting system.

Documents obtained covered a time series extending from 1986/87 to 1995/96, (the last year available up to the release of this study) at the 4-digit ISIC level**.** And another time series extending from 1971 to 1986/87 was also obtained for capital benchmark calculation. From 1987/88 to 1990/91 private sector manufacturing data cover total private for the whole republic. That is formal private, informal private and private investment sectors. However, the inclusion of these three private sector categories was not explicitly stated in CAPMAS publications for these years, but it was later deduced from the analysis conducted on the whole time series. From 1991/92 onward CAPMAS stated its publication of private sector manufacturing into separate categories (formal, informal and investment). Later on CAPMAS published total private data for the whole republic for the years 1992/93 up to 1995/96.

Industrial data are arranged according to three broad categories:

(2) Principal activity mining, and quarrying
(3) Manufacturing
(9) Repair non-classified elsewhere

The variables used in the estimation include; output at factor cost, value added, taxes and duties, value of total revenues, total labor, total wages (basic salary, fringe benefits, and social insurance), total intermediate (raw material: local and imported, packing, fuel, electricity, spare parts), total intermediate services, capital addition, fixed assets end of year, capital formation, fixed assets depreciation, inventory and change in inventory.

Not all variables were available at the 4-digit ISIC digit level, particularly capital and inventory was only reported at the 3-digit level. Therefore, productivity estimation was based on 3-digit ISIC level data.

General Definitions

Total cost of production = total value of product + total services to others + other revenues + subsidies - value of taxes and duties.

Net value added = total cost of products - total intermediate and depreciation.

Total monetary wages = total wages and salaries + social insurance + fringe benefits.

N.B. Payment for labor contractors was added to total wages in the study.

The first industrial statistics survey was issued by CAPMAS with the general census in 1937. Industrial statistics were then issued every three years: 1944, 1947 and 1950. Later on, they were issued every two years from 1952 to 1956 on establishments employing ten workers or more. Starting from 1957, the survey was conducted annually on public enterprises, and starting from 1964/65 both public and private enterprises were included separately, but in one document, in CAPMAS publications for industrial establishments employing ten or more.

Starting from 1989/90, publications were in separate documents for each public and private sector enterprises. Starting from 1991/92, annual industrial statistics were divided into five categories:

- Formal private sector, which is governed by Law 159 of 1981 concerning audited accounting and excludes public ownership. Private sector includes organizations having the following legal formation: joint stock companies limited by shares, limited liabilities and branches of foreign branches.

- Informal private sector, which includes companies not subject to Law 159 of 1981 and Investment Law 230 of 1989 and its amendments. This sector includes entities having the following legal formation: partnership, limited liability, de facto company and single proprietorship.

- Private investment sector is governed by Investment Law 43 of 1974 as amended by Law 230 of 1989 and Law 8 of 1997 for investment incentives). The total private investment sector includes the following legal formation: joint stock companies, limited by shares, limited liabilities, branches of foreign companies, single proprietorship, partnership and simple liability.

- Private sector total republic (formal, informal and investment).

- Public sector (owned by the government of Egypt).

Deflators used in the study were compiled from CAPMAS monthly wholesale price index 1972-96 including capital goods deflators. Energy deflators were calculated using energy prices facing the manufacturing sector over the period under study, weighted by fuel mix used in the corresponding manufacturing activities at the 2-digit ISIC level.

Using the various data provided by CAPMAS, we constructed a panel data of input and output quantities and prices covering nine years for the private manufacturing sector. At the 2-digit ISIC level we have nine cross sections while at the 3-digit ISIC level we have twenty-eight cross sections. Generally, to construct quantity and price indices for output and inputs at the 3-digit level we first computed the price index series, base year 1987/88, by taking a weighted sum of the appropriate deflators for each sector: We used expenditures shares as weights. We then divided values of output and input by the appropriate price index to obtain a quantity index.

Specifically, we computed an output quantity index by dividing output at factor cost by the re-constructed wholesale price index. We constructed the value for materials by subtracting the value of fuel and electricity from the total intermediate goods and services. We then deflated this result by the intermediate goods deflator provided by CAPMAS to arrive at a materials index. We divided the value of fuel and electricity by the energy deflator to obtain a quantity index for energy. The energy deflators are a weighted-sum of energy prices faced by the manufacturing sectors for the period under study. The fuel mix used by each sector provided the weights. Using total wages and total labor figures, we obtained the labor price by dividing the total wage bill by total labor. We normalized the wage rate so that 1987/88 prices are 100 and obtained a labor quantity index by dividing the values of labor, total wages, by this price index.

The construction of the capital quantity and price indices is more elaborate. We constructed five different types of capital inputs. Two measure capital expense and capture the service flow provided by capital, while the rest provide measures of the capital stock. Capital stock values were obtained by applying the perpetual inventory method: $k(t) = (1-\delta)k(t-1) + I(t)$ where $k(t)$ is the capital stock at time t, $k(t-1)$ is the previous period's value, $I(t)$ is current investment, called capital addition by CAPMAS, and δ is the rate of depreciation of the capital stock. We used a 10-year geometrically declining depreciation schedule. In order to calculate the capital stock series, starting in 1987/88, we used two different benchmarks; hence the two different capital stock values which we call k-1 and k-2. For the k-1 series, we used the value of the 1986/87 k-stock as benchmarks while we used the 1970/71 k-stock as benchmark for the k-2 series.

The third measure of the capital stock incorporates inventory figures. For this we first constructed quantity and price indices for inventory as described earlier. The value of inventory is obtained by adding the current period's change in inventory to the previous period's inventory value. We divide this value by its deflator to obtain a quantity index. We then add the values of inventory and k-2 to get total expenditure in 1987/88 prices. Next we obtain a weighted-average of the two price indices with weights being the expenditure shares of the two stocks of capital. We then divided the total expenditure by

this price index to get a new quantity index that we call k-3. To generate the capital expense figures we use $k(t)*\delta + I(t)$. We get KE-1 by using the k-1 series and KE-2 by using k-2 series.

All the different measures of capital are deflated by the rental price of capital, P(T). We use the following version of the rental price formulation:

$$P(T) = (\frac{1}{1-u(T)})\{p_I(T-1)r(T) + \delta * p_I(T-1)\} + p_I c(T)$$

where $u(T)$ is the effective corporate tax rate at time T, $r(T)$ is the nominal interest rate, $p_I(T)$ is the capital goods deflator, δ is the depreciation rate of the capital stock and $c(T)$ is the effective property tax rate. The terms reflect the cost of capital, replacement and indirect taxes respectively. (Christensen and Jorgenson, 1979). A study by the Egyptian Center for Economic Studies provides the effective corporate tax rate as 27 percent for the manufacturing sector, which we used. The property tax rate is estimated to be 16 percent and includes rental, security and occupancy taxes.

Annex 5B ESTIMATION METHODOLOGIES FOR TOTAL FACTOR PRODUCTIVITY ANALYSIS

A. Non-Parametric Index Number Methods

Index number approaches to measuring productivity growth have the advantage of not requiring direct estimation of the underlying technology and therefore, of not requiring econometric specification and estimation of technology. Since they may embody less stringent assumptions than are required by econometric models, they may provide valuable checks on the results of those models. However, for the index number approach to provide meaningful estimates of productivity and productivity growth, fairly strong assumptions about the underlying technology and allocation decisions by the sector must be maintained. Notably, one must often assume an inflexible description of technology, that input and output price ratios form a meaningful description of marginal product ratios and marginal rates of transformation, and/or that all inputs and outputs are measured. Over the last few decades many of these assumptions have been relaxed while still maintaining the advantages of traditional index number approaches. In other instances, the relaxation requires that auxiliary information be incorporated, often obtained through an econometric estimation of the underlying technology.

While the techniques described in this section may have different origins, all are tied by the common theme of describing productivity as a ratio of outputs over inputs. This ratio may be ad hoc in its origin, describe a ratio of aggregator indices, or be based on cost minimizing behavior.

B. Classical Residual Based Partial and Total Factor Productivity Measurement

Typically, measurements of productivity rely on a ratio of some function of outputs (Y_i) to some function of inputs (X_i). In the case where there is a single output, factor specific productivity measures are often constructed and are referred to as partial factor productivity (PFP) indices. A partial factor productivity index (PFP) can be constructed for each input, and essentially describes the average product of labor (AP_L), capital (AP_K), etc.

$$PFP_i = AP_i = Y / X_i$$

While commonly used even today, these measures are potentially misleading because what passes for a difference in productivity may in fact merely represent a different mix of input use. For example, using a more capital-intensive (less labor-intensive) production technique would increase the labor partial factor productivity index. This would result even if the more capital-intensive technique was more costly, and consequently, is a method that should be avoided.

To account for changing input mixes, modern index number analyses use some measure of total factor productivity (TFP). In its simplest form, this is a ratio of output to a weighted sum of inputs:

$$TFP = \frac{Y}{\sum_i a_i X_i}$$

Historically, two common ways of assigning weights for this index were to use either an arithmetic or geometric weighted average of inputs. The arithmetic weighted average, due to Kendrick (1961), uses input prices as the weights. The geometric weighted average of the inputs attributable to Solow (1957) uses input expenditure shares as the weights. Solow's measure is based on the Cobb-Douglas production function with constant returns to scale, $Y = AX_L^{\alpha} X_K^{1-\alpha}$ and leads to the TFP measure:

$$TFP = \frac{Y}{X_L^{\alpha} X_K^{1-\alpha}}.$$

At cost minimizing levels of inputs, the α parameter describes the input expenditure share for labor. The TFP growth rate would be described by $d \ln TFP / dt$.

In applied work Solow's set of weights are often inconsistent with the observed data since it is assumed that expenditure shares are constant over time regardless of price changes. As long as the changes in inputs and outputs is not too large, however, both Kendrick's and Solow's measures of TFP growth arrive at similar results (Nadiri, 1970, 1982).

Fisher (1927) laid out seven desirable properties for these index numbers while Diewert (1976) added two more properties to Fisher's list. If an index can be derived from some underlying utility, cost, production, revenue, profit or transformation functions, then the index numbers satisfy the additional criteria of exactness. If the underlying functional form is flexible (in the sense that it provides a second order local approximation to an arbitrary functional form), then the exact index is termed superlative. One of the more popular index numbers, the Tornqvist-Theil quantity index is superlative in that it can be derived from a translog production function of its components. This input index is:

$$\ln x_j^k = \frac{1}{2} \sum_{i=1}^{n} (S_{ij} + S_{ik})(\ln X_{ij} - \ln X_{ik})$$

where S_{ij} and X_{ij} are the expenditure share and quantity, respectively, of subcomponent i (i.e. input i) at observation j and n is the number of subcomponents. It is important to note that the input index provides an "exact" (in the sense above) aggregator when sectors are cost minimizing. As can be seen from the above formula, it is necessary to establish a point of reference or binary comparison with some other observation (in this case observation k) for the construction of the index. This choice of reference point and subsequent normalization of the index is not trivial. By far the most popular Tornqvist-Theil index, the discrete Divisia, is used in time series applications. The index uses information from the previous time period as the reference:

$$\ln x_t^{t-1} = \frac{1}{2}\sum_{i=1}^{n}(S_{it} + S_{it-1})(\ln X_{it} - \ln X_{it-1})$$

Values of the index are "chained" off of the first observation so that any subsequent observation can be compared to the first one with:

$$\ln x_t^1 = \sum_{s=2}^{t} \ln x_s^{s-1}$$

The value of the input index is typically normalized to be unity in the first time period. Price or output indices can be derived assuming that the underlying utility or revenue function has a translog form. Output indices are similarly defined, using revenue shares rather than expenditure shares for the weights. Further, following Jorgenson and Griliches (1972), a total factor productivity index can be constructed as the difference between log output and log input indices:

$$\ln TFP_t = \ln y_t^1 - \ln x_t^1$$

C. Multilateral Productivity Indices

The Divisia chaining approach may have limitations in some applications. With cross-sectional or panel data there is no obvious way to chain the index and get comparisons between sectors since "adjacent" makes little sense in the cross section. Caves, Christensen and Diewert (1982) address this issue of making comparisons in cross sections. Their solution to the problem is to construct a hypothetical sector whose subcomponent expenditure shares are the arithmetic mean expenditure shares for all sectors ($\overline{S_i}$), and whose subcomponent quantities are the geometric means of the subcomponent quantities across all sectors ($\overline{\ln X_i}$). Comparisons of individual sector observations (subscripted by f) are then made relative to this reference sector (denoted with the superscript *) using the following index:

$$\ln x_f^* = \frac{1}{2}\sum_{i=1}^{n}(S_{fi} + \overline{S_i})(\ln X_{fi} - \overline{\ln X_i}).$$

This index has clear advantages in cross sectional work. It is transitive in a similar sense that the Divisia index is transitive. The sequence of comparisons is not ambiguous as all

comparisons are made indirectly through the hypothetical sector. One undesirable property of this index is that it is now sample dependent. If the sample is extended to include more time periods or more sectors, the entire set of index calculations must be revised. This is quite different from "chained" indices such as the Divisia where historical observations remain fixed after the addition of new data. The first application of this approach was in Caves, Christensen and Tretheway (1983) for a set of U.S. airlines.

For a panel data set, the chaining approach of the Divisia and the hypothetical sector approach of Caves, Christensen and Diewert have appealing features. Chaining allows the information in the cost minimizing shares to be as close as possible to that appropriate for current technology. This is especially important when the cost minimizing shares of subcomponents are changing quickly, or when the time series is long. The hypothetical sector approach provides an unambiguous basis for comparison for observations that have no natural ordering. Both of these features can be incorporated into a single index. The primary requirement to maintain transitivity is that the "path" of comparison must not be ambiguous. This can be accomplished by constructing a hypothetical sector for each cross section and then chaining the hypothetical sectors together over time. The resulting input quantity index describing the aggregate input at time t for sector f relative to the hypothetical sector at the base time period is:

$$\ln x_{ft}^{*1} = \frac{1}{2}\sum_{i=1}^{n}(S_{fit} + \overline{S_{it}})(\ln X_{fit} - \overline{\ln X_{it}}) + \sum_{s=2}^{n}\ \frac{1}{2}\sum_{i=1}^{n}\ (\overline{S_{is}} + \overline{S_{i,s-1}})(\overline{\ln X_{is}} - \overline{\ln X_{i,s-1}})$$

where the bar indicates an average over the relevant quantity. The terms in the first sum describe the difference between the actual sector f and the hypothetical sector at time t while the terms in the second sum chain together the hypothetical sectors back to the base time period. A measure of TFP relative to the hypothetical sector in the base time period can be constructed as

$$\ln TFP_{ft} = \left[\frac{1}{2}\sum_{i=1}^{m}(R_{fit} + \overline{R_{it}})(\ln Y_{fit} - \overline{\ln Y_{it}}) + \sum_{s=2}^{n}\ \frac{1}{2}\sum_{i=1}^{m}\ (\overline{R_{is}} + \overline{R_{i,s-1}})(\overline{\ln Y_{is}} - \overline{\ln Y_{i,s-1}})\right]$$
$$-\frac{1}{2}\sum_{i=1}^{n}(S_{fit} + \overline{S_{it}})(\ln X_{fit} - \overline{\ln X_{it}}) + \sum_{s=2}^{n}\ \frac{1}{2}\sum_{i=1}^{n}\ (\overline{S_{is}} + \overline{S_{i,s-1}})(\overline{\ln X_{is}} - \overline{\ln X_{i,s-1}})$$

where R_{fit} is the revenue share of output j for sector f in period t and m is the number of outputs.

The chained multilateral total factor productivity index also provides a decomposition of TFP change into two components that exploit between and within variations available in sector panel data. When describing the change in TFP between sector f at time t and t', the first set of terms

$$\frac{1}{2}\sum_{j=1}^{m}[(R_{fjt'}+\overline{R_{jt'}})(\ln Y_{fit}-\overline{\ln Y_{jt'}})-(\overline{R_{fjt}}+\overline{R_{jt}})(\ln Y_{fjt}-\overline{\ln Y_{jt}})]$$

$$-\frac{1}{2}\sum_{i=1}^{n}[(S_{fit'}+\overline{S_{it'}})(\ln X_{fit'}-\overline{\ln X_{it'}})+(\overline{S_{fit}}+\overline{S_{i,t}})(\ln X_{fit}-\overline{\ln X_{it}})]$$

describes the change in TFP relative to that of the hypothetical or representative sector (catching up or falling behind or productive efficiency) while the remainder

$$\sum_{s=t}^{t'}\ \frac{1}{2}\sum_{j=1}^{m}\ (\overline{R_{js}}+\overline{R_{j,s-1}})(\overline{\ln Y_{js}}-\overline{\ln Y_{j,s-1}})-\sum_{s=t}^{t'}\ \frac{1}{2}\sum_{i=1}^{n}\ (\overline{S_{is}}+\overline{S_{i,s-1}})(\overline{\ln X_{is}}-\overline{\ln X_{i,s-1}})$$

describes the change in productivity for the typical sector (technological innovation or technological change).

D. Decomposition of TFP Growth into Contributions of Specific Factors of Production

Static factor demand models can be used to parse the affect of different factors of production on total factor productivity growth. As was noted, TFP is basically a measure of output per unit of total factor input. Total factor input is a weighted average of inputs where the weights depend on the underlying production function. Therefore, TFP growth can be related to changes in efficiency and technology embodied in the various factors of production. To illustrate this decomposition of TFP growth, consider the translog cost function:

$$\ln(C)=\alpha_0+\alpha_y\ln Y+\sum_i\alpha_i\ln w_i+\frac{1}{2}\sum_i\sum_j\alpha_{ij}\ln w_i\ln w_j+\sum_i\lambda_i t\ln w_i$$

where i,j=1,..., n index the different inputs; Y is the level of output; t is an index of time. All variables are defined around some expansion point. A set of cost share equations associated with the translog cost function is implied by duality theory. Also, there are several parametric restrictions such as linear homogeneity in factor prices and symmetry conditions that must be met in estimation. The impact of these homogeneity restrictions on the productivity parameters of interest is that $\sum_i\lambda_i=0$. If we assume that productivity growth specific to each factor of production grows exponentially, then effective units of the input $X_i^*=\exp\{\lambda_i t\}X_i$ in the underlying technology have effective prices in the dual cost function that are $w_i^*=\exp\{-\lambda_i t\}w_i$. Under constant returns to scale (α_y=1) the rate of growth in TFP is equivalent to the rate of cost dimunition, i.e., $-\partial\ln C/\partial t=\partial TFP/\partial t$. With an independent estimate of TFP we can use this relationship to decompose its change into the contribution by each factor: capital, labor, energy, and materials.

E. TFP Decompositions Based on Linear Programming Constructions of the Technology

Shephard's (1953) input distance function provides a formal linkage between the observed technology and technical efficiency. This duality can also be exploited by constructions of the technology and of the distance function through programming methods which are powerful, easy, and impose minimal assumptions on the boundary of the input requirements set (piece-wise linearity and convexity). The input distance function is:

$$D(y,x) = \max\{\lambda : \left[\frac{1}{\lambda}\right] x \in L(y)\}$$

where L(y) is the input requirement set and $0 \le \lambda \le 1$. Clearly D(y,x)$\ge$1 and the isoquant is the set of x's on the boundary of the input requirement set at which D(y,x)=1. The Debreu (1951) and Farrell (1957) input-based measure of technical efficiency (with constant returns the distinction between input and output-based measures is lost) is

$$TE(y,x) = \min\{\theta : \theta x \in L(y)\}$$

where $0 \le \theta \le 1$. It is clear that TE(y,x)$\le$1 and that TE(y,x)=1/D(y,x).

Fare et *al.* (1994) noted that the Malmquist total factor productivity change index,

$$m(y_{t+1}, x_{t+1}, y_t, x_t) = \left[\frac{D^t(y_{t+1}, x_{t+1})}{D^t(y_t, x_t)} \times \frac{D^{t+1}(y_{t+1}, x_{t+1})}{D^{t+1}(y_t, x_t)}\right]^{\frac{1}{2}}$$

which is just a geometric mean of two Malmquist TFP indices where the distance functions are based on period t and t+1 technology and evaluated at period t and t+1 observations, could be decomposed into a component which indicated pure technology change and a component which indicated pure change in technical efficiency. The equivalent representation is

$$m(y_{t+1}, x_{t+1}, y_t, x_t) = \left[\frac{D^t(y_{t+1}, x_{t+1})}{D^t(y_t, x_t)} \times \frac{D^{t+1}(y_{t+1}, x_{t+1})}{D^{t+1}(y_t, x_t)}\right]^{\frac{1}{2}} =$$

$$\frac{D^{t+1}(y_{t+1}, x_{t+1})}{D^t(y_t, x_t)} \times \left[\frac{D^t(y_{t+1}, x_{t+1})}{D^{t+1}(y_{t+1}, x_{t+1})} \times \frac{D^t(y_{t+1}, x_{t+1})}{D^{t+1}(y_t, x_t)}\right]^{\frac{1}{2}} = E_{t+1} T_{t+1}.$$

The first term reflects changes in relative efficiency between period t and t+1 and the second term relates changes in technology between the time periods. This index can capture productivity change by accounting for technical and efficiency advances which incorporate data from two adjacent time periods.

Once the four programming problems are solved for each set of observations to construct the distance functions, we can obtain the Malmquist index and its two components of efficiency and frontier advances. An index less than unity indicates productivity decline while a value greater than unity indicates growth.

F. Decomposition of Efficiency Into Technical and Allocative Components Using Data Envelopment Analysis

Price data can be brought into the analysis along with a behavioral assumption of cost minimization to allow for the measurement of both technical and allocative efficiencies. One first estimates technical efficiency using linear programming methods, the so-called Data Envelopment Analysis (DEA) of Charnes, Cooper, and Rhodes (1978). Then the following cost-minimization programming problem is solved:

$$\min_{\lambda, x_i^*} w_i' x_i^*$$

$$s.t.$$

$$-y_i + Y\lambda \geq 0,$$

$$x_i^* - X\lambda \geq 0,$$

$$N1'\lambda \geq 0,$$

$$\lambda \geq 0,$$

where w_i is the vector of input prices for the ith sector and x_i^* (which is solved from the linear programming problem) is the vector of cost-minimizing inputs for sector i for output level y. The total cost efficiency for the ith sector is then $CE = w_i' x_i^* / w_i' x_i$ which is the ratio of minimum cost to observed cost and, given the technical efficiency estimates obtained from DEA, allocative efficiency is constructed as AE=CE/TE.

G. Parametric Stochastic Frontier Methods

The measurement of technical efficiency using parametric models of the technology requires that we define the transformation function, which with a single output y and a vector of inputs x becomes the production function defined as:

$$y \leq f(x).$$

The output-based Debreu-Farrell radial measure of technical efficiency is then

$$TE(y, x) = \frac{y}{f(x)} \ .$$

Econometric based modeling of technical efficiency thus starts with a model such as

$$y_i = f(x_i, \beta) TE_i$$

where $0 < TE(y_i, x_i) \leq 1$ and i indexes the sector. The empirical model replaces TE with a one-sided stochastic error u>0. In a translog or Cobb-Douglas setting we have

$$\ln y_i = \ln f(x_i, \beta) + \ln TE_i = \ln f(x_i, \beta) - u_i$$

and since $u_i = -\ln TE_i \approx 1 - TE_i$ we have that $TE_i = e^{-u_i}$. The relative efficiencies of two sectors I and j are constructed as $TE_i / TE_j = \exp\{-u_i + u_j\}$.

We can decompose the stochastic error into a standard disturbance due to uncorrelated measurement error and a one-sided disturbance interpreted as technical inefficiency (Aigner, Lovell, and Schmidt, 1976). Along with the use of panel data (Schmidt and Sickles, 1984), this provides us with a normalization for the most efficient sector and a relative technical efficiency measure for all other sectors. Furthermore, the error can be time-varying (Cornwell, et *al.*, 1990).

H. The Cost Function Approach

Note that as a fundamental result in duality theory (Shephard, 1953), the cost frontier, assuming constant returns to scale, is related to the cost function by:

$$\ln C_i = \ln c(w_i) - \ln TE_i = \ln c(w_i) + u_i$$

Thus either function can be used to estimate technical efficiency. The added appeal of the cost-based approach is that since prices are explicitly introduced, one can exploit the assumption of cost-minimizing behavior to introduce a set of derived demand equations. One can then compare the observed allocations with those consistent with the condition for cost-minimization. The condition is that the marginal rate of technical substitution between any two pair of factors is equal to their relative prices. This affords us with a parametric and statistical alternative to the index number decompositions introduced above.

To be more explicit cost efficiency is modeled using a Cobb-Douglas functional form. In this case, the deterministic industry cost frontier can be presented as follows:

$$C(y, w) = \left[\alpha_0 + \sum_{i=1}^{p} \alpha_i \ln(y_i) + \sum_{j=1}^{q} \beta_j \ln(w_j) \right]$$

$y = (y_1, ..., y_p) \in \Re_+^p$ outputs are presented by y

$w = (w_1, ..., w_q) \in \Re_+^q$ wages/rents are presented by w

.

However for any particular sector deviations from the industry cost frontier are observed due to the following reasons:

Technical Inefficiency	$T_n \geq 0$
Allocative Inefficiency	$A_{nt} \geq 0$
Random Noise	u_{nt} greater, less, or equal to zero

Sector specific effects, a time trend and a time squared term are included in this formulation. By incorporating these factors the observed (log) total cost function can be presented as follows.

$$\ln(w'x)_{nt} = \left[\alpha_0 + \sum_{i=1}^{p} \alpha_i \ln(y_{int}) + \sum_{j=1}^{q} \beta_j \ln(w_{jnt}) + \gamma_n + \delta_1 t + \delta_2 t^2 + T_n + A_{nt} + u_{nt}\right]$$

$$\ln(w'x)_{nt} = C(y,w) + \gamma_n + \delta_1 t + \delta_2 t^2 + T_n + A_{nt} + u_{nt}$$

number of sectors is n $\quad n = 1,\ldots,N$

number of periods is t $\quad t = 1,\ldots,T$

$u_{nt} \sim N(0,\sigma_u^2)$ and $T_n \sim |N(0,\sigma_T^2)|$

Where T_n is a non-negative term depicting the increase in costs due to technical inefficiency, A_{nt} is a non-negative term depicting the increase in costs due to allocative inefficiency, γ_n is the sector specific fixed effect and u_{nt} represents the random noise term.

The manufacturing industry shares a common cost frontier that denotes the minimum cost associated with a given combination of input prices and outputs. This is represented by the deterministic industry cost frontier. Using Shephard's Lemma, the sectors also share common efficient cost share equations that are represented by the own price elasticity terms in the Cobb-Douglas cost equation. The observed input cost shares can be modeled as presented below.

$$\left(w_j \cdot x_j \Big/ w'x\right)_{nt} = \mu_j + B_{jnt}$$

$$B_{jnt} = b_{jt} + u_{jnt} \quad and \quad B_{jnt} \sim N(b_j, \sigma_{B_j}^2)$$

number of inputs is j *and* $j = 1\ldots q$

The composed error terms (B_{jnt}) of the input share equations consist of persistent allocative errors and random noise. Since actual cost shares can be smaller or larger than the efficient cost shares the allocative errors (b_{jt}) are allowed to be smaller or greater than zero.

According to this formulation, technical and allocative inefficiency measures increase observed costs, while the random noise term may increase or decrease observed costs.

However, the allocative errors (b_{jt}) in the input share equations and the random noise terms may increase or decrease the actual input cost shares relative to the efficient input cost shares. The allocative errors (b_{jt}) of the input cost share equations are related to the allocative inefficiency measures in the cost equation but the technical inefficiency measures in the cost equation do not appear in the input share equations. Outputs are exogenously determined in this framework.

Using the model specification motivated by Ferrier and Lovell (1990), the allocative errors (b_{jt}) appearing in the input cost share equations are linked to the cost of those errors A_{nt} as specified below.

$A_{nt} = b'Fb$
$b' = (b_1,\ldots,b_q)$
F is a (q *by* q) diagonal matrix with $F_{jj} > 0$

The allocative errors (b_{jt}'s) vary by input and not by observation. Thus b_{jt} has no n subscript to signify changing values from one sector to another. The linkage between the allocative errors in the input cost share equations and the allocative inefficiency measures is assumed to satisfy the following conditions.

$A_{nt} = 0$ *iff* $b_{jt} = 0 \ \forall j$	cost rises if and only if mistakes are made
$corr(A_{nt}, \lvert b_{jt} \rvert) > 0$	mistakes in either direction increase costs
$corr(A_{nt}, var(b_{jt})) > 0$	larger errors are more costly

Once estimates of the industry cost frontier, allocative inefficiency measures and the variances of the technical and random noise terms are obtained, the technical inefficiency measures for each sector can be calculated using the following formula.
In this formulation, allocative inefficiency varies over both the sector and time

$$T_n = \frac{1}{T}\left(\ln(w'x)_{nt} + [\cdot] + \hat{A}_{nt}\right)\cdot\left(\frac{\sigma_T^2}{\sigma_T^2 + \sigma_u^2}\right)$$

$\ln(w'x)$	log value of actual costs
$[\cdot]$	estimated cost frontier
$\hat{A}_{nt}$	estimated allocative inefficiency

dimensions. A justification for this is that allocative inefficiency is the result of using an inappropriate input mix given the input prices, which can vary rapidly over time. However, technical inefficiency is persistent over time for each firm because this inefficiency measure accounts for increase in costs resulting from not employing the most up to date production techniques, which changes relatively slowly over time. The estimation of the system of cost and input share equations is undertaken using maximum likelihood estimation techniques. The distributional assumptions made and the estimation method is described in following section.

I. Estimation Method

The parameters in the above model are estimated using maximum likelihood techniques. The distributional assumptions on the error terms of the cost system are made in the spirit of Bauer (1990). These assumptions are consistent with the non-negativity requirements of the technical and allocative inefficiency measures and allow the actual cost shares to be greater or smaller than the corresponding efficient cost shares. The technical inefficiency term is modeled as a non-negative half-normal.

$$T_n \sim \left| N(0,\sigma_T^2 \right|$$

The random noise term in the cost equation is modeled as a normal distribution.

$$u_{nt} \sim N(0,\sigma_u^2)$$

The composed error terms in the cost share equations are modeled as a multivariate normal:

$$B_{nt} \sim N(b, \Sigma)$$

The likelihood function is then constructed as presented below.

$$f(T_n + A_{nt} + u_{nt}) = g(T_n + u_{nt} \mid B_{nt})\, h(B_{nt})$$

where *f(.)* , *g(.)* and *h(.)* are density functions for $(T_n + A_{nt} + u_{nt})$, $(T_n + u_{nt})$ and B_{nt} respectively. The likelihood function that incorporates all the information based on the distributional assumptions of the technical inefficiency term, the composite error terms in the input share equations and the random noise can be written as presented below.

$$\begin{aligned}
\ln(L) = N\ln(2) &- \left(\frac{NTq}{2}\right)\ln(2\pi) - \frac{N(T-1)}{2}\ln\left(\sigma_u^2\right) - \frac{N}{2}\ln\left(\sigma_u^2 + T\sigma_T^2\right) \\
&- \frac{NT}{2}\sum_{j=1}^{q}\ln\left(\sigma_{B_j}^2\right) - \frac{1}{2}\sum^{N}\sum^{T}\sum^{q}\left(\frac{B_{jnt}}{\sigma_{B_j}^2}\right) \\
&- \left(\frac{1}{2\sigma_u^2}\right)\sum^{N}\sum^{T}(T_n + u_{nt})^2 \\
&+ \left(\frac{\sigma_T^2}{2\sigma_u^2(\sigma_u^2 + T\sigma_T^2)}\right)\sum^{N}\left[\sum^{T}(T_n + u_{nt})\right]^2 \\
&+ \sum^{N}\ln\left\{1 - \Phi\left[\left(\frac{\sigma_T}{\sigma_u\sqrt{\sigma_u^2 + T\sigma_T^2}}\right)\sum^{T}\left((T_n + u_{nt}) - \sum^{q}B_{jnt}^2\right)\right]\right\}
\end{aligned}$$

Here N is the number of sectors, T is the number of time periods, q is the number of inputs and the cumulative distribution function for the standard normal density is represented by $\Phi(\cdot)$. Consistent estimates of the relevant parameters are obtained by maximizing the likelihood function with respect to parameters in the cost formulation and the five variance terms; variances of the composed error terms in the input share equations, the technical inefficiency terms and the random noise term in the cost frontier.

As mentioned earlier, the cost structure of the Egyptian manufacturing industry is modeled using the Cobb-Douglas function and the input share equations as proposed by Christensen and Greene (1976). The observed industry cost frontier is represented below.

$$\ln(w'x)_{nt} = \left[\alpha_0 + \sum_{i=1}^{p} \alpha_i \ln(y_{int}) + \sum_{j=1}^{q} \beta_j \ln(w_{jnt}) + \gamma_n + \delta_1 t + \delta_2 t^2 + T_n + A_{nt} + u_{nt}\right]$$

$$\ln(w'x)_{nt} = C(y,w) + \gamma_n + \delta_1 t + \delta_2 t^2 + T_n + A_{nt} + u_{nt}$$

Where y_{int} represents output that is produced in the different sectors using labor, capital, energy and materials as inputs. The inputs are represented by x_i and the corresponding wage/rents paid for these inputs are represented by w_i in the above Cobb-Douglas cost formulation. Linear homogeneity in input prices is imposed parametrically.

Using Shephard's Lemma, the input cost share equations are derived from the Cobb-Douglas cost function. The observed cost share equations consist of the own price elasticity term and a composed error term.

With the above parametric formulation of the cost structure and an initial estimate of the relevant parameters, the maximum likelihood technique is applied to the likelihood function to obtain consistent estimates for the parameters. Allocative and technical inefficiency measures are then obtained using relevant formulas.

In calculating the allocative inefficiency measures, the *(q by q)* positive semi-definite matrix *F* is derived using the methods presented in Bauer (1990),

$$F = D^{\frac{1}{q-1}}\Sigma^{+}$$

where Σ^{+} is the generalized inverse of the variance covariance matrix for the error terms in the input share equations. D is obtained using the product of positive eigen values of Σ.

J. The Production Function Approach

The Cobb-Douglas production function we estimated is :

$$\ln(y_{it}) = \beta_1 \ln(l_{it}) + \beta_{it} \ln(e_{it}) + \beta_3 \ln(m_{it}) + \beta_4 \ln(k_{it}) + \alpha_i + \eta t + \varepsilon_{it}$$

where y_{it} is the output of sector i at time t, m_{it} is the materials quantity index, e_{it} is energy quantity index, k_{it} is the capital quantity index, t is time, α_i is the unobservable sector specific characteristic, and ε_{it} is the error term.

In general, the production function we estimated is based on a one-way error component for the disturbance term. This means that in our regression model of the panel data, the error term $\mu_{it} = \varepsilon_{it} + \alpha_i$, is composed of the unobservable sector specific effect and the remainder error term. This model can be estimated using random or fixed effects methods. In the former, the assumption is that the sector specific effect as well as the disturbance terms are uncorrelated with the explanatory variables. Specifically, the estimation is based on the assumptions:

$$E(\varepsilon_{it}) = 0 \qquad E(\varepsilon\varepsilon') = \sigma_\varepsilon^2 I$$
$$E(\alpha_i \alpha_i) = 0,\ i \neq j \qquad E(\alpha_i \alpha_i) = \sigma_\alpha^2$$
$$E(\alpha_i \varepsilon_{it}) = 0 \qquad E(\alpha_i) = 0$$

Estimation can be implemented by estimating the covariance matrix of the error term and using this to find estimates for the parameters of interest. Alternatively, we can compute the within and between estimates and use these to find the parameter estimates. The between estimation, which amounts to transforming the data into averages and running OLS, can be implemented by applying the following:

$$\hat{\beta}_B = (X' P_D X)^{-1} X' P_D y$$
$$\text{where } P_D = D(D'D)^{-1} D$$

P_D is a symmetric and idempotent matrix that transforms the data into sector specific means.

The within estimation, easily implemented by running OLS on the data from which sector specific means have been subtracted, can in turn be implemented by using the following equation:

$$\hat{\beta}_W = (X' M_D X)^{-1} X' M_D y$$
$$\text{where } M_D = I_{nT} - D(D'D)^{-1} D'$$

Once we have computed the within and between estimators, we then obtain their variance terms and calculate the following term:

$$\hat{\theta} = \sqrt{\frac{\hat{\sigma}_e^2}{T\sigma_\alpha^2 + \sigma_\varepsilon^2}}$$

Finally, using this term we run OLS after transforming the regressors and dependent variables in the following manner:

$$\tilde{y}_{it} = y_{it} - \bar{y}_i + \hat{\theta}\,\bar{y}_i$$
$$\bar{x}_{it} = x_{it} - \bar{x}_i + \hat{\theta}\,\bar{x}_i$$

Note that the $\bar{y}_i$ and $\bar{x}_i$ terms are the sector specific averages.

The fixed effects model assumes that the sector specific effects are correlated with the regressors. As a result, to estimate the model in the presence of these effects requires that we estimate the slope parameters as well as the sector specific effects. To do this, we simply estimate the following equation:

$$y = X\beta + D\alpha + \varepsilon$$

where $D = I_n + i_T$ is a set of n dummy variables, one for each sector. The slope estimates obtained in this manner are the same as the within estimators.

To verify which of the two methods is appropriate we undertaken a wald type of specification test called the Hausman-Wu test. Choosing the appropriate estimation method is important because if the effects are uncorrelated with the regressors, the fixed effects (FE) estimator is consistent but not efficient. If, on the other hand, the effects are correlated with the regressors, the random effects (RE) estimator is inconsistent. The Hausman-Wu test statistic can be computed using the following formula:

$$H = (\hat{\beta}_{RE} - \hat{\beta}_{FE})'(\Sigma_{FE} - \Sigma_{RE})^{-1}(\hat{\beta}_{RE} - \hat{\beta}_{FE})$$

This test statistic has a χ^2 distribution with k degrees of freedom, where k is the number of explanatory variables. The null hypothesis we are testing using this test statistic is that the random effects estimator is correct.

As we mentioned in section 4.1, this test statistic revealed the RE model to be appropriate for our data set. As a result, we apply a modified version of the Cornwell, Schmidt and Sickles estimation. To do this, we fitted a quadratic time trend, to allow changes in efficiency levels to exhibit a nonlinear trend, and regressed the random effects fitted residuals of each sector on an intercept, time and time squared. The coefficient estimates from these allowed us to recover absolute efficiency for each sector at each time period as follows:

$$\hat{\varepsilon}_{it} = \alpha_o + \hat{\alpha}_t t + \hat{\alpha}_{tt} t^2 \text{ and } (efficiency)_{it} = \exp(\hat{\varepsilon}_{it}).$$

We then arrive at relative efficiency measures by dividing absolute efficiency measures by the maximum efficiency for each sector and time period:

$$relative\ efficiency = \frac{\{(efficiency)_{it})\}}{\{\max\,(efficiency)_{it}\}}.$$

6 PROFILES OF PRODUCTIVITY AND COMPETITIVENESS OF THREE KEY INDUSTRIES

A. Introduction

To complement the analyses in the preceding sections of this report, this chapter presents profiles of productivity and competitiveness in three industries: software, household appliances and horticulture. The industries were chosen for their future potential as important export industries and their use of technology, an area that is actively being promoted by the Government of Egypt. In addition to analyzing the recent performance of the three industries, this chapter offers insights on productivity and competitiveness by presenting a synopsis of information gathered in firm-level interviews. Details of the interviews are presented in Annex 6A and the characteristics of the sample are presented in Annex 6B. Interview guidelines focused on productivity factors such as labor, machinery and equipment, and technology, and on institutional factors such as infrastructure, tax administration, support organizations, legal framework, and financial services. Firm strategies in marketing were also investigated.

The interviews were initiated by addressing the importance of any area, say technology, to the productivity and competitiveness of a firm, and then technology was discussed in detail (for details on the interview guidelines used, see Annex 6C). As a summary query, managers or owners were asked to rank each area on a scale representing the degree of challenge it presented to the productivity and competitiveness of the firm, and to its future growth. The information gathered from interviews was mainly qualitative in nature, resulting in data that lend themselves more to cross-tabulation than to rigorous tests of hypotheses.[1] Qualitative data are valuable in that they allow for the interpretation of statistical relationships, offer a way to decipher puzzling responses, and provide the basis for case studies (Reid, 1993). The analysis of this type of data has been complemented by information gathered from various government agencies presented in previous chapters of this report.

This chapter is organized as follows: Sections B through D each begins with an overview of the three industries under review and highlights the major industry characteristics. The results of the firm-level interviews are then presented in summary form, and the detailed discussion of each area under review is presented in Annex 6A. Section E presents recommendations for each industry.

[1] Queries on quantitative data were also included in the questionnaire and related to the amount of machinery and equipment, cost of labor and output and production costs; however, all managers declined responses and cited confidentiality as the reason for not divulging information. This response was somewhat expected since an explanation was given to company managers that the interview was being conducted as part of a study sponsored by the Ministry of Economy and USAID.

B. Software Industry

1. Recent Performance and Industry Characteristics

a. Market Growth and Industry Characteristics

The software industry in Egypt has expanded rapidly in the last few years. Revenue grew by 30 percent in 1997, up from 21 percent one year earlier (see Table 6.1). This growth followed the overall expansion in the information technology (IT) market in Egypt in that year, although it was slightly below the 35 percent growth rate of revenue for the application solutions component of the software market during that same year. During 1995-97, software maintained its share in the IT market, and averaged about 13 percent. Despite the impressive growth in software revenues, the Middle East Region, as represented by the Gulf States, Saudi Arabia and Egypt, represented a negligible share (0.3 percent) of the total world software market in 1998 (Abdelazim, 1999). The recent surge in software growth, however, emphasizes the future potential for this industry in Egypt, but as the Harvard Computing Group (1999) cautions, this growth is considered "soft" in the domestic marketplace, and the real potential is in the export market.

In addition to its rapid expansion and ongoing changes, the software industry is relatively new to Egypt, explaining the lack of statistics on market segmentation. However, a recent report prepared by the Harvard Computing Group (1999), indicates that the industry is highly diverse and reflects nearly all of the company types found in more mature markets. The report also estimates the number of staff employed in Egypt's software industry to be around 5,000. Many software companies that develop their products in Egypt view their competitive edge as being in Arabic-language application software. This type of software is developed for the global and regional markets and for custom business uses in the Arab world, such as country-specific taxation or legal systems. According to one leading software company in Egypt, which focuses on the export of Arabic software packages, about 90 percent of the industry in Egypt is in the custom software business.

Table 6.1
Software Growth in Egypt's Information Technology (IT) Market, 1995-97
(US$ millions and percent)

	Revenues	Share in Egypt's IT Market	Annual Growth
Total Packaged Software			
1995	$38,267	14.2%	--
1996	$46,321	12.9%	21.2%
1997	$60,378	12.8%	30.3%
of which:			
System Software/Utilities			
1995	$8,400	3.1%	--
1996	$8,988	2.5%	7.0
1997	$11,684	2.5%	30.0%
Application Tools			
1995	$11,384	4.2%	--
1996	$14,230	4.0%	25.0%
1997	$17,503	3.7%	23.0%
Application Solutions			
1995	$18,483	6.8%	--
1996	$23,104	6.4%	25.0%
1997	$31,191	6.6%	35.0%
Egypt IT Total			
1995	$269,995	100%	--
1996	$358,212	100%	32.7%
1997	$470,782	100%	31.4%

Source: American Chamber of Commerce (1998).

Egypt also offers an opportunity to act as an important source of offshore software developers, given its comparative advantages in labor costs and highly qualified pool of software programmers. Indeed, many of the firms interviewed as part of this study have positioned themselves as providers of custom-made software for European clients. By offering quality work at low prices and capitalizing on Egypt's proximity and historical connection to the Europe, these types of companies are able to increase their productivity and compete. Moreover, with the new EU-Egypt Agreement soon to be signed, Egypt software developers will be able to make new inroads to the EU market. No official export data are available for the industry, although according to the Egyptian Software Association (ESA), as reported in a recent report by the USAID Growth Through Globalization Project (GTG, 1999), annual exports of software are expected to grow at rates similar to those of revenues, viz., between 20 and 30 percent.

b. Productivity Measures

Table 6.2 shows productivity measures for 25 Egyptian software companies whose recent financial profiles appeared in the Information and Decision Support Center directory (IDSC, 1997). The average capital/output ratio[2] is 0.80 and ranges from 0.04 (for a large company having more than 100 employees) to 2.0 (for a small company having less than 50 employees). Capital/output ratios calculated according to firm size indicate that in general large-size software companies pay less for every unit of output than small and medium-size companies. Wage/output coefficients were also calculated according to firm size, and indicate that medium-size companies in general use labor more efficiently than large and small size companies. For example, for every LE of output medium-size companies spent 41 piasters on labor, compared with 85 piasters spent by large-size companies and 127 piasters for small-size companies.

Table 6.2
Descriptive Statistics of Productivity Measures for Selected Software Companies in Egypt

	Capital/ Output	Wage/ Output	Capital/ Wage	Output/ Wage
Mean	0.80	1.13	1.16	1.94
Standard Error	0.10	0.20	0.22	0.34
Median	0.76	0.71	0.66	1.42
Standard Deviation	0.50	0.96	1.09	1.69
Sample Variance	0.25	0.93	1.20	2.84
Range	1.96	2.97	5.02	5.24
Minimum	0.04	0.18	0.06	0.32
Maximum	2.00	3.15	5.08	5.56
Confidence Level (95.0%)	0.21	0.41	0.46	0.71

Notes: Calculations based on data in Nathan Associates (1999) and IDSC (1997).
These are descriptive statistics, and therefor the wage/output ratio should not necessarily be the inverse of the output to wage ratio. This is only true for individual observations.

[2] Capital refers to financial capital, as opposed to machinery and equipment.

We can calculate industry-level productivity measures by econometric estimation of the value added production function. The regression methodology does not rely as much on the fairly stringent assumptions needed to construct index number calculations of total factor productivity (TFP).[3] The cost of econometric analysis, however, is that the parameter estimates require the imposition of the widely used Cobb-Douglas function. As such, the results should be regarded as complements to, rather than substitutes for, the TFP index number calculations.

Calculations of the production function for the software industry can be used to assess whether there are increasing, constant, or decreasing returns to scale. Following standard estimation procedures associated with the work of Jorgenson (1990) and recently applied by Harrigan (1997a; 1999), let *y* be the output of a firm, *k* the real capital stock, and *l* the level of employment for the software industry of Egypt:

$$y = f(k, l) \qquad \ldots(1)$$

Hicks-neutral technical differences over firms implies that this function can be written as

$$f(k, l) = \beta\, g(k, l) \qquad \ldots(2)$$

The factor of proportionality β can be interpreted as an index of TFP. If the function g(k, l) is Cobb-Douglas, then (2) can be written as follows:

$$\ln y = \alpha_0 + \alpha_1 \ln k + \alpha_2 \ln l \qquad \ldots (3)$$

Subtracting ln *l* from both sides, yields:

$$\ln (y/l) = \alpha_0 + \alpha_1 \ln(k/l) + \gamma \ln l \qquad \ldots(4)$$

where $\gamma = \alpha_1 + \alpha_2 - 1$.

Equation (4) states that the output per worker depends on capital per worker and total employment. It is straightforward to show that the elasticity of scale in equation (4) is equal to $1 + \gamma$, so that γ is a convenient measure of the extent to which the production function of the software industry differs from constant returns to scale.

Using data from 14 firms in the Egyptian software industry, we obtained the following estimates of the coefficients for equation (4):

$$\ln (y/l) = 7.3 + \underset{(2.6)}{0.35} \ln(k/l) + \underset{(1.3)}{0.19} \ln l \qquad \ldots(5)$$

$$R^2 = 0.39 \qquad DOF = 11$$

[3] For a discussion of the assumptions necessary to construct TFP index numbers, see Harrigan (1997b).

where the figures in parenthesis are t-statistics. The t-statistic for the estimated coefficient of the capital per worker variable is significant at the 99 percent level of confidence and that of the employment variable is nearly significant at the 90 percent level of confidence and is certainly significant at the 85 percent confidence level. The R^2 is low but this result is typical of production function estimates found in these types of estimates.[4]

The estimated equation shows that the value added from each worker depends on capital per worker and total employment. The estimated coefficient of 0.35 on the log of capital per worker is reasonable. From the estimate of the coefficient for the employment variable, there is evidence of increasing returns to scale for the industry since the elasticity of scale in equation (5) is equal to $1 + \gamma = 1.35$.

Another way to view the results is to note that from equation (4) the coefficient of the employment variable γ equals $\alpha_1 + \alpha_2 - 1$. We can therefore derive the value of α_2 in equation (3) from the estimated equation, which is $\alpha_2 = 0.84$ ($= \gamma - \alpha_1 + 1 = 0.19 - 0.35 + 1$). The sum of the coefficients of the Cobb-Douglas production function is equal to 1.19, which indicates that returns to scale are increasing.

The results hold for the industry as a whole and do not differentiate between firms. Indeed, large-size firms could have moderate economies of scale, while the smaller ones might not. Estimation with this small data set can not distinguish between firm size and scale economies. Nevertheless, they point to important scale economies for the industry and they complement the values for total factor productivity derived from the construction of index numbers.

2. Overview of Challenges Faced by Software Companies

The software companies that were interviewed as part of this study develop various types of products and services, such as software in the Arabic language, known as Arabization, Arabic Internet browsers, machine translation software, and custom-made software for business management purposes (e.g., billing or stock management), the hospitality or financing industries, or the home entertainment industry. Most companies use Microsoft Windows-based technology as their operating system, although two companies that were interviewed use the UNIX platform. The Windows-based operating system is more readily available in Egypt and is significantly less expensive than the UNIX system, which is costly and requires a high level of training and technical know-how. Most of the clients of software companies interviewed are located in the Middle East region, followed by Europe. Only two companies cited the United States as one of their markets.

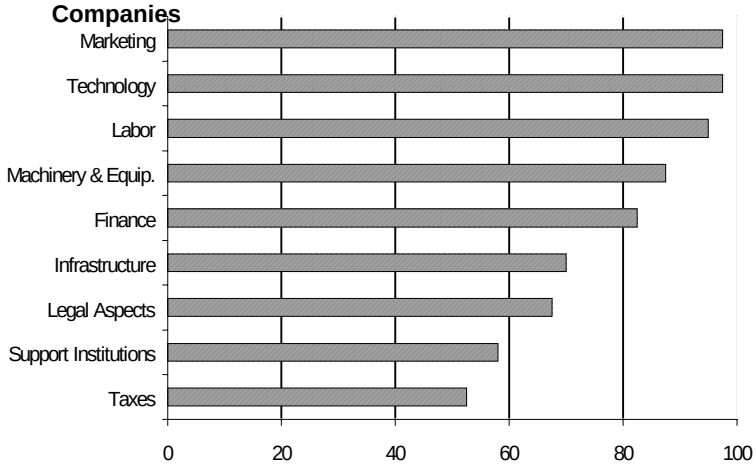
Many company managers commented on the weak demand in the local market for their products and services, and consider the Egyptian market as having low potential for future growth. These opinions are mainly attributed to the perception that Egyptians are generally willing to pay for hardware licenses but not software licenses, either because

[4] See, for example, Bernard and Jones (1996); Chambers (1988); Costello (1993); Diewert (1992); Dollar, Baumol, and Wolff (1988); and Jorgenson (1990).

they do not recognize the value of software and/or readily make illegal copies, a topic that will be addressed in subsequent sections of this chapter. Also, many Egyptians simply do not have sufficient disposable income to purchase certain types of software, such as that for the home entertainment industry. Because of the weak local demand for this type of product, firms often try to sell it in Egypt by "bundling" it with hardware (*viz.*, the software is installed on a personal computer and sold with it as part of a package). Most companies prefer to focus their efforts in regional Arab-speaking markets where they have the advantage of competing in the Arab language and on the basis of technology, or in Europe where they mainly compete on the basis of price and act as off-shore software developers. When queried about the extent of their local competition in the export markets, most firms indicated that they face competition from 10 to 15 Egyptian software companies.[5]

As a way of introducing a discussion on the topic of productivity, firm managers were asked to comment on the importance of certain areas to firm productivity and competitiveness. Responses indicate that the top-ranked factors relating to the overall *importance* of productivity and competitiveness, as perceived by the business owners and managers of the software companies that were interviewed, relate to issues concerning marketing, technology, labor, machinery and finance (see Figure 6.1). While the scores assigned to each of the five areas are similar, that of the area of marketing is the highest, and is particularly important to small-size firms. Business owners and managers also perceive infrastructure and the legal and regulatory environment as being important to the productivity and competitiveness of their businesses. Government and private sector support institutions were reported to be less important to software firm productivity and competitiveness than the other areas investigated.

Figure 6.1
Importance of Factors of Productivity to Software Companies



Note: 0 indicates little importance; 100 indicates great importance.

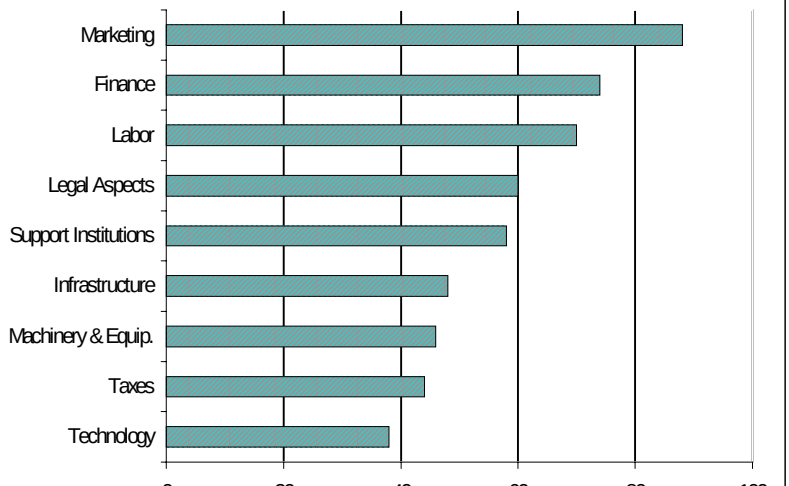
After an in-depth discussion of the issues mentioned above, software business owners and managers participating in the interviews were also queried on the challenge of factors of productivity and competitiveness to successful business operations and future growth. Figure 6.2 shows that marketing, finance and labor present the greatest challenge to

[5] About 255 companies are listed in the IDSC 1997 Software Directory, many of which distribute software as opposed to developing it. The criteria for this study in selecting software companies to be interviewed are that they must be exporters and that they must design and develop software themselves. The number of software companies actively involved in exporting, according to the American Chamber of Commerce (1998) was between 15 and 20 in 1998, which approximates the responses by the companies that were interviewed as part of this study.

successful business operations. Two of the three top-ranked areas in terms of challenge, viz., marketing and labor, were also ranked among the most important areas related to productivity and competitiveness. Equally interesting are the relative low rankings accorded to machinery and technology as challenges to business operations, compared with the relative high scores of these areas in terms of importance to productivity and competitiveness.

The conclusion that could be drawn from the combination of these rankings is that the areas of marketing and labor, which were reported to be of great importance and that currently present the greatest challenge to business operations and growth of the areas investigated, merit special attention and further investigation. Likewise, the scores suggest that the software companies that were interviewed do not currently experience significant difficulty in the areas of machinery and technology, which are nevertheless of great importance to productivity and competitiveness. Annex 6A discusses individual factors relating to productivity and competitiveness, as perceived by the software company managers and owners that were interviewed.

Figure 6.2
Major Challenges Faced by Software Companies



Note: 0 indicates little challenge; 100 indicates great challenge.

C. Household Appliance Industry

1. Recent Performance and Industry Characteristics

The household appliance industry, which includes manufactures of consumer products such as stoves, washing machines, fans, refrigerators, air conditioners and kitchen appliances, is a promising sector for future growth, according to a recent study by Ismail *et al.* (1998). Above all, the household appliance industry has an important local demand that is expected to strengthen during the next decade. Imports have increased in recent years despite a steadily rising output, emphasizing an opportunity to meet a larger share of the growing local demand (see Table 6.3). Notwithstanding the recent slowdown in exports, the industry has potential to increase external trade with neighboring markets in the Middle East, since those countries have standards of living and needs similar to Egypt.[6] Moreover, they have little or no local manufacturing of the types of products that Egypt manufactures. There are also opportunities to tap new markets in Africa under the

[6] A recent report prepared by the American Chamber of Commerce (1999) indicates that exports of refrigerators and air conditioners increased in 1997/98.

COMESA trade agreement. Finally, the household appliance industry has potential for increasing its value added, which has increased substantially during the first part of this decade. Future increases are likely to originate from the ready availability of needed technology to improve the industry's production process and the fact that the technology is not sophisticated.

The statistics in Table 6.3 show important changes that occurred in the early 1990s in terms of output and efficiency. The real output/worker fell from 102.3 to 62.5 (000) LE indicating that each worker produced much less in 1995/96 than he or she did five years earlier. In the meantime real wage bill increased by 124 per cent due partly to the dramatic increase in number of employees by 166 per cent. The wage to output ratio rose by 38 per cent over the whole period, indicating that companies' spending on labor rose from 3 piasters to 4 piasters for pound (LE) of output. The lower real wage rate must have adversely affected the social welfare of workers. Imports increased by 18 percent, while exports dropped by 43 per cent between 1993/94 and 1995/96.

Table 6.3
Recent Performance of Private Sector in Household Appliance Industry in Egypt

	1991/92	1992/93	1993/94	1994/95	1995/96	Ave91-96	Index 96, 91=100
Number							
Establishments	16	16	15	20	20	17	125
Employees	1800	4400	3500	4806	4791	3859	266
Million LE at constant 1991 prices							
Wages & Salaries	5.0	8.8	7.8	8.5	11.2	8	224
Output	184.1	172.2	145.1	212.7	299.6	203	163
Imports	NA	NA	2287.6	1180.8	2692.1	2054	118*
Exports	NA	NA	21.5	16.0	12.2	17	57*
Value added	49.5	22.8	55.8	70.3	109.3	62	221
Change in Number							
Establishments		0	-1	5	0		
Employees		2600	-900	1306	-15		
Percent Change							
Wages & Salaries		76.2	-11.1	8.6	31.7		
Output		-6.4	-15.8	46.6	40.9		
Imports		-	-	-48.4	128.0		
Exports		-	-	-25.3	-23.8		
Value added		-53.9	144.8	26.0	55.3		
Productivity Measures							
Wages/Output Ratio	0.03	0.05	0.05	0.04	0.04	0.04	138
Output/Worker (000LE)	102.3	39.1	41.4	44.3	62.5	58	61

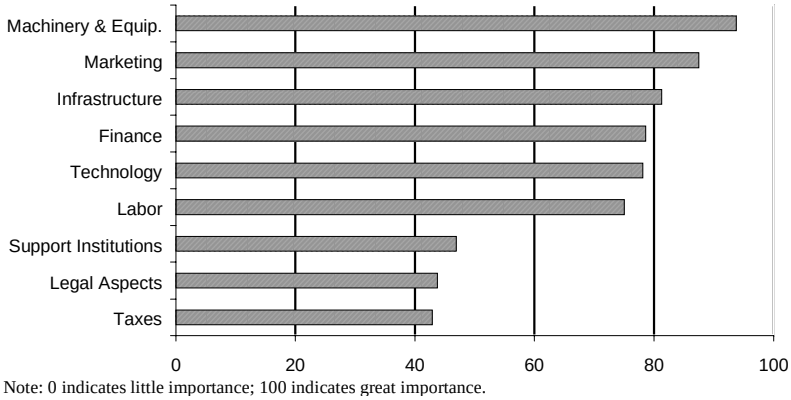
* Index of imports and exports base year 1993/94
Source: CAPMAS Output Statistics for Output, Value Added, number of workers & establishments
CAPMAS print out for Exports and imports provided for DEPRA

In 1996, exports stood at only 57% of their 1993/94 level, while imports increased by 18 per cent. Real output and real value added increased by 63 and 121 per cent, respectively, of their 1991/92 levels.

The household appliance industry was established in Egypt in the 1960s and consisted mainly of government-owned manufacturing facilities under licensing agreements with international firms (Ismail *et al.*, 1998). At that time, most basic components used in the production process were imported and little attempt was made to upgrade or develop products and their performance. Like today, the industry was also characterized by a strong local demand that could not be fully met by the production capacity, and imports became an important source of supplies for the country. The set-up and operation of the industry eventually led to the privatization of some firms. The resulting private sector participation in the household appliance industry eventually reached 59 percent of the industry by 1995/96 (Ismail *et al*., 1998). Nowadays there are about 20 firms in Egypt that dedicate their principal manufacturing activities to the production of household appliances. These firms are large in size, based on the number of employees. Some of the firms specialize in a certain product, such as refrigerators, and mainly differentiate the product in terms of quality (and hence price) or, as in the case of stoves, the fuel used (*viz.* gas or electric). Other companies manufacture a wide range of home appliances. Most companies manufacture products under their own brand names, although some small home appliances such as irons and food processors are produced under license with European or Asian companies and are sold under the name of the licensing partner. Many of the inputs are imported, especially various types of metal because the required grade or quality of the metal is not available in Egypt.

All of the companies interviewed as part of this study manufacture household appliances mainly for the Egyptian market, and they reported their exports to be less than five percent of total sales. While all company managers emphasized that domestic demand is strong and competition is based mainly on price, they also expressed a desire to export their products. Many managers added that given the opportunity, they would target export markets with characteristics similar to Egypt or with similar standards of living as Egypt as possible markets, and identified the African countries that are members of the COMESA trade agreement. However, it is questionable whether Egyptian firms would be able to compete in export markets, given that the technology they use is relatively low compared with that of their competitors. One reason for the low level of technology is that the current level of protection afforded by import tariffs has acted as a disincentive to upgrade technology, and a disincentive to export. Therefore, if Egyptian firms would like to compete in foreign markets without upgrading technology, they will need to find a niche market. If they upgrade their technology they would be better able to compete in a broader market.

Figure 6.3
Importance of Factors of Productivity to Household Appliance Companies



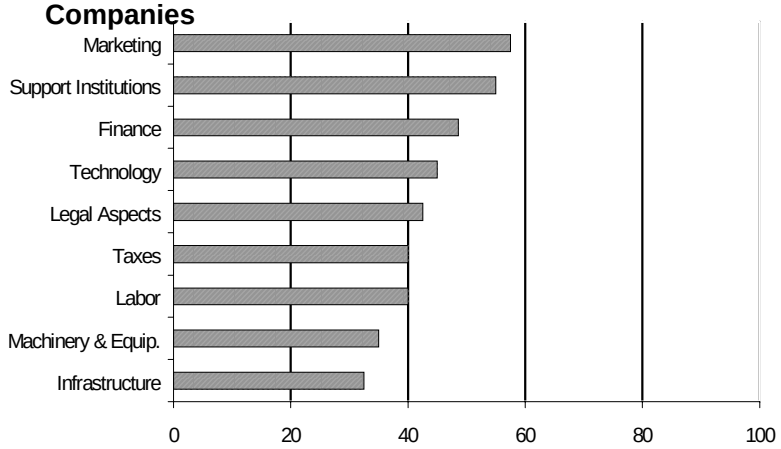
Note: 0 indicates little importance; 100 indicates great importance.

2. Overview of Challenges Faced by Household Appliance Companies

Interviews with managers of household appliance companies were conducted using the same questionnaire as that used for the software industry. Accordingly, the lead question focused on the overall *importance* of areas impacting on productivity and competitiveness. Figure 6.3 on the previous page shows a summary of the responses and indicates that the areas of machinery and equipment, marketing and infrastructure are of great importance, followed by finance, technology and labor. The areas of support institutions, legal and regulatory environment and taxes are of less importance to the productivity and competitiveness of the household appliance companies interviewed as part of this study.

Following an extensive discussion of individual areas, business owners and managers of the household appliance companies were also queried on the *challenge* of certain areas to successful business operations and future growth. Figure 6.4 shows that the areas of marketing and support institutions present the greatest challenge to successful business operations, followed by finance, technology and the legal environment. The area of marketing was ranked among the top two areas both in terms of importance to productivity and competitiveness and challenge to business operations and growth. These rankings suggest that the area of marketing requires further investigation for the household appliance companies interviewed in this study. The areas of machinery and equipment and infrastructure, which were ranked high in terms of importance, were ranked low in terms of challenge to business operations and growth. The combination of rankings for those two areas indicates that they are functioning well for the companies interviewed. Annex 6A presents details on the reasons underlying the challenges presented by individual areas, such as marketing, as perceived by the household appliance company managers and owners interviewed as part of this study.

Figure 6.4
Major Challenges Faced by Household Appliance Companies



Note: 0 indicates little challenge; 100 indicates great challenge.

D. Horticulture Industry

1. Recent Performance and Industry Characteristics

Horticulture includes fresh fruits, vegetables, cut flowers and plants, and is considered a promising sector for exports because of Egypt's natural competitive advantage in labor-intensive activities. It is also one of the promising exports with high value added. Although the overall export performance of the sector has been mixed in recent years, exports of citrus expanded by nearly 25 percent a year during 1994-97 and frozen vegetable exports increased by nearly 30 percent during that period (see Table 6.4). Some producers have recently made inroads in niche markets for certain high value added products such as table grapes and strawberries. Producers of other products have initiated investigations to expand cut flower exports to the Netherlands, where import demand is strong and shows no signs of weakening. Recent studies on Egypt's export potential, such as the Growth Through Globalization export sector review (GTG, 1999), identified fresh fruit, vegetables and processed foods as one of the five export sectors having the greatest potential in Egypt. Moreover, the American Chamber of Commerce (1999) cited fruits and vegetables as being one of the most promising product groups, occupying 16 percent of Egypt's cultivated land.

There are numerous agribusinesses in Egypt that export fruits and vegetables, but most companies interviewed as part of this study believe that there are 20 or so medium to large size companies in Egypt that produce mainly for export. These same companies actively export nearly all their production, especially fruits and vegetables. One of the reasons for the relatively high concentration of firms in the industry is that one of the main markets is Europe, which has seasonal quotas for imports of certain fruits and vegetables. These market “windows” are especially restrictive for high value added products such as table grapes, which enter the European market during the month of June. Because of the restricted access for this type of product, medium and large size firms are usually the only ones with the financial resources needed to export in such a limited time period. They are also the ones having the volume needed to make exporting financially worthwhile. Companies of these sizes also typically join producer associations or actively seek technical assistance from donor-sponsored projects because they are generally more organized than small-size firms. Another reason for the high concentration of firms is that many of the firms, regardless of their market, work on a volume basis. This strategy is especially true for fruits and vegetables.

The cut flower segment of the horticultural industry is quite different from other sub-sectors of the industry. There are few companies in Egypt that devote their efforts to cut flower production, and they sell mainly in the local market. While there is a strong demand in Europe for this product (especially in the Netherlands, which is one of the world's larger exporters and importers of cut flowers), flower growers choose to target the local market for several reasons. First, the domestic price is more stable and usually higher than in the export market, where flowers are sold in a wholesale market at an auction. Under the auction system prices fluctuate daily and often buyers make purchases on the basis of name recognition. In Egypt, flower growers sell directly to retail shops,

Table 6.4
Exports of Fruits, Vegetables and Cut Flowers, 1994-97
('000 US$ and percent)

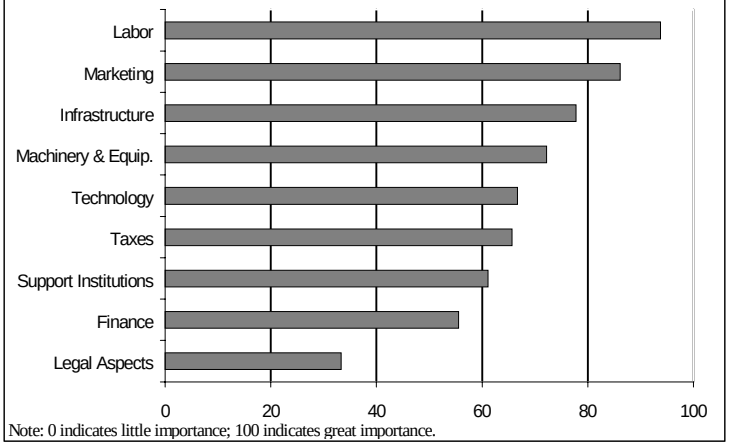
	1994	1995	1996	1997	Ave 1994-97	1995	1996	1997
Thousands US$						***Annual percentage change***		
Total Fruits (SITC 057)	**23,124**	**25,282**	**25,875**	**24,720**	**24,750**	**9.3**	**2.3**	**-4.5**
of which:								
Oranges	8,360	13,217	17,358	14,118	13,263	58.1	31.3	-18.7
Citrus other than oranges	3,589	3,008	2,028	3,472	3,024	-16.2	-32.6	71.2
Grapes	618	468	913	499	625	-24.3	95.1	-45.3
Figs, fresh or dried	58	7	2	66	33	-87.9	-71.4	3200.0
Edible nuts fresh, dried	1,180	606	507	1,251	886	-48.6	-16.3	146.7
Other fruit a/	9,319	7,976	5,067	5,314	6,919	-14.4	-36.5	4.9
Total Vegetables (SITC 054)	**117,874**	**201,187**	**159,920**	**135,921**	**153,726**	**70.7**	**-20.5**	**-15.0**
of which:								
Potatoes	26,599	102,115	79,909	41,249	62,468	283.9	-21.7	-48.4
Legumes	2,019	10,188	8,615	9,004	7,457	404.6	-15.4	4.5
Tomatoes	5,835	1,862	1,555	1,297	2,637	-68.1	-16.5	-16.6
Other fresh vegetables	29,832	25,510	17,876	18,253	22,868	-14.5	-29.9	2.1
Frozen vegetables	8,619	10,574	10,929	17,495	11,904	22.7	3.4	60.1
Veg. products, roots, tubers	2,088	2,255	1,813	1,946	2,026	8.0	-19.6	7.3
Total Fruits & Vegetables (SITC 057+ 054)	**140,998**	**226,469**	**185,795**	**160,641**	**178,476**	**60.6**	**-18.0**	**-13.5**
Cut Flowers (SITC 2927)	**599**	**481**	**338**	**183**	**334**	**-19.7**	**-29.7**	**-45.9**

a/ Includes melons, stone fruit, berries, dates, avocados and other fresh fruit.
Source: UNCTAD/WTO, PC TAS CD ROM version.

hotels or other businesses, so there is no middleman, and the price is higher than in a wholesale market. Second, flower growers would have to change their production scheme to compete in an export market, which requires a significant amount of new investment. Cut flower companies currently grow several varieties of a certain flower, say roses of many colors that differ in size of stem length and bud, which can be widely distributed in the Egyptian market. To export successfully to Europe, however, the companies would have to concentrate on a particular variety of roses, say a red sweetheart rose, in order to meet volume requirements and become competitive. Third, investment for an export market requires an entire cold chain to be in place so that the flowers arrive at their destination in a condition that is competitive with other flowers sold in the export market. At present, there are many breaks in the cold chain because the local market does not require it, since distances traveled are short and refrigerated trucks are adequate for the local market. Given the peculiarities of the cut flower industry, many Egyptian growers are investigating the export market with caution before making the needed large investments, and also to ensure that they are able to maintain their domestic market shares. The interviews conducted as part of this study revealed important challenges for horticulture companies and provided insights on the productivity and competitiveness of this industry.

2. Overview of Challenges Faced by Horticulture Companies

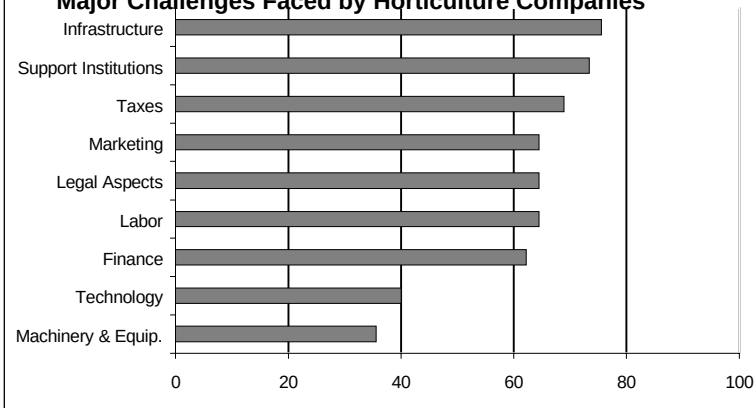
Figure 6.5
Importance of Factors of Productivity to Horticulture Companies



Note: 0 indicates little importance; 100 indicates great importance.

To maintain consistency throughout the study, the same questionnaire was used to interview horticulture companies as software and household appliance companies. The summary queries presented in Figure 6.5 indicate that the three areas that are considered the most important to the productivity and competitiveness of horticulture companies are labor, marketing and infrastructure. Other areas such as legal aspects, finance and support institutions appear to have less influence on the productivity and competitiveness of the firms interviewed. After a detailed discussion of each of the nine areas under review, firms were asked to rank each area in terms of challenge to business operations and growth. The scores, shown in Figure 6.6, indicate that infrastructure, support institutions and taxes present the greatest *challenge* to business operations and growth. The combination of the scores indicates that the area of infrastructure merits special attention since it appears at the top of the two scales on importance to productivity and challenge to business operations and growth. However, firm managers' views about support institutions and taxes indicate that these areas also deserve investigation.

Figure 6.6
Major Challenges Faced by Horticulture Companies



Note: 0 indicates little challenge; 100 indicates great challenge.

E. Strategy and Action Plan

Private enterprises are playing an increasingly important role in the growth and development of Egypt, and the Government continues to adopt policies to create an environment that is conducive to the development of the private sector, including limiting public sector involvement in the economy. The Government and international donors are supporting the development of the country's private sector by helping businesses undertake financially viable projects and by mobilizing domestic and external resources in such a way as to promote the efficient use of resources. The main goals at the enterprise level include increased productivity, greater competitiveness and lower costs of doing business in a wide range of activities.

The overall strategy proposed for private sector development is to achieve the aforementioned objectives through a combination of policy measures and technical assistance programs that will reduce or eliminate the constraints on private sector development in Egypt. The recommended action plan is intended for businesses operating in the software, horticulture and household appliance sectors, but can easily be extended to other sectors and industries in the economy. It is designed to strengthen the responsiveness of business owners and managers to changing market signals, provide support to specific weaknesses identified in particular sectors of the economy, and strengthen the capacity of the Government institutions to support business activity. To be effective, the action plan needs to be viewed as an integral part of the country's economic policy reforms in the monetary and fiscal sectors, infrastructure development, labor market reforms, and legal and regulatory reforms. The recommendations presented in Boxes 6.1-6.3 aim to support the opening up of Egypt's domestic and foreign markets as a result of the government's economic reform program, its membership in WTO and new regional and bilateral trade agreements.

Box 6.1
Recommendations to Improve Productivity and Competitiveness of Software Companies

Existing Challenge	Recommended Actions	Expected Impact / Benefits
Marketing (Score = 88): 1. Software industry is not developing to full potential due to absence of overall promotion strategy 2. Sales potential is limited due to absence of personnel with adequate skills or experience in software industry 3. Insufficient distribution channels and exposure of products and services	• Develop a long-term strategy, using India and other successful countries as example with inter-Ministerial Committee and EEA • Provide technical assistance in the field of marketing software • Assist companies to develop marketing plans, including providing the financial support so that companies participate in international and regional trade shows	• Will help to develop software industry in an organized and strategic way following examples of successful countries and will positively impact on areas other than marketing • Will increase sales and expand exports • Will organize companies' strategies, open new channels of distribution and expose Egypt as a software industry on regional and international basis
Finance (Score = 74): 1. Unavailability of short-term and long-term funds due to bank unwillingness to finance intangible assets 2. Lack of understanding by financial institutions of software business 3. Bank officials lack necessary skills to evaluate software proposals	• Develop long-term financial strategy to promote software industry, including e-commerce • Providing training to bank personnel on importance intangible assets of company • Provide training to decision-makers in financial institutions on how to evaluate software project proposals	• Will encourage new investment and expand software industry • Will improve understanding of software industry • Will increase number of software project proposals and generate investment in sector
Labor Aspects (Score = 70): 1. Inability to find qualified technical employees due to inadequate university training 2. The need for highly specialized employees for scientific or linguistic applications 3. High employee turnover	• Promote continual dialogue between the private sector and universities • Promote investigation of university curriculum in the United States and Europe and its possible application to Egypt • Offer specialized training in Arabic language programming and scientific programming	• Industry needs will be met with formal training • Will introduce new computer operating system in technical training and will afford more career options • Will emphasize specialty knowledge in area that seems to have market niche and promote longer term employment with companies
Legal Aspects (Score = 60): 1. Software piracy and the weak enforcement of the intellectual property rights law 2. Insufficient punishment for copyright infringement 3. Lack of awareness on the part of users to use original software	• Improve the technical capabilities of the enforcing agencies and conduct more raids for illegal software • Increase penalties for copyright infringement • Implement wide-spread media campaign to raise awareness of need to use original software	• Will make efforts to combat use of illegal software more efficient and will reduce piracy rates • Will discourage use of illegal software • Will raise awareness and reduce piracy rates

(cont'd)

Box 6.1
Recommendations to Improve Productivity and Competitiveness of Software Companies (cont'd)

Existing Challenge	Recommended Actions	Expected Impact / Benefits
Support Institutions (Score = 58): 1. Insufficient assistance by both Government and the private sector agencies to support software industry 2. Inadequate technical assistance tailored to industry	• Increase involvement by Government and private sector agencies involved in software and information technology promotion • Update IDSC Software Company Directory on a regular basis • Provide technical assistance, especially in marketing • Fund research on Indian and USA software industries with possible application to Egypt	• Will support industry and increase revenues and exports • Will provide companies with information on other companies to form strategic alliances, and will provide Government with planning statistics • Will help to determine overall strategy to develop software industry in Egypt
Infrastructure (Score = 48): 1. Excessive costs of telephone service, including international leased lines and satellite lines	• Continue to promote competition in communication sector	• Will lower costs of production and improve competitiveness
Machinery & Equipment (Score = 46) 1. Trying to keep up with India in terms of having most recent hardware	• Investigate technology parks in India with possible application to Egypt	• Will improve competitive position of Egyptian software companies relative to Indian companies
Taxes (Score = 44): 1. Import taxes and inspections 2. Export fees	• Considering lowering taxes on key inputs and provide training to Customs officials on assessment of CD ROMs • Consider removing export fees on CD ROMs	• Will lower costs of production and save time in terms of processing shipments, and will discourage lost sales • Will lower costs of production and increase profits
Technology (Score = 38) 1. In a limited number of cases, expensive training **2. High-tech on-line data systems or satellite transmission currently not available in Egypt**	• Offer affordable training courses of various lengths • Continue to promote competition in telecommunications sector	• Will ensure that a wide range of software companies and start-up companies have equal access to training • Will promote competition

Notes: Scores are based on the degree of challenge that a particular area presents to business operations and future growth; for details on interviews, see Annex 6A.

Box 6.2
Recommendations to Improve Productivity and Competitiveness of Household Appliance Companies

Existing Challenge	Recommended Actions	Expected Impact / Benefits
Marketing (Score = 58): 1. Absence of information on demographics and supply/demand balances 2. Absence of information to determine whether or not Egyptian household appliances would be accepted by consumers in potential export markets, namely COMESA member countries	• Establish market information system with reliable data on demographics and supply/demand balances in local and potential export markets • Conduct detailed market demand study for feasibility of exporting household appliances to COMESA markets	• Will provide managers with information tools necessary for planning so that certain markets can be targeted • Will provide market research necessary to decide whether to export to new market and will help in marketing strategy
Support Institutions (Score = 55): 1. No coordinated effort among businesses 2. Perceived absence of support from both private sector and Governments	• Encourage membership in business associations • Closely tied with recommendations for marketing: develop complete and reliable information system that is updated on a regular basis • Enlist assistance, especially from foreign experts, in all types of management: production, financial, marketing and personnel	• Will encourage linkages among firms and initiate idea of exporting to new foreign markets • Will help develop marketing strategy and improve production and planning processes • Will make production processes and management more productive and efficient
Finance (Score = 49): 1. High interest rates cited at 12 - 17% that raise costs of production relative to competitors 2. Perceived inadequacy of bank officials in evaluating loan proposals, thereby stunting investment and preventing expansion	• Explore ways to lower interest rates or offer low-cost loans through donor programs • Offer training to bank personnel, preferably abroad, to evaluate loan proposals • Introduce concept of venture capital and risk management to banking sector to expand exports	• Will lower financial costs and make Egyptian producers more competitive in global markets • Will improve processing of loan proposals and possibly increase investment • Will possibly increase investment and exports
Technology (Score = 45): 1. Lack of knowledge in determining optimal production processes and impartial and unbiased outside advice 2. Lack of knowledge in developing product design to compete against European imports **3.** High costs of financing new technology	• Through support institutions, offer workshops or seminars to improve management skills in optimizing production, marketing, and developing technology • Through support institutions, hire industry experts to assist in product design • Investigate ways to lower costs of financing	• Will make companies more efficient and productive • Will enable companies to compete more effectively against European imports and create new product designs for export markets • Will lower financial costs and make companies more competitive
Legal Aspects (Score = 43): 1. Courts take too long to settle commercial disputes	• Improve court system so that disputes are settled within a reasonable time frame	• Will improve business operating environment and make companies more productive
Taxes (Score = 43): 1. Export fee of 1% hinders exports	• Remove fee	• Will promote exports and reduce operating costs of companies

(cont'd)

Box 6.2
Recommendations to Improve Productivity and Competitiveness of Household Appliance Companies (cont'd)

Existing Challenge	Recommended Actions	Expected Impact / Benefits
Labor (Score = 40): 1. Difficult to dismiss unproductive employees 2. Shortage of skilled and technical workers, managers and those with marketing skills 3. Lack of hands-on practical experience of workers	• Revise Labor Code to enable dismissal of unproductive workers • Review educational system to improve technical base with hands-on experience	• Will increase productivity • Will raise educational level of workforce, increase productivity and improve competitiveness

Notes: Scores are based on the degree of challenge that a particular area presents to business operations and future growth; for details on interviews, see Annex 6A.

Box 6.3
Recommendations to Improve Productivity and Competitiveness of Horticulture Companies

Existing Challenge	Recommended Actions	Expected Impact / Benefits
Infrastructure (Score = 76): 1. Limited cargo space blocks small companies from exporting and raises costs for exporters 2. Misuse in loading produce on planes leads to spoilage and rejection during quality control inspections 3. Cooling facilities are not cold enough and lead to spoilage and poor quality	• Privatize air shipping operations • Expand cooling facilities in terms of volume and improve temperature • Implement system for loading produce within reasonable time	• Will open air freight facilities to competition and offer more choices to exporters at competitive costs • Will reduce spoilage, improve quality and expand exports
Support Institutions (Score = 73): 1. Perceived lack of support for small and start-up companies 2. Worry over EU quota system and new EU-Egypt trade agreement	• Make special effort to include small and start-up companies in donor-assisted projects • **Continue to negotiate increased EU quotas, especially for promising products like strawberries**	• Will promote small business development and increase private sector participation in agriculture sector • Will expand exports
Taxes (Score = 69): 1. Perceived unfair assessment of large swings in profit and loss due to weather 2. Overall tax burden is perceived as greater than that of competitors in foreign countries	• Investigate tax code with special application to agriculture, such as income averaging	• Will help to smooth out tax burden, improve cash flow and improve competitiveness
Marketing (Score = 64): 1. Lack of timely and reliable data on production and yield both in Egypt and foreign markets **2.** Technical information on new varieties, chemicals and other inputs specific to high value-added products such as cut flowers	• Improve collection and dissemination of production and yield data • Encourage associations to regularly maintain information on inputs, especially for high value added products	• Will improve planning and make companies more productive and competitive • Will keep companies up to date with latest information to improve competitiveness and productivity

(cont'd)

Box 6.3
Recommendations to Improve Productivity and Competitiveness of Horticulture Companies (cont'd)

Existing Challenge	Recommended Actions	Expected Impact / Benefits
Legal Aspects (Score = 64): 1. Lengthy and time-consuming approval process for land registration and land permits **2.** Lengthy process to approve new seed varieties	• Review land registration and permit process with view of combining steps to reduce time • Review approval process for imports of new seeds	• Will enable companies to use land as collateral and expand investment • Will save time and increase productivity • Will allow producers to respond more quickly to market needs for new varieties
Labor Aspects (Score = 64): 1. Lack of managerial skills, and workers with technical skills	• Design and implement training course for managers through producer association	• Will improve productivity and competitiveness

Notes: Scores are based on the degree of challenge that a particular area presents to business operations and future growth; for details on interviews, see Annex 6A.

References

American Chamber of Commerce in Egypt, 1999, *Egypt: The Stable Emerging Market*, April.

American Chamber of Commerce in Egypt, 1998, *Information Technology in Egypt*. August .

American Chamber of Commerce in Egypt, 1996a, *A Comparative Study of Egypt, Jordan, Syria, Lebanon, Palestine & Israel*, November 1996.

American Chamber of Commerce in Egypt, 1996b, "Recommendation to Eliminate Impediments to Investment and Doing Business in Egypt", mimeo, June 1996.

American Chamber of Commerce in Egypt, 1994, "Impediments to The Private Sector Development In Egypt", mimeo, October.

Bernard, A. B., and C. I. Jones, 1996, "Productivity Across Industries and Countries: Time Series Theory and Evidence", *Review of Economics and Statistics* 78:135-146.

Business Software Alliance (BSA), 1999, Newsletter, Issue No. 1, April 1999.

Cabinet Information and Decision Support Center (IDSC), 1997, *Software Companies in Egypt 1997.*

Chambers, R. G., 1988, *Applied Production Analysis*, Cambridge, England: Cambridge University Press.

Costello, D. M., 1993, "A Cross-Country, Cross-Industry Comparison of Productivity Growth", *Journal of Political Economy* 101: 207-222.

Diewert, W. E., 1992, "The Measurement of Productivity", *Bulletin of Economic Research* 44: 163-198.

Dollar, D., W. Baumol, and E. N. Wolff, 1988, "The Factor Price Equalization Model and Industry Labor Productivity: an Empirical Test Across Countries", in R. C. Feenstra, ed., *Empirical Methods for International Trade*, Cambridge, MA: MIT Press.

Fawzy, S., 1998, "The Business Environment in Egypt", Working Paper No. 34, The Egyptian Center for Economic Studies.

Growth Through Globalization (GTG), 1999, "Egyptian Export Sector Review", GTG Working Paper, May.

Harrigan, J., 1997a, "Technology, Factor Supplies, and International Specialization: Estimating the Neoclassical Model" American Economic Review 87(4): 475-495.

Harrigan, J., 1997b, *"Cross-Country Comparisons of Industry Total Factor Productivity: Theory and Evidence"*, Federal Reserve Bank of New York Research Paper no. 9734.

Harrigan, J., 1999, "Estimation of Cross-Country Differences in Industry Production Functions" Journal of International Economics (forthcoming).

Harvard Computing Group, 1999, *Sector Assessment of the Egyptian Software Industry*, February.

Ismail, A.F., *et. al.*, 1998, *"Competitiveness Study for the Household Appliances Cluster: Building Regional Competitive Advantage in the Middle East, Phase I,"* Final Report, March.

Jorgenson, D. W., 1990, "*Productivity and Economic Growth,"* in: E. R. Berndt and J. E. Triplett, eds., *Fifty Years of Economic Measurement*, (University of Chicago Press, Chicago).

McHorney, C.A. *et al.*, 1993, *"The MOS 36-Item Short-Form Health Survey (SF-36): II, Psychometric and Clinical Tests of Validity in Measuring Physical and Mental Health Constructs"*, *Medical Care*, Vol., No. 3: 247-263.

Nathan Associates, 1999, "*Annex: Egypt Export Enhancement Project: Economic Analysis of Five Industries*", report submitted to USAID, Cairo, Egypt, February.

Annex 6A DETAILS OF FIRM-LEVEL INTERVIEWS: FACTORS IMPACTING PRODUCTIVY AND COMPETITIVENESS

The following sections of this Annex present details gathered through firm-level interviews of the software, home appliance and horticulture industries that complement the summary information presented in Chapter 6. The information focuses on individual factors relating to productivity and competitiveness, as perceived by the software company managers and owners that were interviewed as part of this study. The layout of the material follows the format of the interview guidelines that are presented in Annex 6C. A summary of the recommendations discussed below is provided in Boxes 6.1-6.3 in Chapter 6, together with a synopsis of the constraints in each area and expected impacts of the recommendations if implemented.

A. Individual Factors Impacting Productivity and Competitiveness of Software Companies

1. Marketing

Marketing is an important part of doing business in any type of business, especially in the Egyptian software industry that is young and growing rapidly. Because of these general characteristics of the software market in Egypt, it is not surprising that companies scored the area of marketing high (88 on a scale of 0 to 100[1]) in terms of presenting a challenge to business operations. This result makes this area the most important one of the nine areas under review. The area of marketing also ranked the highest in terms of importance to productivity and competition, with a score of 98 (out of 100).

The marketing strategy of most companies that were interviewed is to offer high-quality products and services at competitive or better prices using similar or better technology compared with their competitors. Promotion of products and services produced by Egyptian software companies encompasses various forms of activities: electronically on the Internet, through printed media, and participation in trade shows in Cairo and abroad.

One of the key elements in a company's marketing plan is the *ability of staff* to undertake the selling and promotion of products and services. For 70 percent of the companies interviewed, this element is lacking or inadequate. The general reasons that were cited were the absence of personnel having work experience in the field of marketing or the lack of understanding of the software industry and therefore the inability to promote it.

[1] Scores were weighted according to the number of responses for each degree or importance or challenge, then normalized on a scale of 0 to 100. See Appendix D for details on the summary query on which scores are based.

The managers or owners who cited no difficulty with this area generally assume the responsibility themselves for marketing and are satisfied with their personal performance.

The major challenges for software firms associated with marketing….

- Staff with inadequate marketing skills due to lack of work experience or knowledge of software industry
- High costs associated with advertising
- Insufficient distribution channels

Recommended actions…

- Establish inter-Ministerial Committee with participation of private sector to lay out and implement industry strategy, based on recent sector analyses comparing Egypt with India and other countries
- Help individual companies develop a marketing plan, including funding their participation in international trade shows in the region and the Far East

When discussing the promotion of software products or services through *media channels* such as newspapers, radio, the television and Internet, 63 percent of firm managers indicated that this area is inadequate and has a negative impact on their business operations and growth. High costs were commonly cited as the problem in advertising, and that more bilingual advertising (Arabic/English) is needed than is currently used. One-half of the software company managers also indicated that there are *insufficient distribution channels* through which to sell their products or services. Two managers commented on the development of joint ventures or relationships with foreign firms, especially with those in the United States, to develop software and transfer technology rather than simply re-selling it in Egypt. The case of the development of the software industry in India was also mentioned as a model for Egypt. Other areas that were investigated in marketing were *market information*, which was cited by 40 percent of the firm managers as being inadequate and hindering current business operations and future growth, and *packaging and promotional materials*, which presented a challenge to only 13 percent of the managers interviewed.

Managers were also queried on actions that they themselves or the Government could take to improve the marketing of software products and services. Several firms called for the Government to develop an overall long-term strategy to promote the software industry, and specifically to investigate in further depth the successful models of the Indian and United States software industries and their possible applications to Egypt. Further investigations uncovered a recent sector assessment for software (Harvard Computing Group, 1999) that compares Egypt's software industry with those in India, Israel, Ireland and Pakistan and whose major findings coincide with those made in this report. Also, the Egyptian Exporters' Association (EEA) is developing a strategy for the sector as part of a private-sector initiative to promote the software industry. Given these studies, it is therefore recommended that an inter-Ministerial committee be established with the participation of the EEA to develop an action plan and implement it.

Other suggestions focused on the need for a long-term process of transferring technology by developing linkages with foreign firms rather than supporting short-term seminars. Such linkages would have a good chance of ensuring success of an Egyptian software industry in the long run, and is one of the keys to the “incubator approach” to business

development whereby links are created among industry, government and educational institutions to promote a sector. Other managers commented on the need to learn how to export software, and that they need exposure to do so with participation in industry trade shows such as GITEX in Dubai and COMDEX in the Far East that could be funded by the Government. Plans for the GITEX Cairo 2000 are currently underway. One company manager suggested that the software market be regulated, e.g., that developers be licensed by a committee jointly established by the private and public sectors to prevent outdated technology from entering the market. This comment elicited a lively discussion on the effect that licensing would have on limiting competition, which evidently is growing in Egypt, and whether or not the market should determine the type of software sold rather than a public or private agency, as in a free market and competitive economy.

2. Finance

Business communities in industrialized and developing countries alike often voice complaints about the limited access to finance and its high cost. In Egypt software company managers ranked finance as their second most important concern of the nine areas investigated in the survey and scored it at 74 on a scale of 0 to 100. In terms of importance to productivity and competitiveness, this area was ranked fifth with a score of 83 (out of 100). Business owners were queried on whether the lack of short-term finance (to be used for raw materials and intermediate goods) and long-term finance (to be used for new projects and capital equipment) impeded business operations and growth. Eighty percent of the software company managers interviewed indicated that the unavailability of long-term finance hinders the productivity and competitiveness of their business, while nearly as many managers (70 percent, or 7 out 10) indicated that the lack of short-term finance is also problematic to business productivity and competitiveness. Disaggregated data show no correlation between firm size and degree of difficulty in obtaining short and long-term finance.

The major challenges for software firms associated with finance….

- Unavailability of short-term and long-term finance due to bank unwillingness to finance intangible assets
- Lack of understanding by financial institutions of software business
- Inability of banks to evaluate software project proposals

When queried about the details on difficulties in obtaining financing of any length, nearly all managers who voiced problems with financing stated that financial institutions prefer to finance hardware rather than software because hardware is a tangible product. Managers also complained vigorously that banks simply do not understand that the core of the software industry is built on human skills that are developed and translated into software programs or computer programming services and then sold. Another common complaint was that the decision-makers in financial institutions have neither the knowledge nor tools to evaluate intellectual property nor do they believe it important as an intangible asset for companies in the software business. Software company managers stated that obtaining long-term financing to expand investment is simply not feasible in Egypt, and that many of them had to either postpone business expansion until a later date or use personal funds to finance new projects. The software managers also commented on

the interest rates of loans, which they believe to be high (14 to 16 percent was cited), and expressed no problem with bank charges or other payment terms.

The main recommendations made by managers focused on improving the trust of the banking sector vis-à-vis software companies, and attempting to change the way of thinking of decision makers so that software will be viewed as an important intangible asset. Managers also recommended that banks provide training to decision-makers on ways to evaluate software project proposals. They also commented on the need for financing institutions with the support of the Government to make funds available for technology-related projects such as software, and to trust the Egyptian market that is moving rapidly towards high-technology and internet-based electronic commerce.

Recommended actions to improve financing for software companies….

- Develop a financial strategy to promote the software industry, including e-commerce
- Providing training to decision-makers in financial institutions on how to evaluate software project proposals
- Promote the importance of intangible assets such as software

3. Labor

The major challenges for software firms associated with labor….

- Inability to find qualified technical employees due to inadequate university training
- The need for highly specialized employees for scientific or linguistic applications
- High employee turnover

Recommended actions…

- Promote continual dialogue between the private sector and universities
- Promote investigation of university curriculum in the United States and Europe and its possible application to Egypt
- Offer specialized training in Arabic language programming and scientific programming

Software business owners or managers consider labor to be crucial to enterprise productivity and competitiveness (and ranked it 95 on a scale of 0 to 100), since the software industry depends to such a great extent on human capital. However, managers perceived the area of labor less of a challenge when compared with marketing and finance, although they scored it the third highest of the nine areas at 70. Finding qualified labor is an important issue for the majority of software managers (60 percent), especially at the technical level. The managers that voiced concern about finding qualified technical employees related their difficulties to what they perceive as shortcomings in university or technical school training (e.g., syllabus that are out of date or training that is too theoretical). They also stated that many Egyptians are recruited by companies to work in the United States or in other Middle Eastern countries, and that employees change jobs often (high turnover) throughout the industry. Insufficient work experience was also cited as a reason for difficulty in finding qualified staff.

One company whose business is based on the UNIX platform explained that while it is fairly easy to hire data base programmers in Egypt, it is difficult to find programmers with experience or training in UNIX. The owner stated that students in the United States and Europe have the opportunity to learn to develop programs under UNIX at nearly all

universities, whereas in Egypt students learn to program under INTEL and Windows-based technology. Consequently, companies that use UNIX-based software typically allocate a great deal of their operating budgets to scientific training to bolster productivity and compete. The owner of this company also commented on the growing trend in the software market towards the need for specialized technical skills, and noted that several years ago more general skills were required.

Software managers were also asked to comment on ways to improve employee performance and productivity. All companies agreed that a combination of improved educational training and applied work experience is necessary. Only three managers perceive that better foreign language skills would improve their competitiveness and productivity, while two of those same managers also believe that better work habits would boost productivity. One manager believes that an improved work environment would be beneficial. No manager related salaries to performance, although several commented that many employees leave Egypt to work in Saudi Arabia and the United Arab Emirates where the salaries are reported to be much higher than in Egypt. They also commented that nowadays it seems fashionable for software developers to work outside of Egypt. The cause of high employee turnover could be attributed to the movement outside of Egypt, or to movement within the industry. In the United States, high turnover is characteristic of the software industry, where reportedly some employees change companies every few months, especially in Silicone Valley in California.

When asked to relate wages to output, 60 percent of respondents (6 out of 10) stated that wages were sufficient, 10 percent stated that if wages were higher then output would be higher, and 30 percent stated that wages are not related to output. Managers were also asked to comment on the Labor Code and the effect of its key provisions on productivity and output. The majority of business owners voiced the opinion that the Code is not a constraint on business. However, three managers commented on the difficulty they have encountered in dismissing employees, which is curious given the high turnover of employees in the software industry. One large company, a leader in the development of Arabic software, believes that job satisfaction is a key to finding and maintaining employees. That company offers many social benefits and a salary incentive program tied to productivity and creativity.

When queried on recommendations to improve challenges related to labor, managers commented on the need for universities to update their curricula and to follow those in the United States and Europe. They also believe it necessary to offer fields of specialization, in addition to programs on general software development or information technology skills. Most companies had no suggestions on how to improve the issue of high employee turnover and did not believe that increased salaries would solve the problem. During a discussion about a topic unrelated to turnover, one business owner commented on the perceived need to license software programmers to curb competition in the local market. That owner believes that the private sector should be responsible for setting criteria and deciding who obtains a license, rather than allowing market forces to set parameters for the types of software sold on the market and hence the free determination of the types of programmers working in Egypt. Licensing would only serve

to restrict competition and regulate the market, which is clearly not a viable recommendation, given the fact that Egypt needs to move forward in the field of information technology by reacting to local and international market forces. Other comments were about revising the labor code to more easily dismiss employees who are not working as productively as expected.

4. Legal Aspects

Software company owners and managers indicated that the legal environment poses a moderate challenge to their businesses, and ranked this area as the fourth of the nine areas investigated with a score of 60 (on a scale of to 100). They ranked legal aspects as being somewhat important to their businesses, and ranked it seventh out of nine areas with a score of 68. The challenge faced by the one-half of the software companies that reported problems with the legal system is software piracy and enforcement. The two companies that use UNIX platform commented that piracy is not a problem for their businesses since the machines they use provide the security to prevent illegal copies. Managers commented on the need for the new intellectual property rights law and the even greater need to enforce it and to make punishment for copyright infringement stronger than at the present time. Comments also focused on the general lack of understanding the importance of using original software by computer users, and the widely accepted practice of ignoring copyrights. The companies that voiced this complaint stressed that software piracy causes huge losses of investment and resulted in one company nearly going out of business. Piracy also discourages additional investment and start-up companies. Other areas that were investigated related to the settlement of commercial disputes. Fifty percent of the managers commented that the court system is too slow but reported that adequate legal representation is available at an acceptable cost.

The major challenges for software firms associated with the legal environment ….

- Software piracy and the weak enforcement of the intellectual property rights law
- Insufficient punishment for copyright infringement
- Lack of awareness of users of the need to use original software

Recommended actions…

- Improve the technical capabilities of the enforcing agencies and conduct more raids
- Increase penalties for copyright infringement
- Implement wide-spread media campaign to raise awareness of need to use original software

Managers made recommendations to improve the legal environment and focused on the issue of piracy and copyright enforcement. Even though the situation is better than three years ago, two managers commented, there are many improvements to be made.[2] They suggested that the Government implement an awareness campaign through mass media

[2] According to the Business Software Alliance (BSA, 1999), which promotes worldwide anti-piracy initiatives in Egypt through its Middle East Chapter, in 1998 the special Anti-Piracy Unit of the Police conducted 63 raids against computer resellers. The Unit seized over 21,000 compact disks and 51,000 illegal software programs that were loaded onto personal computers. BSA estimated Egyptian piracy rates at 85 percent for 1997, impacting on the productivity of firms in terms of lost wages and jobs and on competitiveness due to the detrimental effects on Egyptian software developers relative to their competitors.

(e.g., newspaper, television and radio) to promote the use of original software and to warn that persons or companies caught using illegal software would be penalized. Suggestions were also made to improve the technical abilities of the enforcement agency to facilitate its work and to enable an increased number of investigations of suspect businesses or users.

5. Support Institutions

The scores assigned to public and private sector support institutions (e.g., government agencies and private sector business associations that offer services and promote private sector development) in terms of importance and challenge to productivity and competitiveness were identical (58 on a scale of 0 to 100). However, the rankings differed when compared with the other areas investigated. In terms of importance, software company managers and owners ranked this area as not important (in eighth place out of nine places), but ranked it as somewhat of a challenge (in fifth place). When queried on the adequacy of Government support institutions, managers and owners cited the need for greater involvement by the Government to promote the industry especially by the IDSC and Regional Information Technology and Software Engineering Center (RITSEC). The Software Engineering Institute, recently developed with the support of Motorola in cooperation with RITSEC and the Regional Information Technology Institute (RITI) also seems to be in a favorable position to offer support. Curiously, no software company mentioned support organizations such as the Egyptian Software Association (ESA), the Egyptian Society for Computer Companies (ESCC), the Egyptian High Tech Association (EHTA) or the Internet Society of Egypt (ISE). Managers indicated that technical assistance in the area of market research offered by support institutions would benefit productivity and competitiveness. The request for market research supports the previous finding that the area of marketing presents the greatest challenge to businesses and that this area is also the most important in terms of productivity and competitiveness.

The major challenges for software firms associated with support institutions….

- Insufficient support by both Government and the private sector to support software industry
- Inadequate technical assistance tailored to industry

Recommended actions…

- More involvement by Government agencies involved in software and information technology promotion
- Updated IDSC Software Company Directory on a regular basis
- Technical assistance in marketing, foreign trade fairs
- Research on Indian and USA software industries with possible application to Egypt

All software company managers and owners believe that Egypt's participation in international and multilateral trade agreements will benefit their companies, and they made particular reference to the WTO. They feel that the WTO will open the Egyptian market more to foreign direct investment, afford their companies increased exposure in international markets and remove obstacles to trade. Oddly enough, no mention was made of the intellectual property rights requirement under the WTO.

Recommendations were made on the need for more research in the field of information technology and the possible creation of a technical institute to offer training in the discipline of software development. Managers called for active involvement by the IDSC that could be initiated by updating its directory of software companies. In addition to the request for technical assistance in market research, company managers also expressed the need for specialized industry consultants, funding for their participation in trade fairs overseas and research on the Indian and United States software market development strategy with possible application to Egypt.

The major challenges for software firms associated with infrastructure ...

- Excessive costs of telephone service, including international leased lines and satellite lines

Recommended actions…

- Attempt to cut costs of telephone services to lower operating costs so that Egyptian software companies can more readily compete with those in Israel and India

6. Infrastructure

For most types of industries infrastructure refers to a broad range of services that usually encompasses communication networks, transportation, power and water. For software companies infrastructure focuses on communication networks, and in particular the number and speed of telephone lines to access the Internet and verbally communicate with customers in the local, regional and international markets. Many companies use regular telephone service and supplement it with international leased lines, satellite telephone lines and cellular telephone service. Within these parameters, infrastructure appears somewhat important to software companies with a score of 70 (on a scale of 0 to 100) and does not appear to present a great challenge to productivity and competitiveness with a score of 48. Both scores according to importance and challenge place the area of infrastructure towards the bottom of the scale in the sixth (out of nine) place.

All company managers stated that the number of phone lines is adequate and 70 percent of respondents feel that their speed is sufficient. All managers except two stated that the cost of telephone service is excessive, especially that for leased lines and satellite lines. Managers explained that the high cost of telephone services raises their operating costs to a level that will not permit them to compete with software developers in India and Israel, and that high costs prevent expansion. The obvious recommendation is to cut costs and improve services so that operating costs will fall and in turn improve competitiveness of Egyptian software companies compared with their foreign competitors.

7. Machinery and Equipment

Machinery and equipment refers to hardware for the software industry, and it was ranked as being important (88 on a scale of 0 to 100 and in fourth place out of nine places) to productivity and competitiveness. In contrast, machinery and equipment do not appear to be troublesome to software company owners and managers, who scored it at 46 and ranked it as the sixth (out of nine) most troublesome area for business operation and growth. Nearly all company managers (nine out of ten) expressed the view that in terms of physical state their present machinery and equipment are sufficient to positively

impact on productivity and competitiveness, and eight claimed that the operating capacity of their systems is adequate. Nonetheless, when queried on the percentage of equipment that is outdated, responses ranged from 0 percent (four companies) to 70 percent (one company), and two managers claimed that 10 percent of their equipment is outdated. Two other managers believed that 15 and 50 percent respectively of their hardware needed to be upgraded. Four company managers plan to upgrade their hardware in less than one year, while three plan to invest in additional capital during the next three years (three managers had no response).

Major challenges for software firms associated with machinery and equipment ….

- Trying to keep up with India in terms of having most recent hardware

Recommended actions…

- Investigate technology parks in India with possible application to Egypt

When asked about recommendations on how to improve hardware as it relates to productivity and competitiveness, several managers commented on the need to "catch up with India." They discussed the need for the Government to investigate technology parks following the example of that country of India. One manager related that the Government of India rents office space to software developers and subsidizes telephone line usage and hardware to promote the industry. This type of arrangement could benefit Egyptian software producers and could be investigated in depth for a possible application to Egypt.

8. Taxes

Major challenges for software firms associated with taxes …

- Import taxes and inspections
- Export fees

Recommended actions…

- Remove or lower import taxes on inputs and train customs officials in import inspections
- Remove export fees

Software company managers and owners ranked the area of taxes at the bottom of the list of the nine areas investigated in terms of importance to productivity and competitiveness. They also scored this area low at 44 (on a scale of 100) in terms of the challenge that taxes present to business operations and growth. The low score and ranking is probably due to the fact that all the companies that were interviewed receive tax concessions under the Investment Law. When queried on the impact of the Investment Law, managers responded that the concessions received have helped them to start software companies and compete, which they would not have been able to achieve without the tax concessions.

Managers commented on difficulties encountered with Customs Administrations officials who are reportedly not able to readily distinguish the difference between empty compact discs that are imported as inputs and those containing software or music. The confusion has resulted in delayed shipments and lost sales. Another company complained about the export fees for administrative expenses, such as the 1 LE levied on each compact disc exported. And one company manager claimed that tax collectors incorrectly calculate depreciation since the software industry is new and they do not completely understand the industry. Recommendations that were made included the elimination of all export

fees and import taxes on inputs such as compact discs, and that tax concessions should be applied to software companies located anywhere in Egypt.

9. Technology

Not surprisingly, software company managers ranked technology at the lowest end of the scale in terms of presenting a challenge to business operations and growth, and at the high end of the scale (second-highest out of nine areas) in terms of importance to enterprise productivity and competitiveness. Only two managers expressed difficulty in obtaining technology, one of which attributed his problem to the inability to follow the new technology trends in the United States because they require specific on-line systems or satellite transmissions that are not available in Egypt. The other company stated that both technology and training are expensive. Software company managers use various sources to obtain technology: all managers use the Internet and subscribe to industry publications, followed by the most managers attending trade shows and discovering new technology through their competitors. Only three managers cited the use of a licensing partner as a source of technology. Four managers stated that software is improved through imports and named the United States as their source of inputs. No recommendations were offered on how to improve technology, with the exception of one firm that requested training at lower costs than presently available.

Major challenges for software firms associated with technology….

- In a limited number of cases, expensive training
- High-tech on-line data systems or satellite transmission currently not available in Egypt

Recommended actions…

- Offer affordable training courses of various lengths
- Continue to promote competition in telecommunications sector

B. Individual Factors Impacting Productivity and Competitiveness of Household Appliance Companies

1. Marketing

The business owners and managers of the household appliance companies interviewed as part of this study, like those of the software industry, scored the area of marketing the highest of the nine areas under review in terms of challenge to business operations and future enterprise growth and assigned it a score of 58 (on a score of 0 to 100). They also scored it as the second most important area to productivity and competitiveness at 88 (on a scale of 0 to 100), indicating that marketing is an area that merits special attention for this particular industry. Business owners were queried on the distribution system, which was cited as functioning adequately for the domestic market since networks are well established and function well through retailers, links with foreign firms and distributors. The area of promotion was explored, including advertising through newspapers, radio and other media and promotional materials such as packaging. Business owners voiced no complaint about promotion except high associated costs. When queried about the

adequacy of marketing staff, the business owners and managers all agreed that the staff is indeed adequate for the local market and voiced no complaints. Research and development that is undertaken by firms is also apparently adequate for the local market. Seven out of eight managers reported that they compete on the basis of price, followed by quality. Most managers feel that both their prices and product quality are competitive or better than those of their competitors.

A discussion on market information invoked numerous responses from company managers and owners, and was cited as the largest problem hindering business expansion. Managers in fact stated that market information on demographics and supply and demand balances for both the Egyptian and potential export markets is not available through government sources, and the data that are available through private sources are unreliable. Many managers also stated that they are unable to find the information they need on the Internet. Managers cited the desire to export, especially to African countries that are members of the COMESA agreement, and stated that they need data on those markets. Moreover, they explained, they need information on whether or not Egyptian products would be accepted by consumers in those markets. They also expressed concern about opening up the Egyptian market under the GATT agreements, and stated that if the Government of Egypt maintains its protection on imports of competing products, then the household appliance industry will survive. In contrast, they said that if the Egyptian market opens up to imports and the companies do not develop export markets, then the domestic industry will fail.[3] The over-riding recommendation therefore for this industry is two-fold. First, market research should be undertaken on the feasibility of exporting household appliances to COMESA markets and second, a market information system should be established and updated on a regular basis with accurate information that reflects demographics and supply/demand in both the local and international markets.

Major challenges for household appliance firms associated with marketing….

- Absence of market information on demographics and supply/demand balances for local and export markets
- Absence of data to determine whether or not Egyptian household appliances would be accepted by consumers in potential export markets, especially COMESA member countries

Recommended actions…

- Establish market information system with reliable data on demographics and supply/demand balances in local and potential export markets
- Conduct detailed market demand study for feasibility of exporting household appliances to COMESA markets

2. Support Institutions

There is no known business association for the household appliance industry, and the owners interviewed as part of this study stated that there is no collective effort to coordinate the activities or address the needs of the industry. The lack of a coordinated effort to promote the industry, and the perceived weak support from the Government of

[3] The current import tariff on electrical household appliances such as stoves is 40 percent, which is below the ceiling rate negotiated under the GATT of 60 percent.

Egypt and the private sector in general led business owners and managers to score the area of "support institutions" as the second highest in terms of presenting a challenge to business operations and growth (55 on a scale of 0 to 100). In contrast, in terms of importance to productivity and competitiveness, business owners stated that support institutions were not important and ranked this area at the low end of the scale in sixth place (out of nine places). When queried on the sharp difference in rankings of support institutions in terms of importance and challenge, business owners replied that up to now they basically had no experience with such institutions and concentrated their efforts on the local market. They continued to say that if they wanted to expand their operations, specifically to the COMESA market, they would need support from both the public and private sectors.

When queried on their experiences with government sector support organizations, two managers provided details. One manager mentioned the help received from the Government in upgrading the factory's machinery to comply with new environmental regulations under the Montreal Protocol for Ozone Project. Another business owner mentioned that the Ministry of Information provided general data on the household industry in Egypt. One manager mentioned that he had approached the Federation of Egyptian Industries for information, but other managers explained that they had no dealings with support institutions in the public or private sectors.

Major challenges for household appliance firms associated with support institutions….

- No coordinated effort among businesses
- Perceived absence of support from both private sector and Governments

Recommended actions…

- Closely tied with recommendations for marketing: develop complete and reliable information system that is updated on a regular basis
- Enlist assistance, especially from foreign experts, in all types of management: production, financial, marketing and personnel

Discussions also focused on the types of assistance needed from support organizations. Managers and business owners agreed on the need for specialized help in computer-assisted production management, financial management and the development of new marketing strategies. Assistance in improving technology was specifically mentioned by two managers, and one manager requested that foreign experts provide the assistance. The issue of complying with environmental regulations was also raised in terms of support needed. The theme of developing an export market emerged again but in terms of the support needed from Government and private sector organizations. Managers again discussed the need for market information including news and data, and the need for marketing seminars or training on how to develop new marketing strategies. When queried on the impact of trade agreements, most managers again mentioned the new COMESA agreement and underscored their desire to export to those new markets.

Recommendations on ways to improve support institutions so that actions positively influence productivity and competitiveness and promote expansion are closely tied to the recommendations related to marketing. In addition to developing a complete market information system that is based on reliable and updated data, support institutions could

offer assistance in management techniques that focus on improving production, marketing, financial management. It would be also useful to enlist the technical expertise of foreigners to help companies improve all types of management related to industry: production, marketing, financial and personnel management.

3. Finance

Managers and owners ranked the area of finance as the third highest out of nine in terms of presenting a challenge to business operations and growth and scored it at 49 (on a scale of 0 to 100). They also perceived finance as being important to productivity and competitiveness, ranked it as the fourth (out of nine) most important area, and scored it at 79 (on a scale of 0 to 100). The combination of these scores suggests that finance is important to the household appliance industry and merits investigation. Discussions about finance revealed that business owners perceive little problem in obtaining short or long-term financing due the good reputation of many businesses and the fact that they are well established in Egypt. Most managers stated that bank charges are reasonable and that guarantees present no problem, with the exception of one company that is currently experiencing financial difficulties related to a loan guarantee. No problems were cited with the duty drawback scheme. The recently implemented policy requiring 100 percent import coverage for letters of credit and the lack of export credit appear to be a serious problem for one company that is actively attempting to expand international operations.

Major challenges for household appliance firms associated with finance...

- High interest rates cited at 12 - 17% that raise costs of production relative to competitors
- Perceived inadequacy of bank officials in evaluating loan proposals, thereby stunting investment and preventing expansion

Recommended actions…

- Explore ways to lower interest rates
- Offer training to bank personnel, preferably abroad, to evaluate loan proposals
- Introduce concept of venture capital and risk management to banking sector to expand exports

The problems related to finance focus on interest rates, the evaluation of new project proposals and the concept of risk management. Interest rates are considered excessive and were cited as being between 12 to 17 percent. The effect of high interest rates, as explained by some managers, is to raise the costs of production above those of Egypt's competitors and discourage new investment in the sector. Certain banks were cited as disguising high interest rates by charging fees as high as 30 percent. The inability of bank officials to evaluate new project proposals and their skills in project appraisal are viewed as a serious hindrance to business expansion, according to several managers. Overseas training for officials was requested so that the concepts of venture capital and risk management would be introduced to the Egyptian banking system and so that the evaluation of new project proposals would be improved and ultimately lead to the expansion of this industry. Based on discussions, the recommendations in the area of finance therefore focus on exploring ways to lower interest rates and improve the skills of bank officials in evaluating new project proposals.

4. Technology

The area of technology appears somewhat important to the owners and managers of the household appliance companies interviewed as part of this study. They ranked this area in fifth place (out of nine) and scored it at 78 (on a scale of 0 to 100) in terms of importance to productivity and competitiveness. In terms of challenge to business operations and growth, managers perceive technology to be somewhat troublesome, and ranked it in fourth place (out of nine) with a score of 45. The larger number of managers cited trade shows as the main source of information on technology, followed by the Internet and publications. Three companies maintain links abroad, namely with a mother company in France, with a trading partner in Korea and factory agents in Saudi Arabia and the United States. When queried on whether the production of the final product is improved by imports of inputs, interview results uncovered that between 80 and 85 percent of inputs are manufactured by the companies at their factory locations. The components that are imported are sourced from outside of Egypt due to the lack of products on the Egyptian market, or the insufficient grade or quality. For example, steel used in the construction of some household appliances requires a certain metal content that is not available in Egypt.

Major challenges for household appliance firms associated with technology…

- Lack of knowledge in determining optimal production processes and impartial and unbiased outside advice
- Lack of knowledge of developing product design to compete against European imports
- High costs of financing new technology

Recommended actions…

- Through support institutions, offer workshops or seminars to improve management skills in optimizing production, marketing, and developing technology
- Investigate ways to lower costs of financing

Several trouble spots were identified when discussing the ease or difficulty with which technology is acquired in Egypt. One manager cited the absence of impartial and unbiased advice on new production and technology-related processes and the mistrust of sales agents from private companies attempting to sell their products. Another manager explained that he simply does not know how to determine the optimal production capacity for his factory and how to improve the production process to improve productivity. Two managers commented on the need for financing to introduce new technology to their factories, which would reduce the amount of time required for product assembly and improve quality.

It is important to note that the recommendations made by company managers and owners on how to improve technology are closely related to those for the areas of finance and support institutions. One manager called for assistance in improving productivity through computer-related technology. Examples were given for the production of specific products, such as side panels of refrigerators that require a certain type of technology. Other managers stressed the fact that they often purchase know-how because they do not know how to develop technology or improve the production processes themselves and need assistance in becoming self-sufficient. They also explained that assistance in these areas could help their production processes become more efficient and competitive.

Certain companies also requested help in developing product characteristics and product design in order to compete against imports from Italy. Again the idea of being able to compete in the local market due to protection afforded by relatively high import tariffs was discussed. Many company managers said that they would update technology to improve productivity if financing were less expensive.

5. Legal Aspects

Major challenges for household appliance companies associated with legal aspects….

- Slow court system in commercial dispute settlement

Recommended actions…

- Revise court system so that disputes are settled within a reasonable time frame

The legal environment as it relates to doing business in Egypt is relatively important to the productivity and competitiveness of household appliance industries and, likewise, it is a significant challenge to business operations and future growth. Business managers of the household appliance industries interviewed as part of this study scored "legal aspects" at 43 both in terms of importance and challenge. However, they ranked this area somewhat higher in terms of *challenge* (fifth out of nine places) than *importance* (seventh out of nine places). Business owners expressed no difficulty with protection of trademarks or copyrights, or licensing. However, nearly all managers stated that the court system takes too much time to settle commercial disputes and felt that their rights were not guaranteed. Based on these considerations, the overwhelming recommendation made by the managers was that the court system be revised so that disputes are settled in a timely manner.

6. Taxes

Major challenges for household appliance companies associated with taxes….

- Export fee of 1% hinders exports

Recommended actions…

- Remove fee to promote exports

Managers assigned similar scores to the responses of the queries on importance of taxes to productivity and competitiveness (43 on a scale of 0 to 100) and on the challenge that taxes present to business operations and growth (40). However, in terms of a comparison in ranking the scores differed significantly. Managers ranked taxes at the bottom of the scale in terms of importance, and in sixth place (out of nine places) in terms of a challenge to business operations. Five of the seven companies that responded to the queries on taxes receive tax concessions as beneficiaries of the Investment Law, and responded that their tax base is fairly calculated compared with their competitors. It is curious to note that the two managers whose companies do not participate in the Investment Law do not feel that their tax base is fairly calculated. The only complaints voiced about taxes were that duties levied on final imported products are high and the one percent export fee should be removed to promote exports. One manager also feels that the sales tax of 10 percent is excessive. Since import duties have been reduced in recent years and there are no plans to lower the sales tax, the recommendation that would have a positive impact on exports is to remove the export tax. Software

company managers also complained about this tax and, like the managers of the household appliance companies, feel that it hinders exports.

7. Labor

When queried about the importance of labor to productivity and competitiveness, managers of household appliance firms scored it at 75 (on a scale of 0 to 100), and ranked it in sixth place (out of nine), indicating that labor is somewhat important to their business. When queried on the challenge that labor presents to business operations and future growth, they ranked it somewhat lower (seventh out of ninth place) and scored it at 40 (on a scale of 0 to 100). Most of the companies interviewed use labor intensively in the production process, although one manager stated that nearly all processes in his factory are now automated. Only three managers stated that they experience difficulty in finding employees, and that the types of employees they need are skilled workers, technical workers, managers and workers with specific marketing skills. For the most part, the complaints surrounding the scarcity of technical workers had to do with specific skills such as refrigeration, and the need for more practical experience (as opposed to theoretical) in this field. Yet another manager claimed that providing on-the-job-training is difficult because the engineering base of knowledge with which employees arrive at the firm is weak.

Major challenges for household appliance firms associated with labor aspects….

- Difficult to dismiss unproductive employees
- Shortage of skilled and technical workers, managers and those with marketing skills
- Lack of hands-on practical experience of workers

Recommended actions…

- Revise Labor Code to enable dismissal of unproductive workers
- Review educational system to improve technical base with hands-on experience

When queried on actions that could be taken to improve employee productivity, managers responded that improved education and training is needed. Although many managers believe that salaries impact on performance, they are of the opinion that an improved educational base with practical experience would yield better results. When queried about the impact of the Labor Code on productivity, many managers expressed frustration over not being able to dismiss employees that do not perform, and also that the code lacks strict environmental regulations to protect workers. The recommendations that were most frequently offered were to improve the Labor Code to allow for easier dismissal of unproductive employees than at the present time, and to offer workers a technical educational base that is modernized and involves practical (as opposed to theoretical) training.

8. Machinery and Equipment

The area of machinery and equipment was ranked as the most important one under review in terms of impact on productivity and competitiveness and was scored at 94 (on a scale of 0 to 100). It was ranked near the bottom of the scale, in eighth place (out of nine), in terms of presenting a challenge to business operations and growth and was

scored 35 (on a scale of 0 to 100). The combination of these scores indicates that while machinery and equipment are very important to productivity, there are currently no obstacles in this area. Most managers expressed the view that the physical state of the factory machinery is adequate for current production levels, as are the capacity and stock of products. When queried on the percentage of equipment that is outdated, few managers responded and, those that did believe that the equipment is sufficiently updated. Two managers related this area to technology, and reiterated the need for seminars in production management and planning.

9. Infrastructure

The area of infrastructure, like that of machinery and equipment, does not appear troublesome to business operations and growth of the household appliance companies interviewed as part of this study, although it is important to enterprise productivity and competitiveness. Most companies have extensive distribution systems that work well despite crowded highways and congested traffic. However, one manager complained about frequent power cuts that affected computer systems and the poor quality of telephone lines. Another manager stated that the Government's privatization program will help to improve infrastructure, while one called for improved quality of telephone lines and less congested traffic.

C. Individual Factors Impacting Productivity and Competitiveness of Horticulture Companies

1. Infrastructure

The owners or managers of horticulture firms interviewed as part of this study ranked infrastructure at the top of the list in terms of challenge to business operations and growth with a score of 76 (on a scale of 0 to 100). They also ranked it third out of nine in terms of importance to productivity and competitiveness and scored it similarly at 78 (on a scale of 0 to 100). Discussions about the reasons why infrastructure presents such a challenge to business operations and growth focused mainly on issues surrounding the Cairo Airport. Details revealed that there are serious bottlenecks there in terms of limited cargo space for horticulture products. The companies interviewed that hire charter planes to ensure that their produce leaves on time, and to also ensure that they will be able to ship their entire planned volume, voiced complaints about limited space. Other companies noted that they have stopped exporting certain products that have a strong demand in the European market, such as green beans, because there is insufficient cargo space. The ability to charter flights requires large-size companies working on a volume basis that are already exporting. Small companies cannot do this because they cannot afford the costs. Even though prices have recently decreased for airfreight of fruits and vegetables on the national air carrier, insufficient cargo space remains a serious constraint.

The limited cargo space on airplanes has affected other challenges faced by exporters at the airport, such as the way in which produce is loaded onto planes. Several company owners noted that their products were left on the runway for too long, leading to spoilage and product loss. To avoid this situation, unofficial payments are commonly made so that shipments are given priority for loading. A related problem is the inadequacy of cooling facilities, which were cited as not being sufficiently cold for fragile products such as strawberries and cut flowers.

Major challenges for horticulture companies associated with infrastructure….

- Limited cargo space blocks small companies from exporting and raises costs for exporters that can afford private services
- Misuse in loading produce on planes leads to spoilage and rejection during quality control inspections
- Cooling facilities that are not cold enough leads to spoilage

Recommended actions…

- Privatize air freight operations
- Expand volume of cooling facilities and improve temperature
- Implement system for loading produce within reasonable time frame

Other challenges related to infrastructure include the fact that producers themselves must invest large sums in irrigation systems and back-up electrical generators, whereas in countries like Israel the government invests in such systems. Other company managers explained that while services and facilities at ports have improved recently, there is a lack of cooling facilities and shaded areas, and that they are not sufficiently sure that the product will arrive at its destination in good condition due to poor handling practices. In short, the main challenges for exporters of horticulture products are insufficient cargo space and cooling facilities at the airport and ports. Improvements through privatization of airport facilities and larger and colder cooling facilities would lower costs and ensure that high product quality standards are maintained.

2. Support Institutions

The area of support institutions ranked high in terms of challenge to business operations and growth with the second highest score of the nine areas under review (score 73 on a scale of 0 to 100). In terms of importance to productivity, this area ranked towards the low end of the scale in sixth position (out of nine) and was scored at 61. All business owners and managers called for greater involvement by both the public and private sectors to encourage exports of horticultural products. They stated that small-size businesses and start-up businesses were in great need of assistance. When queried about the types of assistance needed, managers focused on programs that would provide results, and named the Horticultural Export Improvement

Major challenges for horticulture companies associated with support institutions….

- Perceived lack of support for small and start-up companies
- Worry over EU quota system and new EU-Egypt trade agreement

Recommended actions…

- Continue to negotiate increased EU quotas for certain products with potential for increased production, *viz*, strawberries
- Make special effort to include small and start-up companies in donor-assisted projects

Association (HEIA) as an example. They also called for assistance in management training, an area that was also raised in discussions about labor. The topic of trade agreements was also discussed, and many managers expressed concern over the importance or unimportance of the new EU-Egypt agreement for exporters of agricultural products. They made particular reference to the EU quotas, and in the case of strawberry producers, stated that the quotas were insufficient. While most company owners perceive the EU market as having potential, they are also concerned about their competitors in Israel and Morocco who also enjoy benefits from special trade arrangements. Most of the recommendations made on how to improve support from the public and private sectors related to making the importation of certain inputs easier, a topic that is discussed under the area of taxes and licensing.

3. Taxes

Major challenges for horticulture companies associated with taxes….

- Perceived unfair assessment of large swings in profits and losses due to weather by tax assessors
- Accumulation of taxes relative to competitors in foreign countries

Recommended actions…

- Investigate tax code with special application to agriculture, such as income averaging

The area of taxes was scored as the third highest at 69 (on a scale of 0 to 100) in terms of presenting a challenge to business operations and growth, and in sixth place in terms of importance to productivity and competitiveness. It is curious that this area was scored so high since all the businesses that were interviewed receive important tax concessions under the Investment Law. In fact, nearly all company owners readily recognized the benefits of the tax concessions. It appears that the challenge caused by taxes is related to the way in which tax inspectors deal with agriculture and not the rate itself. Some company managers explained that tax assessors often do not understand the influence of weather on the financial performance of enterprises and the related large seasonal variations in profits and losses. Other owners complained that not all business expenses were allowed, such as multiple trips to competing countries like Israel to undertake investigations, and that the tax on profits (cited at 40 percent) is too high. One manager called for the complete removal of taxes for agricultural exporters, including customs duties, sales tax and income tax in order to compete with exporters of other countries who reportedly pay no tax.

4. Marketing

The area of marketing is perceived as a challenge to horticulture companies, although its score of 64 (on a scale of 0 to 100) tied with those of the areas of labor and legal aspects. In terms of importance, however, marketing was ranked as the second most important area influencing productivity and competitiveness and was scored at 86 (out of 100). Discussions on marketing were initiated by inquiring about the adequacy of marketing staff, and all company managers and owners responded that their staff is adequate. The companies that participated in the interviews use staff from their offices in Egypt, receivers in Europe or agricultural associations to undertake marketing, and they found

no trouble with the way in which products are sold. Four of the nine managers stated that market information is inadequate, and cited the need for production and yield data both in Egypt and outside of Egypt. Flower growers called for information on new varieties of flowers and new seed types since nearly all inputs for the cut flower industry must be imported. Flower growers also called for technical information on flower production, including specific chemicals. The company managers that have sufficient information receive it from various sources, including associations, trade publications and the Internet.

No challenge was identified relating to promotional material, shortage of distribution channels, links with foreign firms or research and development at the firm level. When queried about actions that could be taken by the Government of Egypt or the firms themselves to promote their exports through marketing, managers commented on the usefulness of reliable and timely production and yield data in foreign markets and Egypt for planning purposes. One manager also commented on the need for government support that would organize an export industry, such as the cut flower industry that was created and successfully developed in Israel with the commitment of that government. Another manager stated that it is the responsibility of the company to identify good representatives in the foreign markets to act as the key to successful export operations, but that normally only large-size companies have the funds to cover those costs.

Major challenges for horticulture companies associated with marketing….

- Lack of timely and reliable data on production and yield both in Egypt and foreign markets
- Technical information on new varieties, chemicals and other inputs specific to high value-added products such as cut flowers

Recommended actions…

- Improve collection and dissemination of production and yield data
- Encourage associations to regularly maintain information on inputs, especially for high value-added products

5. Legal Aspects

The area of legal aspects was tied in fourth place (with marketing and labor) in terms of challenge to business operations and growth with a score of 64 (on a scale of 0 to 100). In contrast, it was ranked at the bottom of the nine areas under review in terms of importance to productivity and competitiveness with a score of 33 (out of 100). Five of the nine company managers interviewed stated that the court system takes too long to settle commercial disputes, yet felt that legal representation is available in Egypt at a reasonable price. Most companies stated that they attempt to minimize their legal risk for non-payment of shipments by dealing only with companies with whom they have

Major challenges for horticulture companies associated with legal aspects...

- Lengthy and time-consuming approval process for land registration and land permits
- Lengthy process to approve new seed varieties

Recommended actions…

- Review land registration and permit process with view of combining steps to reduce time
- Review approval process for imports of new seeds

a good working relationship. When queried on licensing, three important areas were raised. First, one manager stated that registering land and obtaining land permits are difficult in Egypt due to the numerous (seven or eight) agencies that require personal visits to process paperwork and issue approvals, which was cited as lasting up to three years. Another company owner stated that land is often used as collateral in bank loans, which are sometimes difficult to obtain due to the absence of necessary land permits. One manager deemed other inspections such as health inspections for chemicals as necessary. Yet another had difficulty with shipments of potatoes at both the exporting and receiving ends due to potato disease that had once been a problem and has since been eradicated. It seems that registration of seeds for new varieties is lengthy in terms of time: one manager reported that it can take up to three years to register new seeds, after which time the market changes and new varieties are introduced. That manager feels that one year would be a reasonable amount of time to approve seeds. In sum, the recommendations that were made as they relate to legal aspects focused on reducing the time required to obtain land permits and seed approval, which in turn would reduce the opportunity costs and make businesses more efficient.

6. Labor

Major challenges for horticulture companies associated with labor aspects...

- Lack of managerial skills, and workers with technical skills

Recommended actions…

- Design and implement training course for managers through producer association

The area of labor also tied in fourth place with legal aspects and marketing in terms of being a challenge to business operations and growth with a score of 64 (on a scale of 0 to 100). Not surprisingly, business owners and managers scored this area as the highest of the nine areas under review (94 out of 100) in terms of importance to productivity and competitiveness of their enterprises, since agriculture is a labor-intensive sector. Discussions on the availability of qualified labor and the ways in which labor impacts productivity and competitiveness elicited several insights for the horticulture industry. The majority (56 percent) of the company managers claimed that they have no real problem with labor, since their businesses are seasonal and require a large pool of unskilled labor. That type of labor is abundant in Egypt. Most companies provide on-the-job-training, which requires basic skills for agricultural production. The exceptions are the skills needed for grapes, which were reported to require special handling and packing skills, due to the fragility of the fruit, which were reported to be superior in women than in men. Strawberry production and the production of other soft fruits are also more labor-intensive than fruits such as citrus. Several company managers commented on the high turnover of unskilled labor, especially with young women who work one season and then return to their homes to raise families. And while companies normally do not require a lot of time to train workers, the constant turnover nonetheless causes a lack of continuity and disrupts productivity, especially for grape growers who count on the packing skills of women. Unfortunately, there is no real solution for this issue, which is a complex social one, as company managers highlighted.

The issue of output was raised by one company owner, who stated that while manpower is abundant and inexpensive in Egypt compared with other countries, workers are not necessarily qualified and end up costing more in the long run than those in competing countries. An example was given of a worker in Egypt being able to pack eight boxes of fruit in a certain amount of time compared with 20 boxes for a worker in Australia. Other challenges faced by businesses in terms of skills of workers relate to management. As an example, a new flower grower admitted that he had no idea of the concept of a production plan or marketing strategy, and is currently seeking help from the HEIA project. He suggested that a management-training course be provided to small companies that would be geared towards the management of an agribusiness. Other company managers highlighted the need for workers with technical skills. When queried about the impact of salaries on productivity, the responses were mixed, *viz.* some managers stated than improved salaries would favorably influence productivity and their companies have implemented incentive and bonus programs, while other managers stated that wages are simply not related to productivity in the field of agriculture. Lastly, only two managers cited difficulty with the Labor Code in the area of not being able to easily dismiss unproductive employees.

7. Finance

Business owners and managers scored the area of finance at 62 (on a scale of 0 to 100) and ranked it in fifth place (out of nine) in terms of challenge to business operations and growth. They also scored this area at 56 (out of 100) and ranked it in eighth place (out of nine places) in terms of importance to productivity and competitiveness. Most companies have access to both short and long-term finance, and reported no significant problem with bank charges, interest rates or guarantees. However, the issue of the fixed exchange rate of the Egyptian pound relative to the United States dollar was raised by two managers. Those managers claimed that a devaluation of the Egyptian pound would allow them to be more competitive in the global markets. Two other managers also commented on the regulation requiring 100 percent import coverage for letters of credit. They explained that on the one hand, such a requirement clears the market by preventing over-buying and consequent “dumping” on the market; on the other hand, companies must request cash from their clients and cannot offer credit so that sales decrease. Despite these complications, those managers understand that the policy was implemented due to a shortage of hard currency in Egypt.

8. Technology

Technology was ranked fairly low in terms of challenge to business operations and growth with a score of 40 (on a scale of 0 to 100). In terms of productivity and competitiveness, it was ranked in fifth place (out of nine places) with a score of 67 (out of 100). The business owners and managers interviewed as part of this study stated that they experience no real challenge in acquiring technology, and in fact stated that great improvements were made during the last decade. Managers stated that they are constantly investigating ways to update irrigation systems, improve seed varieties and cuttings through imports from Europe and Latin America and use appropriate fertilizers to

maximize yields. The most frequently cited source of technology was trade shows, followed by publications and travel abroad. One flower grower hired specialized consultants from the Netherlands as a way of sourcing technology for that business and a grape producer hired consultants from Chile for specialized production advice.

9. Machinery and Equipment

The area of machinery and equipment was scored the lowest of the nine areas under review at 36 (on a scale of 0 to 100), although it ranked somewhat higher in fourth place (out of nine) in terms of importance to productivity and competitiveness. All company managers or owners stated that the physical state of the equipment used is sufficient, as is the production capacity of the equipment. Most equipment also seemed to be sufficiently updated to meet the production requirements. The only challenges voiced were that machinery often needs repair due to frequent misuse by workers who are untrained, and that the sales tax charged on imports of machinery puts Egyptians at a competitive disadvantage with producers in Israel who pay no taxes. One cut flower grower stated that large investments would need to be made in specialized machinery for tying, grading, and cooling facilities.

Annex 6B CHARACTERISTICS OF INDUSTRY INTERVIEW SAMPLE

A. Overview

The firms to be chosen for the interviews were mainly selected from the commercially available database, KOMPASS (CD ROM version). The KOMPASS database contains more than 25,000 companies in Egypt with emphasis placed on manufacturing, commerce and associated service sectors. The database allows the researcher to locate companies that are potential suppliers or customers and also targets individual companies for detailed information searches. The KOMPASS database was chosen to select the sample of firms to participate in interviews for this study due to its impartiality and the ability to choose firms randomly. A directory of software companies and a horticulture association membership list supplemented the names of firms generated from KOMPASS.

The criteria used to select firms were: (i) firms whose main activity is the production of software, household appliances or horticulture; (ii) firms with private ownership (versus public); and (iii) firms that export. Once a group of firms was identified according to sector, further selection was based on firm size (0-50 employees being considered small, 51-100 employees as medium, and more than 100 employees as large). Information in the KOMPASS database that was excluded as selection criteria included the year of business establishment, business organization affiliation, and financial data such as start-up capital. Once a list of companies was identified according to sector, the search was further narrowed according to location to investigate a possible geographic concentration. The majority of the companies in each of the three sectors is headquartered in Cairo; therefore a sample was selected from Cairo and its environs. Once a list of firms in the Cairo area was generated, subgroups according to firm size were formed for each type of business activity and a random sample of about 25 firms was generated from which the final selection was made.

The constraints in making appointments and in choosing the final number of firms to be interviewed were of time and availability of business owners to participate in meetings (for details on the final sample, see Box A.1). Nonetheless, given the nature of the open and closed-ended questions and the fact that the interviews were conducted in person, more reliable information was gathered than had the questions been of the 'yes/no' or 'true/false' type and had the questionnaire been administered by mail, telephone or fax. All interviews were completed within a period of about four weeks. For the sample to be statistically significant for all three sectors, about one-half of the companies corresponding to the selection criteria would have to have been chosen, which would have made the task impossible to complete within the time frame of the study. Details of firm selection according to industry appear in the following sections of this annex.

Box 6B.1
Overall Sample Characteristics
(number of firms)

Type of Firm	Size			Ownership		
	Small	Medium	Large	Egyptian	Foreign	Total
Software	6	2	2	9	1	10
Horticulture	2	1	6	9	0	9
Household Appliances	0	0	8	7	1	8
TOTAL	**8**	**3**	**16**	**25**	**2**	**27**

B. Software Industry

In the KOMPASS database a search was conducted using the words "software design and development" in the search criteria: 21 companies in were found in Egypt, 11 in Cairo, 8 in Giza and 2 in Alexandria of the following sizes:

Box 6B.2
Search Results for Software Companies in Egypt

Small size companies: (0-50)	Med size (51-100 employees)	Large size (more than 100)
• 20 in Egypt	• 0 in Egypt	• 1 in Egypt
• 18 in Cairo	• 0 in Cairo	• 1 in Cairo
• 2 in Alexandria		• 0 in Alexandria

Note: Moderate difficulty was encountered in identifying about 10 firms because the software export industry is relatively new to Egypt.

Extensive searches for firms that actually produce and export software were undertaken by reading the description of individual companies and a list of 10 companies was generated. Because many of the company managers were not available, the Information Decision and Support Center Directory of software companies (IDSC, 1997) was used to choose companies that conform to the criteria -- viz, private companies that manufacture and export of software.

C. Household Appliances Industry

A search on 'appliances' resulted in a list of 422 companies in Egypt, 201 in Cairo, 42 in Alexandria, 96 in Giza, and the balance in other areas of the country. By searching on a code for electrical appliances, 114 companies were identified in Egypt. However, many of those companies are trading companies and do not conform to the main criteria of manufacturing and exporting household appliances. Other searches were made using codes for refrigerators, small kitchen appliances and home appliances. Because of the need to read company descriptions of each possible candidate, it was not feasible to count

the number of firms from which to choose. Arriving at a list of about 25 firms was difficult. Subsequent interviews with eight companies revealed that in Egypt no more than 15 companies are actively involved in producing household appliances as their main activity and also export. The final sample of 8 companies, or about one-half of the total companies in Egypt satisfying these criteria, represents a statistically-significant sample for this sector.

D. Horticulture Industry

Fruits, vegetables and cut flowers are considered to be the main types of horticultural products that Egypt produces and exports, and a search in the KOMPASS data base revealed that the companies that produce and export fruits and vegetables usually do not produce cut flowers (and vice versa). A separate search was therefore performed for fruits and vegetables, which resulted in a list of 65 companies in Egypt, 37 of which are located in Cairo and its environs, 15 in Alexandria, and the balance in various parts of the country. A search for cut flowers resulted in a list of four companies in Egypt, none of which whose main activity focuses on the production of cut flowers. Therefore, assistance was sought from the Horticultural Export Industry Association (HEIA) to identify cut flower firms. Representatives of the HEIA explained that only about 15 companies produce cut flowers and of those companies, about 10 are interested in exporting. A list of seven companies was provided, five of which are located in the Cairo area and with which three appointments were made. Six other appointments were made with horticulture companies in the Cairo area and the majority of the sample was drawn from KOMPASS, for a total of nine companies.

Box 6B.3
Search Results for Horticulture Products Companies in Egypt

Small size companies: (0-50)	Med size (51-100 employees)	Large size (more than 100)
• 21 in Egypt • 13 in Cairo • 6 in Alexandria • 2 elsewhere	• 40 in Egypt • 21 in Cairo • 11 in Alexandria • 8 elsewhere	• 4 in Egypt • 2 in Cairo • 2 in Alexandria

Annex 6c ENTERPRISE INTERVIEW ON PRODUCTIVITY & COMPETITIVENESS IN EGYPT

I. Contact Information

1. Company name _____
2. Your name and title _____

II. Profile of Your Firm

1. Ownership __Egyptian __Foreign __Both
2. Legal status _Individual proprietorship _ partnership _joint-stock
3. Main business activity _____
4. Employees _____ Total ___ full-time ___ part-time
5. Sales Information:

Average monthly level of sales	LE
Percent of monthly sales exported	%
Percent of monthly sales allocated to production costs	%
Percent of monthly sales allocated to total labor costs (wages + benefits)	%

6. What percentage of your total costs of production do you import? ___ %
7. What are your markets and what types of industries are your customers? (local/foreign markets; same/different type of industry)_____
8. Who are your competitors? (local/foreign; type of industry)_____
9. How many competitors do you face? ___ 1-10 ___ 11-50 ___ 51-100 ___ 100 or more
10. How much of a market share do your competitors have in your export markets? ___<20% ____ 20-40% ___ 41-70% ___ >70%
11. What are the competing products/services? _____

III. Specific Areas

A. Labor

1. How would you rank the importance of labor in the production process on a scale of 1 to 4? __ 1-low __ 2-medium __ 3-high __ 4-very high
2. Do you have difficulty in finding qualified employees? ___ (Y/N) If so, do you have trouble finding employees at these levels: __ worker __ technical __ managers
3. Why do you have difficulty in finding qualified employees? __ factory location __ low salaries offered __ work conditions ___ lack of language skills___ other
4. How could the performance of your employees be improved? ___ better education, training, or work experience ___ better work habits ___ better work environment ___ better salaries & benefits ___ better language skills ___ other (please specify) _____
5. What do you think about wages relative to output: __ sufficient __ if wages were higher, productivity would increase ___ if wages were lower, productivity would fall
6. How would you classify the following possible obstacles to operating your business? Please rank the obstacles on a scale of 1 (“no obstacle”) to 5 ("largest obstacle").

	No Obstacle				***Largest Obstacle***
	1	**2**	**3**	**4**	**5**
a. Regulations on working conditions (e.g. working hours, safety at the workplace)	__	__	__	__	__
b. Insurance (e.g., social security, vacation, health and maternity leave)	__	__	__	__	__
c. Restrictions on hiring and firing employees	__	__	__	__	__
d. Other (please indicate) _____	__	__	__	__	__

7. What actions could your firm or the Government take to resolve or improve labor-related problems?
_____

B. Capital (machinery and equipment, factory, unsold goods)

1. How would you rank the importance of capital in the production process on a scale of 1 to 4?
__ 1-low __ 2-medium __ 3-high __4-very high
2. What is your opinion about the physical state of machinery and equipment used in your factory?
__ sufficient __ inadequate __ excessive
3. What is your opinion about the capacity of the factory and equipment?
__ sufficient __ inadequate __ excessive
4. What percentage of your equipment is outdated? __% When would you expect to update it?
__ < 1 year _ 1-3 years ___ +3 years
5. What is your opinion about your stock (unsold goods)? __ sufficient __ inadequate __ excessive
6. What actions could your firm or the Government take to resolve capital-related problems?
_____

C. Technology

1. How would you rank the importance of new technology in the production process on a scale of 1 to 4? __ 1-low __ 2-medium __ 3-high ___ 4-very high
2. Do you have problems with a lack of technology or acquiring it for your business? __ (Y/N) In what sense? (for example, technology is not easily available in Egypt, adequate training is not available, the cost is too high, unable to find license agreement)
_____
3. How do you become informed of new technology? __ trade shows __internet __ publications __competitors __ licensing agreement partner __ other (please specify)
4. Is the production of the final product improved by importing materials and inputs that are high in technology? __ (Y/N) If so, from which country do those inputs originate? _____
5. What actions could your firm or the Government take to resolve technology-related problems?_____

IV. Institutional Factors

A. Infrastructure (air, rail and road transportation; ports; water; sewage; electricity; communications; etc.)

1. How would you rank the importance of infrastructure in the production process on a scale of 1 to 4?
__ 1-low __ 2-medium __ 3-high ___ 4-very high
2. What are the most important obstacles that your business faces in terms of infrastructure in Egypt?
__ inadequate ___ inefficient __ costly __ poor service ___ other (please specify) _____
3. What type of damage or trouble have the infrastructure-related problems caused to your business? (for example, prevented expansion, incurred costs higher than necessary, provoked loss of business, etc.)
_____
4. What actions could your firm or the Government of Egypt take to resolve or improve problems related to
infrastructure?_____

B. Tax Administration (Income, Property, Import Taxes, Duty Drawback System)

1. How would you rank the importance of taxes in the production process on a scale of 1 to 4? __ 1-low __ 2-medium __ 3-high ___ 4-very high
2. If new investment reduced tax liability by 10%, how much would your investment increase? __ 0-5% __ 5-10% __ 10-15% __ 15-20% ___ 20%+
3. Do you think that your tax base is over-calculated, compared with that of your competitors? __(Y/N)
4. Does your company enjoy tax concessions under the Investment Law? __ (Y/N) If yes, how has the law impacted on your productivity and competitiveness?_____
5. What actions could your firm or the Government take to resolve or improve tax-related problems? _____

C. Support Institutions

1. How would you rank the importance of support institutions in the production process on a scale of 1 to 4?__ 1-low __ 2-medium __ 3-high ___ 4-very high
2. Do government agencies provide good support services for your business? __ (Y/N) Please explain___
3. Do private sector agencies provide good support services? __ (Y/N) Please explain _____
4. Is the support adequate, or does your business need some type of technical assistance to improve productivity and competitiveness?_____
5. Do you think that Egypt's participation in trade institutions and agreements such as WTO, COMESA and AFTA will make your business more competitive and productive? __ (Y/N) Why?
6. What actions could be taken to improve support institutions? _____

D. Legal and Regulatory Aspects

1. How would you rank the importance of legal and regulatory aspects in the production process on a scale of 1 to 4? __ 1-low __ 2-medium __ 3-high ___ 4-very high
2. Do you think that the court system is adequate in settling disputes? If not, why? __ takes too long __ inadequate legal representation available ___too expensive __ other (specify)_____
3. Do you think that regulations and laws on copyrights and patents are effectively enforced, as far as they relate to your business operations? ___ (Y/N) If no, please explain _____
4. How do licenses and permits impact on the productivity of your business? (for example, in terms of time and cost)_____
5. Which licensing processes are more problematic than others in terms of time and cost? _____
6. What actions could your firm or the Government take to resolve or improve the legal aspects of doing business in Egypt?_____

E. Financial Services

1. How would you rank the importance of financial services in the production process on a scale of 1 to 4? __ 1-low __ 2-medium __ 3-high ___ 4-very high
2. Are any of the following a problem to you, and if so, why?
   a. Short-term finance (e.g., for raw materials and inputs) ___ (Y/N) If yes, please explain.
   b. Long-term finance (e.g., for new projects, capital equipment) ___ (Y/N) If yes, please explain.
   c. Lack of special funds for small/medium size businesses ____(Y/N) If yes, please explain
   d. Guarantees and collateral for loans ____ (Y/N) If yes, please explain _____
   e. Interest rates ____ (Y/N) If yes, please explain _____
   f. Bank charges ____ (Y/N) If yes, please explain _____
   g. Other payment terms (specify) _____
   h. Domestic and foreign letters of credit facilities ___ (Y/N) If yes, please explain _____
   i. Export credit facilities ___ (Y/N) If yes, please explain _____

3. What actions could your firm or the Government take to resolve or improve the financial services in Egypt?_____

F. Marketing

1. How would you rank the importance of marketing in the production process on a scale of 1 to 4? __ 1-low __ 2-medium __ 3-high ___ 4-very high
2. In marketing your product or service, are any of the following a problem to your business:
   a. Lack of good sales and marketing people ____ (Y/N) If yes, please explain _____
   b. Lack of market information __ (Y/N) _____
   c. Lack of good packaging and promotional materials ___ (Y/N) _____
   d. Inadequate media (newspapers, radio, TV, Internet) ___ (Y/N) _____
   e. Lack of linkages with foreign firms__ (Y/N) _____
   f. Distribution channels __ (Y/N) _____
3. What is your opinion about the research and development you use in your firm? __ inadequate __ adequate __ excessive Comment: _____
4. How does your firm compete? __ price ___ product ___ quality ____ technology
5. Compared with your competition, how competitive do you consider your product or service to be in respect of:

	Better	Competitive	Worse
a. Quality	_____	_____	_____
b. Availability	_____	_____	_____
c. Price	_____	_____	_____

6. What actions could your firm or the Government take to improve the marketing of your product or service? _____

V. Summary

Based on the preceding information and discussion, how would you rank the following obstacles to the productivity and competitiveness of your firm? Please rank the obstacles from 1 (no obstacle) to 5 (large obstacle).

	No Obstacle **1**	**2**	**3**	**4**	***Largest Obstacle*** **5**
A. Labor Aspects	__	__	__	__	__
B. Capital	__	__	__	__	__
C. Technology	__	__	__	__	__
D. Infrastructure	__	__	__	__	__
E. Tax Administration	__	__	__	__	__
F. Institutions	__	__	__	__	__
G. Legal & Regulatory Aspects	__	__	__	__	__
H. Financial Services	__	__	__	__	__
I. Marketing	__	__	__	__	__
J. Other (please indicate) _____	__	__	__	__	__

COMMENTS _____

_____

THANK YOU!

7 EGYPT'S PROSPECTS FOR HIGHER PRODUCTIVITY AND GROWTH

This chapter highlights the major findings and conclusions presented in the preceding chapters. It also offers recommendations to accelerate Egypt's transition to a self-sustained economy with high growth and productivity.

The prosperity of any economy depends on its productivity, or the value created by a day of work or a pound of capital invested. Both macro and micro fundamentals bear on the sustainable rate of growth in productivity that an economy can achieve. As the race for productivity growth intensifies, it will be innovation and technology that drives a nation's bid for prosperity. Throughout the 1990's, Egypt has made real progress in meeting the never-ending productivity and competitiveness challenge of getting its house in order. Egypt has moved aggressively to shrink budget deficit, lower inflation, strengthen financial institutions, promote increasingly outward-looking and internationally competitive business practices and streamline regulations. The economic reform program led to clear gains to the Egyptian economy and citizens of Egypt. These are estimated at LE 660M over the period 1987/88-1995/96 just from the increase in the productivity of the private manufacturing sector. Nevertheless, some problems related to the external balance still persist, like the still existing tariff and non-tariff barriers to trade, foreign exchange issues and transaction costs, which require immediate remedies.

Private Sector Macro Profile

The impact of the economic reform program on the performance of the private sector in general and the investment sector in particular has been significant and positive.

At the macro level, the analysis demonstrates that the private sector is generally expanding quickly relative to the public sector in its contributions to national output, and its contributions to investment and employment, are growing, although its export performance has been weak. In general the activities preferred by the private sector in descending order are services, agriculture and industry. Private industrial output (manufacturing in particular) remains low, however, relative to the economy's total output.

Between the pre-reform and the post-reform periods, the private sector in general was able to increase employment, which partially offset the contraction of public sector employment. Real wages decreased in all sectors, however, so that only the private formal sector experienced a (small) increase in its total wage bill.

At the aggregate level, government policy towards improving the investment climate and providing incentives under Law 8 of 1997 yielded positive results. The private investment sector operating under this law demonstrated its capacity to expand output, employment, savings and exports. Most of its activities were more labor intensive than in the formal private and public sectors. In addition, nearly all-economic indicators showed

positive signs. These improvements have been clearly evident in the utilization of Egypt's scarce resources between 1986/87 and 1995/96. While output per unit of labor fell by 36 percent between the pre-reform (1986-90) and the post reform (1991-96) periods, output per unit of the real wage bill rose by 19 percent and incremental output per unit of new capital rose sharply. Employment in this sector increased by 81% during this period. Hotels and restaurants, building and construction and manufacturing have been the driving force behind this improved performance. Furthermore, the investment sector was the only sector that showed an increase in savings/value added between the two periods. Those large savings allowed for greater economic growth.

Private Sector Sectoral Profile

At the sectoral level, the private investment sector increased productivity the most in hotels and restaurants, building and construction, and manufacturing, while the private formal sector become much more productive in agriculture, forestry and hunting. The private investment sector is also more export-oriented than the private formal sector, and it has a more diversified export structure that favors non-traditional technology-intensive products. The private formal sector needs incentives similar to those extended to the private investment sector.

The cost of providing tax exemption to the private investment sector in terms of foregone taxes to the treasury were more than offset by the increase in value added generated from its activities, yielding a NPV of LE 3.3 billion at constant 1987/88 prices over the period under study. These net national benefits accruing to the Egyptian economy reach LE 8.5 billion, when annual net benefits are compounded at 10 per cent). This is in addition to other economic gains in terms of better orientation towards exports, employment generation, and the acquisition of managerial skills, marketing and information technology.

Government Support to the Private Sector

The role of government in fostering private sector productivity has been formidable as reflected in the following developments:

- Considerable success has been achieved in the Government's privatization program, compared with those applied by other countries. Most privatized companies (70 percent of total) are now more profitable than before privatization.

- Egypt's privatization program is unique in terms of the social dimension because of its labor compensation schemes for early voluntary workers retirement. In 1998 the entire scheme cost about LE1.3 billion for 12 companies, which covered about 57,000 workers with an average compensation for early retirements varying between LE11,000 and LE27,000.

- Enhanced competition and increased private sector participation in public utilities and services is expected from the recent government strategy to allow further

privatization through international investment banking. This is expected to attract additional investment embodying high technology, and managerial and marketing know-how that will help foster higher levels of productivity and bolster the country's export potential.

- Egypt's three-pronged strategy for trade is based on its membership in international trade agreements (viz., WTO, EU, unilateral basis with G15, COMESA, and Arab free trade), and this strategy is expected to enhance its export potential, particularly after improvements in the trade regulations that extend beyond those already made to the tariff structure.

Private Manufacturing Sector Growth Prospects

The analysis of demand and supply sources of growth at the two-digit ISIC manufacturing activity categories according to small, medium and large employment firm size reveals the following:

- High growth rates of private manufacturing activities have become the driving force behind the growth of the manufacturing sector.

- In the post-reform period, there occurred a clear change in the structure of private manufacturing activities and its contribution to Egypt's growth: traditional activities in basic metals and wood gave way to more sophisticated ones like engineering and non-metal activities by large firms. Small firms have also demonstrated a favorable performance in non-traditional activities.

- Productivity gains are evident in private sector manufacturing activities. However, further study is needed to identify the distributional impact of these gains.

- The growth rate of value added exceeded the growth rate of labor and intermediates, particularly imports, which thereby reduced the cost share per unit of value added.

- The 1991 devaluation of the Egyptian pound affected the cost of production. Activities with higher rates of growth were able to cope with the devaluation better than others. Small-size firms were able to deal with the devaluation by reducing the import content of their total production cost and expanding output for the domestic market in more effective competition with higher priced imported goods. Large-size firms expanded real exports by 5.5 fold, thereby absorbing the increased cost of imported inputs with higher earnings of foreign exchange and more than doubling their real value added in the process. Medium-size firms seem to have had more difficulty coping.

- The contribution of exports to the economic growth of Egypt private manufacturing activities remains limited. The local market is the principal target of the private manufacturing sector. Egypt's tariff structure increases the profitability of producing for the domestic market, while raising the costs of intermediate

goods, whether imported or domestic, and thereby discriminates against exports. The implicit economy-wide tax on Egyptian exports is equal to about 19 percent, while a 22 percent premium for not exporting is implicitly being granted to potential exporters of manufacturing goods for selling in the domestic market (see Cassings et al., DEPRA, June 1998).

Private Sector Manufacturing Productivity

Private manufacturing productivity estimates suggest that market forces have made the private sector more efficient than before and therefore more competitive in the 1990's than it was in the late 1980's. This phenomenon is one of the major reasons for the strong performance of the private sector in total factor productivity (TFP) growth. The study also suggests that capital formation in the form of new and existing technologies will enhance the prospects for growth in the next decade.

There is evidence of substantial increases in productive efficiency in 28 Egypt manufacturing sectors at the 3-digit ISIC level for the period 1987/88 to 1995/96. The level of pre-reform efficiency equaled 65 percent, while that in the post-reform period equals about 80 percent. The results also indicate that technical TFP would be higher if technical progress embodied in new foreign and domestic investment were higher.

The specific findings of the study indicate that TFP increased by 11 percent between 1987/88 and 1995/96. Over 80 percent of TFP growth derived from capital, another 8 percent originated from labor, and 11 percent derived from energy and materials.

Linear programming techniques used to estimate allocative and total cost efficiencies showed that there were upward trends throughout the period under study. The level of cost efficiency increased by about 37 percent, equivalent to an average annual growth rate of 4 percent. Technical and allocative efficiencies scored 37 percent and 24 percent respectively, equivalent to a growth rate of 3.1 percent and 2.7 percent per year respectively.

Estimates of the composition and distribution of intra-sector TFP growth based on parametric methods using data at the 2 and 3 digit level of ISIC show an average increase of 1 percent in efficiency over the nine-year period. Simple OLS regression on the pooled data indicates a 1.2 percent increase in average efficiency over the same period. The marginal contribution of capital, labor, energy, materials to total output are 0.024, 0.316, 0.034 and 0.814 respectively, while average expenditure shares are 0.136, 0.094, 0.030 and 0.74 respectively. The marginal contributions of energy and labor are commensurate with their shares in total expenditure, while that of capital is lower and that of materials is somewhat higher. These findings suggest that more intensive use of capital input could be made to increase its marginal contribution to output.

Analysis of individual sectors revealed important differences not observed in the overall average growth rates. Overall gains in efficiency were experienced in the manufacture of

food, textiles, garments, non-metallic products and other industries, equal to 31, 20, 7, 8 and 5 percent respectively. On the other hand, the wood, paper, chemicals and engineering sectors experienced declines in efficiency of 12, 33 and 1.3 percent, respectively. Based on the capital service flows, the chemical sector shows efficiency gains in the last 2 years.

It appears that the labor-intensive sectors have been making better use of inputs than the capital-intensive ones. The slowdown of relative efficiency among the capital-intensive sectors is evident of the problem of decreasing technical efficiency in these sectors. New ways need to be found to introduce appropriate technological advancements in these sectors, while increasing the output growth of the labor intensive ones by employing more capital and better labor inputs. Towards this end, human capital development should be given greater attention.

The impact of the economic reform program on TFP growth of the private manufacturing sector has been significant. TFP growth in the private manufacturing sector has occurred through improvement in efficiency, as measured by production and cost efficiencies and technological growth rates. In particular, 57 percent of all manufacturing sectors had higher TFP growth rates, 90 percent had higher technological growth rate, of which 29 percent were positive, and 36 percent had higher efficiency growth rates. The winners in the private manufacturing sector experienced higher growth rates in all three productivity indices: TFP, technology and efficiency. Those sectors were beverages, tobacco, wearing apparel, food, textiles, wood, rubber, plastics and other non-metallic products. Nine sectors experienced lower efficiency growth rates and also lower productivity growth. Five manufacturing sectors had growth in TFP and technology but not in efficiency (paper, industrial chemicals, professional equipment, transport, and fabricated metal). Two industries experienced decrease in all three indices (iron and steel and non-ferrous metals). These results suggest that the impact of efficiency performance on TFP growth has been quite substantial. The winners have been those not only with higher technological growth rates in the post-reform period, but also with strong efficiency growth rates.

Profiles of Promising Industries

The interviews conducted on three promising activities (software, home appliances, and horticulture) identified a number of major impediments and challenges relating to marketing, finance, support institutions, technology, legal aspects, taxes, labor, machinery and equipment and infrastructure. The results suggest a number of actions needed to rectify the existing situation.

The Egyptian software industry, though highly diversified as compared with that of other countries, expanding quickly and employing about 5,000 persons, is limited by the extent of the domestic market. Real potential lies in the export market, which is expected to grow by about 20 to 30 percent a year. The software industry has a competitive edge in Arab language application. There is evidence of increasing return to scale in this industry in Egypt.

The major challenges to the software industry Egypt in descending order are as follows:

1. Marketing
   - *Lack of an overall marketing strategy, especially compared with countries successful in this industry, like India*

2. Finance
   - *Unavailability of short-term and long-term finance due to bank unwillingness to finance intangible assets*
   - *Lack of understanding by financial institutions of software business*
   - *Inability of banks to evaluate software project proposals*

3. Labor
   - *Inability to find qualified technical employees due to inadequate university training*
   - *The need for highly specialized employees for scientific or linguistic application.*
   - *High employee turnover*

4. Legal aspects
   - *Software piracy and weak enforcement of the intellectual property rights law*
   - *Insufficient punishment for copyright infringement*
   - *Lack of awareness of users of the need to use original software*

5. Support Institutions
   - *Insufficient support by both Government and the private sector*
   - *Inadequate technical assistance tailored to industry*
   - *Infrastructure*
   - *Excessive costs of telephone service, including international leased lines and satellite lines*

6. Taxes
   - *Import taxes and inspections*
   - *Export fees*

7 Technology
   - *Expensive training*
   - *High-tech on-line data systems or satellite transmission currently not available in Egypt*

The household appliance industry has a strong local demand that is expected to expand over the next decade. Its output nearly doubled between 1991 and 1994. Nevertheless, productivity of output per unit of labor and per unit of wages has dropped drastically. Also, the export performance has been poor: exports in 1994 were at about one-fifth of their 1991 level. It is questionable whether Egyptian firms would be able to compete in

export markets, including those in the Middle East and Africa that are members of the COMESA trade agreement, because of the relative low level technology in the industry. One reason is that the current level of protection offered by the tariff structure has acted as a disincentive to upgrade technology and a disincentive to export.

The most important challenges facing this sector in descending order are as follows:

1. Marketing

   - *Absence of market information on demographics and supply-demand balances of local and export markets*
   - *Absence of data to determine whether or not Egyptian household appliances would be accepted by consumers in potential export markets*

2. Support Institutions
   - *Lack of coordinated effort among businesses*
   - *Perceived absence of support from both private sector and government finance*
   - *High interest rates at 12-17 percent that raises costs of production relative to foreign competitors*
   - *Perceived inadequacy of bank officials in evaluating loan proposals, thereby stunting investment and preventing expansion*

3. Technology
   - *Lack of knowledge in determining optimal production processes and impartial and unbiased outside service*
   - *Lack of knowledge of developing product design that compete against European imports*
   - *High costs of financing new technology*

4. Legal Aspects
   - *Slow court system in commercial dispute settlement*

5. Taxes
   - *Export fees of 1 percent that hinder exports*

6. Labor
   - *Difficult to dismiss unproductive employees*
   - *Shortage of skilled and technical workers, managers and those with marketing skills*
   - *Lack of hands-on-practical experience of workers*

The horticulture industry comprising vegetables, fruits and cut flowers makes up 16 percent of Egypt's cultivated area. It is a high value-added industry with large export potential. The bulk of horticulture exports are vegetables, which in 1994-97 averaged US$ 154 million. Exports of cut flowers were lower and recorded negative average annual growth rates.

The major challenges faced by the horticulture industry in descending order are as follows:

1. Infrastructure
   - *Limited cargo space preventing small companies from exporting and raising cost for exporters than can afford private services*
   - *Misuse in loading produce on planes, which leads to spoilage and rejection during quality control inspections*
   - *Cooling facilities that are not sufficiently cold and cause spoilage*

2. Support institutions
   - *Perceived lack of support fror small and start-up companies*
   - *Worry over EU quota system and new EU-Egypt trade agreement*

3. Taxes
   - *Perceived unfair assessment of large swings in profits and losses due to weather by tax assessors*
   - *Accumulation of taxes relative to competitors in foreign countries*

4. Marketing
   - *Lack of timely and reliable data on production and yield for both Egypt and foreign markets*
   - *Technical information on new varieties, chemicals and other inputs specific to high value added products such as cut flowers*

5. Legal Aspects
   - *Lengthy and time-consuming approval process for land registration and land permits*
   - *Lengthy process to approve new seed varieties*

6. Labor
   - *Lack of managerial skills, and workers with technical skills*

7. Finance
   - *Overvaluation of the Egyptian pound relative to the US dollar, which undermines the competitiveness of the industry in the global market*
   - *Regulations requiring importers to cover 100 percent import coverage for letters of credit.*

Recommendations

Based on the aforementioned findings, the present study has identified the following mechanisms for accelerating private sector's contribution to Egypt's productivity and growth:

- Development of an action plan to promote growth in the manufacturing sector that stresses factors affecting both demand and supply.

- Development of a Government strategy to support factors that would increase the demand for Egyptian products in the international markets, such as development of technology, innovation, skills, compatible mix and match, standardization, clusters and export channels.

- Governmental review of investment incentives with a view towards leveling the playing field for all activities and allowing the market to pick the winners and towards reducing the current bias against exports.

- Promotion of small enterprises to stimulate the growth of employment.

- The Government should provide investment incentives through generalized tax exemptions since investment needs to be responsive to demand. Otherwise resources will not be efficiently allocated in the economy and will not contribute to sustainable growth.

- The Government should promote investment opportunities to emerging technologies and start-up enterprises, rather than large entrenched industries, which would have a large and favorable impact on TFP growth.

- The Government should adopt greater market-oriented trade and investment policies. Particular attention should be given to industries that have not enjoyed efficiency growth, including those in the chemical, non-metallic products, metal, engineering and other manufacturing sectors.

- The Government should further strengthen the on-going transformation in almost all private-manufacturing industries of Egypt, so that more sectors can achieve positive and higher technological growth rates. This process could be enhanced through the adoption of market-oriented practices that eliminate import licenses and bans, and the institution of private industry links with government sponsored R&D organizations.

- The private manufacturing sector should support efforts to build in-house R&D facilities to facilitate the adoption of foreign technology in the local economy. Simply importing the best and latest technology from abroad does not improve TFP growth.

- Since Egypt is a labor-abundant country, capital-saving technological growth should be sought. Such technology would aim to increase the efficiency of the scarce capital. This process has already taken hold in the private investment sector, which enjoys the highest output per unit of capital.

- Technology that enhances labor productivity should be adopted in an effort to reverse the falling labor productivity of Egypt over the period of the study.

Based on an analysis of interviews conducted on the three promising activities (software, home appliances, and horticulture), an action plan is recommended for marketing, finance, support institutions, technology, legal aspects, taxes, labor, machinery and equipment and infrastructure. These recommendations could easily be extended to other sectors and industries in the economy. The plan is designed to strengthen the responsiveness of business owners and managers to changing market signals, provide support to specific weaknesses identified in particular sectors of the economy, and strengthen the capacity of government institutions to support business activity. To be effective, the action plan needs to be viewed as an integral part of the country's economic policy reforms package.

Recommendations for Promising Sectors

The recommendations for the software industry center of the establishment of an inter-ministerial committee with the participation of the private sector to implement an industry strategy that reflects similarities and differences between the software industries of Egypt and India, as well as other countries. Help should also be provided to individual companies to develop detailed marketing plans, including funding their participation in international trade shows in the Middle East region and the Far East.

Specific recommendations for the software industry are as follows:

1. Marketing
   - *Develop a long-term strategy, using India and other successful countries as an example with inter-Ministerial Committee and EEA.*
   - *Provide technical assistance in the field of marketing software*
   - *Assist companies to develop marketing plans, including financial support, so that companies can participate in international and regional trade shows*

2. Finance
   - *Develop a long-term financial strategy to promote software industry, including e-commerce*
   - *Providing training to bank personnel on the importance of intangible assets of companies*
   - *Provide training to decision-makers in financial institutions on how to evaluate software project proposals*

3. Labor Aspects
   - *Provide continuous dialogue between the private sector and universities*
   - *Investigate university curriculums in the United States and Europe in terms of their application to Egypt*
   - *Offer specialized training in Arabic language programming and scientific programming*
4. Legal Aspects
   - *Improve the technical capabilities of the enforcing agencies and conduct more raids for illegal software*
   - *Increase penalties for copyright infringement*
   - *Implement widespread media campaign to raise awareness of need to use original*

5. Support institutions
   - *Increase involvement by government and private sector agencies involved in software and information technology promotion*
   - *Update IDSC Software Company Directory on a regular basis*
   - *Provide technical assistance especially in marketing*
   - *Provide research on Indian and USA software industries with possible application to Egypt*

6. Machinery and Equipment
   - *Investigate technology parks in India with possible application to Egypt*
   - *Consider lowering taxes on key inputs and provide training to customs officials on assessment of CD ROMs*
   - *Consider removing export fees on CD ROMs*

7. Technology
   - *Offer affordable training courses of various lengths*
   - *Continue to promote competition in telecommunication* sector

The household appliance industry recommendations are as follows:

1. Marketing
   - *Establish market information system with reliable data on demographics and supply/demand balances in local and potential export markets*
   - *Conduct detailed market demand study on feasibility of exporting household appliances to COMESA markets, G15, and other markets*
   - *Undertake a follow-up study on the feasibility of exporting home appliances to African markets under COMESA Agreement and on establishing an information system with demographic data*

2. Support institutions
   - *Encourage ways to lower interest rates or offer low-cost loans through donor programs*
   - *Offer training to bank personnel, preferably abroad, to evaluate loan proposals*

- *Introduce concept of venture capital and risk management to banking sector to expand exports*

3. Technology
   - *Offer workshops or seminars to improve management skills in optimizing production, marketing, and developing technology*

4. Legal aspects
   - *Improve the court system so that disputes are settled within a reasonable timeframe*

5. Taxes
   - *Remove export fee of 1 percent*

6. Labor
   - *Revise labor code to enable dismissal of unproductive workers*
   - *Review educational system to improve technical base with hands-on experience*

For the horticulture industry, the recommendations focused on

1. Infrastructure
   - Privatize air shipping operations
   - Expand cooling facilities in terms of volume and improve temperature
   - Implement system for loading produce within reasonable time

2. Support Institutions
   - Make special effort to include small and start-up companies in donor-assisted projects
   - Continue to negotiate increased EU quotas, especially for promising products like strawberries.

   - Taxes
   - Investigate tax code with special application to agriculture, such as income averaging

   - Marketing
   - Improve collection and dissemination of production and yield data
   - Encourage association to regularly maintain information on inputs, especially for high value-added products

5. Legal Aspects
   - Review land registration and permit process with view of combining steps to reduce time
   - Review approval process for imports of new seeds

6. Labor Aspects

- Design and implement training course for managers through producer associations

To conclude: Despite real progress achieved so far by the Egyptian Government in meeting the never-ending productivity and competitiveness challenge including: stabilizing the economy, strengthening financial institutions, promoting increasingly outward-looking and internationally competitive business practices and streamlining regulations which have been reflected in clear gains to the Egyptian economy and its citizens, some problems still persist, particularly those related to the external balance. Tariff and non-tariff barriers, foreign exchange issues and transaction costs require immediate remedies. Concerted efforts on the part of both Government and the Egyptian business community are needed to design an action plan to promote growth and productivity in the Egyptian economy in general, and in the manufacturing sector in particular, with focus on promising activities. This includes the development of technology, innovation, skills, compatible mix and match, standardization, clusters and export channels, and support efforts to build in-house R&D facilities. .