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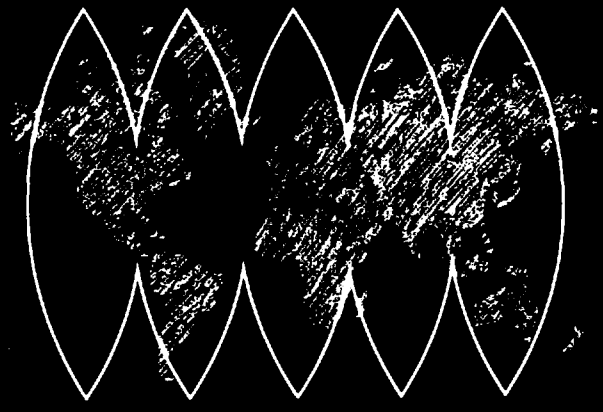
Iran

Industrial development review



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Islamic Republic of

IRAN

Industrial Revitalization

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CONTENTS

Page

LIST OF TABLES, FIGURES, BOXES AND ANNEX TABLES

FIGURES

BOXES

ANNEX TABLES

PREFACE

This Industrial Development Review of the Islamic Republic of Iran (hereafter referred to as Iran) is one of a series of country reports which form part of the work programme of the Information and Research Division of UNIDO. The Reviews present a survey and analysis of each country's industrial development process.

The study was undertaken in close consultation with the United Nations Development Programme (UNDP) and partially financed under the Technical Support Services (TSS-1) programme, project No. NC/IRA/92/034.

This Review comprises three Chapters. Chapter I presents an overview of the economy, analysing the macroeconomic context of the ongoing process of industrialization. Chapter II elucidates the structure and performance of the manufacturing sector. Chapter III examines the constraints and prospects of key industry branches, focusing on the emerging subsectoral investment opportunities.

This Review was prepared on the basis of information available as of mid-March 1995.

EXPLANATORY NOTES

References to dollars ($) are to United States dollars, unless otherwise stated.

Dates divided by a slash (1991/92) indicate a fiscal year or a crop year. Dates separated by a hyphen (1991-92) indicate the full period, including the beginning and end years.

In Tables:
Totals may not add precisely because of rounding.
Two dots (..) indicate that data are not available or not separately reported.
A dash (-) indicates that the value is nil or negligible.

The following abbreviations are used in this publication:

APFII	Law on the Attraction and Protection of Foreign Investment in Iran
BKPC	Bandar Khomeini Petrochemical Complex
BOD	biological oxygen demand
bpd	barrels per day
CBU	completely built-up
cc	cubic centimetres
CFCs	chlorofluorocarbons
CIS	Commonwealth of Independent States
CKD	completely knocked-down
CNG	compressed natural gas
COD	chemical oxygen demand
DAP	diammonium phosphate
DMT	dimethyl terephthalate
DMT/DOP	Dioctylphtalates
EOR	enhanced oil recovery techniques
EU	European Union
FAO	Food and Agriculture Organization
GDP	gross domestic product
GI	galvanized iron
HYL	*hojalata y lámina* steel production technology
IBD	Iran Bonyan Diesel Company
ICC	Iran Carbon Company/Iran Carpet Company as applicable
IDM	Iran Diesel Motors Company
IDRO	Industrial Development and Renovation Organization
IFC	International Finance Corporation/Iran Fishing Company as applicable
IJPC	Iran-Japan Petrochemical Complex
INSIG	Iran National Steel Industry Group
IR	Iranian rial
IRALCO	Iran Aluminum Company
ISC	Iran Sericulture Company
ISIC	International Standard Industry Code
ITC	Iran Tobacco Company
ITI	Iran Telecommunication Industries
ITO	Iran Tea Organization
KFTZ	Kish Free Trade Zone

kVA	kilovolt-ampere
kWh	kilowatt hour
LAB	linear alkyl benzene
LNG	liquefied natural gas
LPG	liquefied petroleum gas
MAP	monoammonium phosphate
MCM	million conductor metres
MESA	Ministry of Employment and Social Affairs
MST	Machine Sazi Tabriz
MSTS	Motor Sazan Tractor Sazi Company
MVA	manufacturing value added
MW	megawatt
NGC	National Gas Company
NIIO	National Iranian Industries Organization
NIOC	National Iranian Oil Company
NPC	National Petrochemical Company
OECD	Organisation for Economic Cooperation and Development
OPCP	Organization for the Protection of Consumers and Producers
OPEC	Organization of Petroleum Exporting Countries
PABX	private automatic branch exchange
PU	polyurethane
PVC	polyvinyl chloride
R&D	research and development
SBCI	Shahid Bahonar Copper Industry
SBR	styrene butadiene rubber
SCI	Statistical Centre of Iran
SGK	Sazeman Ghaleh Keshvar (regulatory body for cereal marketing)
SKCC	Sarcheshmeh Kerman Copper Complex
SMC	Shahid Modarres Complex
STPP	Sodium tripolyphosphate
TPP	triple polyphosphate
tscf	trillion standard cubic feet
TSP	total suspended particles/triple superphosphate as applicable
UK	United Kingdom
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
UNIDO	United Nations Industrial Development Organization
USA	United States of America
USSR	Union of Soviet Socialist Republics
WB	World Bank
WHO	World Health Organization

BASIC INDICATORS

BASIC INDICATORS I: THE ECONOMY

GDP (1992) (At market prices)	:	IR 67,811 billion
Population (mid-year 1992)	:	59.2 million

Annual average growth rate of population (Percentage)

1975-86	1986-91	1975-91
3.9	2.5	3.4

Growth of GDP (Percentage)

1987	1988	1989	1990	1991	1992
0.0	-4.4	4.5	11.2	10.6	5.8

Structure of GDP (Percentage)

	1975	1992
Agriculture	8.5	23.3
Mining	39.1	10.3
Manufacturing	7.8	14.0
Other	44.6	52.4

Exports (1992)	:	$19.2 billion
(Oil and gas)	:	$16.3 billion
Imports (1992)	:	$21.2 billion

Current account balance ($ billion)

1987	1988	1989	1990	1991	1992
-2.1	-1.9	-0.2	0.3	-7.8	-4.7

Total external debt ($ billion)

1987	1988	1989	1990	1991	1992
4.0	4.2	5.9	6.2	10.9	14.6

Debt service ratio (Percentage)

1987	1988	1989	1990	1991	1992
3.6	5.7	3.4	3.3	4.2	4.1

Gold reserves (Million fine troy ounces)

1987	1988	1989	1990	1991	1992
4.3	4.3	4.3	4.3	4.3	4.3

Consumer price index (1982 = 100)

1987	1988	1989	1990	1991	1992
241.0	314.6	336.3	379.9	478.6	562.7

Official exchange rate (Iranian rial equivalents to $1, annual average)

1987	1988	1989	1990	1991	1992
71.5	68.7	78.0	68.1	67.5	65.6

Note: All years begin 21 March.

BASIC INDICATORS II: THE INDUSTRIAL SECTOR

Value of industrial production (1992) : IR 12,133 billion

Industrial employment (1992) (Number of persons) : 2.0 million

Growth of MVA (Percentage) :

1987	1988	1989	1990	1991	1992
11.1	2.0	8.9	16.0	20.5	3.2

Structure of MVA (Percentage) :

	1975	1990
Food products	12.03	13.78
Textiles and garments	20.95	15.21
Chemicals/petrochemicals	14.37	13.26
Iron and steel	7.85	9.51
Non-ferrous metals	0.71	3.72
Metal products	2.65	4.22
Non-electrical machinery	6.54	9.96
Electrical machinery	7.22	2.57
Transport equipment	8.56	13.13
Other	19.12	14.64

Value of selected manufactured exports (1992) ($ million) :

Textiles and garments	630.3
Processed foods	590.7
Chemicals/petrochemicals	481.0

Value of selected industrial imports (1992) ($ million) :

Machinery and equipment	9,992.5
Chemicals/petrochemicals	2,013.7
Metals and metal products	1,585.8

Structure of merchandise imports by end-use (Percentage) :

	1980	1992
Capital goods	16.0	23.3
Intermediate goods	57.2	63.3
Other	26.7	13.4

Note: All years begin 21 March.

BASIC INDICATORS III: INTER-COUNTRY COMPARISON OF SELECTED INDICATORS

Indicator	Unit	**Iran**	Egypt	Pakistan	Saudi Arabia	Turkey
Population (mid-1992)	Million	59.6	54.7	119.3	16.8	58.5
Area	Thousand square km	1,648	1,001	796	2,150	779
GNP per capita (1992)	$	2,200	640	420	7,510	1,980
Average annual rate of inflation (1980-1992)	Percentage	16.2	13.2	7.1	-1.9	14.3
Private consumption (1992)	Percentage of GDP	58	80	72	..	63
Gross domestic investment (1992)	Percentage of GDP	33	18	21	..	23
Gross domestic savings (1992)	Percentage of GDP	30	7	14	..	20
Exports of goods and services (1992)	Percentage of GDP	14	27	17	..	21
Energy consumption per capita (1992)	Kg of oil equivalent	1,256	586	223	4,463	948
Food industry (1991)	Percentage of MVA	16	25	..	7	17
Textiles and clothing (1991)	Percentage of MVA	21	17	..	1	13
Machinery and transport equipment (1991)	Percentage of MVA	16	7	..	4	18
Chemicals (1991)	Percentage of MVA	10	12	..	39	10
Other industries (1991)	Percentage of MVA	37	39	..	50	42
Manufactured exports to OECD countries (1992)	$ million	735	1,011	3,474	1,837	7,809
Current account balance (1992)	$ million	-4,651	2,605	-1,049	-19,431	-943
Gross international reserves (1992)	$ million	..	11,620	1,524	7,467	7,508
External debt (1992)	$ million	14,167	40,018	24,072	..	54,772
Debt service ratio (1992)	Percentage	4.0	15.5	23.6	..	31.9

Source: World Bank, *World Development Report 1994* (Washington D.C., 1994).

Note: Data for Iran may not correspond to those cited elsewhere in this report because of different sources.

SUMMARY

The Iranian economy has experienced a number of external shocks during the past few decades, including a highly destructive war in 1980-88. These events seriously disrupted the country's development process and hampered its ability to realize its full economic potential. By 1988 its gross domestic product had fallen, in real terms, well below the level prevailing a decade earlier, and with the population having increased substantially in the meantime, this implied a sharp fall in per capita incomes and personal living standards.

The end of the 1980-88 war gave rise to a recognition of the urgent need to restore the economy to a sustainable growth path, and prompted the government to initiate the First Socio-Economic and Cultural Development Plan of the Islamic Republic of Iran, covering the five year period from March 1989 to March 1994. One of its most important features was an attempt to revive market mechanisms and reverse the extensive accretion of administrative restrictions over the economy that had occurred during the preceding ten years. Particular attention was paid in this connection to fiscal and monetary stabilization, the gradual removal of price controls and subsidies, the establishment of realistic interest and exchange rates, the liberalization of trade and investment regulations, and the restoration of incentives for the development of private entrepreneurship.

The following years consequently witnessed the introduction of a number of fundamental economic policy reforms. These included measures to improve the tax administration and diversify the government's revenue base away from its high dependence on the petroleum sector, remove credit ceilings and raise the rates of return on bank deposits and credits, reactivate the Tehran Stock Exchange, and pave the way for a far-reaching privatization programme. These measures were complemented by a significant liberalization of price policy, a relaxation of trade restrictions, and a unification of the complex multiple exchange rate structure prevailing in 1988 at a sharply depreciated market-related level.

These measures, supported by a strengthening of international oil prices in the wake of the Iraqi invasion of Kuwait in August 1990, resulted in a marked improvement in Iran's economic performance. This was reflected in a significant acceleration in the rate of GDP growth and a sharp drop in inflation in 1989 and 1990 as the government's budget deficits were reduced. This trend began to be reversed in 1991-93, however, with inflation picking up again in response to an acceleration of credit expansion, exchange rate realignments and price deregulation, and the inevitable need to import a wide range of capital and intermediate goods required for the reconstruction process imposing a considerable strain on the balance of payments. With Iran's foreign exchange reserves having been depleted in the preceding years by the need to finance the war effort and the substantial compensation payments awarded to foreign owners of firms expropriated by the government in the early 1980s, this widening of the current-account deficit provoked serious cash flow problems from mid-1992 onwards and resulted in a rapid build-up of arrears on Iran's trade-related debt.

As the arrears continued to accumulate, the government entered into negotiations with Iran's creditors to reschedule debt service payments, and by mid-1994 wide-ranging agreements had been reached with most major creditors. The deteriorating balance of payments and external debt situation inevitably prompted a further weakening of the rial in the foreign exchange markets, however, resulting in a further significant depreciation of the currency in 1993-94 and the renewed emergence of a differential between official and free market rates. The mounting economic pressures during 1992 and 1993 also prompted a gradual shift in public attitudes towards the reform process, which resulted in the *majlis* (national parliament) postponing its endorsement of the Second Socio-Economic and Cultural Development Plan of the Islamic Republic, which was

presented to it for deliberation and approval on 21 December 1993. The introduction of this plan, which sought to continue the reform process and was scheduled to come into force upon expiry of the First Plan on 20 March 1994, was thus delayed to 21 March 1995.

In the meantime, the government responded to growing concern over rising inflation and the worsening external payments situation by reimposing a variety of economic controls from mid-1994 onwards. While the reintroduction of these controls constitutes a short-term setback to the reform programme initiated in the late 1980s, and will have to be reversed in the coming years in order to ensure the removal of the existing economic distortions and the sustainability of Iran's economic recovery and future growth, the longer-term outlook remains promising. The country has a substantial resource potential on which to diversify its economy from its present high dependence on the hydrocarbon industries, provided an appropriate incentive structure is established and maintained. Much of this potential is of an industrial nature, moreover, and the development of an efficient and competitive manufacturing sector based closely on Iran's endowment of natural and human resources will play a major role in stimulating the country's overall economic development.

This issue is discussed in detail in Chapter I, which also provides an overview of the structure of the Iranian economy and surveys of the major productive sectors. In addition, Chapter I presents an analysis of the macroeconomic policy environment, as well as an historical summary of the evolution of Iran's industrial policies. The chapter ends with a discussion of the country's policy towards foreign investment, which points out that Iran has begun to adopt a more open approach to foreign participation in the economy since the late 1980s, and concludes with the observation that the Iranian authorities have recognized the need to attract increased investment flows and are actively seeking to create a favourable investment environment.

Chapter II continues with an analysis of the manufacturing sector as a whole. Specifically, it discusses the historical development of Iran's manufacturing industry in terms of growth and structural change, and assesses past trends and future prospects for industrial employment, productivity and profitability. In addition, it provides an overview of the institutional support structure for industrial development, and of industrial ownership and investment patterns, industrial trade flows, industrial location and the environmental impact of industrial development. The chapter concludes with a brief survey of international cooperation in the industrial sector, and of the contribution made by UNIDO in this field.

Chapter II shows that the Iranian economy was essentially agrarian in character until well into the present century, with the modern manufacturing sector having its origins in the establishment of a number of textile mills, cement plants and sugar refineries in the 1930s. These industries continued to form the backbone of the industrial sector until the early 1960s, after which a number of basic consumer goods industries were established and the foundations were laid for the iron and steel, automotive, and petrochemical and chemical industries. After accelerating further in the 1970s, the industrialization process slowed down in the 1980s as a result of changing economic priorities, a reduction in private investment, and the impact of the 1980-88 war, which resulted in a significant diversion of resources and severe damage to many of Iran's leading industrial facilities.

The end of the war and the subsequent adoption of more liberal economic policies, culminating in the introduction of the First Socio-Economic and Cultural Development Plan of the Islamic Republic (1989-94), paved the way for a resumption of industrial growth and development. Many of the installations damaged during the war were rebuilt, and many delayed projects were completed. The restoration of stability also stimulated a gradual recovery in private investment

interest, especially within the Iranian business community, which is beginning to move from short-term intermediation activities to longer-term industrial capital formation.

Data on the distribution of manufacturing value added (MVA) by major industrial branches presented in Chapter II show that the manufacturing sector has traditionally been dominated by the textiles, food processing (including beverages and tobacco manufactures), and transport equipment branches, whose combined share remained almost unchanged at about 41 per cent between 1975 and 1992. Important changes did take place within these branches, however, with the share of the textile industry declining from 20.5 per cent to 14.6 per cent, while the shares of the food processing and transport equipment industries increased from 12 per cent to 13.7 per cent and from 8.6 per cent to 13.1 per cent respectively during this period. Other major manufacturing branches are the non-metallic mineral products industries (including ceramics and glass), the metal and metal products industries (excluding machinery and equipment), and the electrical and non-electrical machinery industries.

Employment data collected by the various population censuses conducted since the 1950s show that the manufacturing sector had only a modest impact on labour absorption. After rising sharply from 13.8 per cent in 1956 to 18.2 per cent in 1966, the share of the labour force employed in the manufacturing sector rose only marginally to 19 per cent in 1976 before falling back to a mere 13.2 per cent in 1986. While this last figure is no doubt distorted to some extent by the effects of the 1980-88 war and other political developments in the 1970s and 1980s, it nevertheless underlines the limited capacity of the manufacturing sector to absorb the rapid growth in population and the labour force in recent years.

Two principal causes can be identified for the comparatively low absorption of labour by the manufacturing sector in Iran. One is the import-substituting approach to industrialization adopted by the country, which promoted the establishment of capital-intensive industries and was supported by expansionary monetary policies and an overvalued exchange rate. The other was the emergence of the highly capital-intensive petroleum industry as a dominant element in the economy, which made a substantial contribution to GDP while playing a minimal role in employment creation.

Of the non-oil industries, the most important sources of employment creation have been the textile, food processing, non-metallic mineral products, basic metals and engineering industries. By contrast, the leather, wood, paper and professional equipment industries have employed a very small share of the industrial labour force. The contribution of the chemical industries (comprising industrial chemicals, non-industrial chemicals, petroleum refining, miscellaneous coal and petroleum products, and rubber and plastic products) has also been significant in overall terms, although the share of the individual components has historically been relatively small.

For religious and cultural reasons, a segregation of the sexes is observed in Iran, under which women are expected ideally to limit their activities to the domestic sphere and avoid contact with non-related men. Women nevertheless do engage in gainful employment, and make an important contribution to both the formal and informal sectors of the economy. Industrial employment for women is believed to have decreased sharply since the mid-1970s. The main source of industrial employment for women is carpet-weaving, which is carried out mainly in small rural workshops. Other important employers of women are the textile, garment, leather and footwear industries, although they have suffered some of the most dramatic declines in female employment over the past two decades. The food and beverages industries are also significant employers of women, as is the electrical goods assembly industry. In addition, rural women are also involved in a variety of handicrafts, including carpet-making, weaving, embroidery, mat-making, the production of *gillims* (hand-woven floor coverings) and sericulture, which represent an important source of income for rural households.

Productivity growth has been very limited in the industrial sector since the mid-1970s, with the initial gains made in the first half of the 1980s being eroded in subsequent years and the share of value added in the gross output of the manufacturing sector being only marginally higher in 1992 than in 1975. This overall pattern conceals considerable differences in the performance of various individual industries, however. Particularly impressive results were recorded by the food processing, beverage and tobacco manufactures industries, all of which substantially increased their share of MVA in gross output between 1975 and 1992. Other industries recording an improved performance included the basic iron and steel, the non-electrical machinery and the transport equipment industries, in most cases as a result of the increased availability of cheap local inputs to replace more expensive imports. All other industries suffered a reduction in this share, reflecting their declining efficiency and productivity.

Labour productivity also varies significantly between industries. Inevitably, the highly mechanized or capital-intensive industries enjoy the highest levels of labour productivity, with the transport equipment and non-ferrous metal industries recording productivity rates more than twice the average level of the manufacturing sector as a whole, and the beverages, tobacco processing, leather, chemicals, glass, iron and steel, and machinery industries also reporting above-average productivity rates in 1992. Relatively low rates, by contrast, are recorded by the traditional low-value-added labour-intensive industries, such as garments, footwear and ceramics.

The analysis in Chapter II also shows considerable inter-temporal shifts in relative labour productivity rates between 1975 and 1992. In most cases the changes have been negative, with a particularly sharp fall in relative labour productivity having taken place in the petroleum refining industry and significant falls having been recorded in the leather footwear, furniture, paper and publishing, industrial chemicals, rubber and plastics, metal products, electrical machinery and scientific equipment industries. They have been partially offset, however, by significant improvements in the non-ferrous metal, non-electrical machinery, transport equipment and miscellaneous manufacturing industries.

The falling productivity can be ascribed to a number of causes, many of which are exogenous to the manufacturing sector itself and have their origins in the political developments of the past two decades and the economic policies adopted during this period. This has had a considerable impact on the operating environment faced by manufacturing enterprises, affecting the availability of appropriate factors of production, management skills, investment funds, technology, and markets. In many cases the availability of these resources has been severely limited, leading inevitably to sub-optimal decision-making and the choice of second-best options.

Chapter II shows further that the cost structure and profitability of Iranian industry has been influenced very significantly by a number of favourable government policies over the past two decades, including the maintenance of an over-valued exchange rate to reduce the cost of imported inputs and a deliberate effort to reduce the real cost of domestic credit. At the same time, however, these policies have distorted the operation of the price mechanism, and resulted in the emergence of inefficient and uncompetitive industries as well as a number of macro-economic disequilibria, which are proving very difficult to correct.

The government has traditionally played an important role in the manufacturing sector in Iran, which until September 1994 was organized into four groups, each of which came under the jurisdiction of a separate ministry. Light industries, including food processing, textiles and leather, chemicals and pharmaceuticals, non-metallic minerals, light metal products and electrical and electronic appliances, were placed under the supervision of the Ministry of Industry, while the automotive, machine tools and heavy engineering industries were supervised by the Ministry of

Heavy Industries. The basic metals industry, meanwhile, was allocated to the Ministry of Mines and Metals, while the petroleum and petrochemicals industry fell under the remit of the Ministry of Petroleum. In order to rationalize this structure, the government proposed the gradual merger of these ministries, taking the first step in this direction in September 1994, when the Ministries of Industry and Heavy Industries were combined.

The government's involvement in the manufacturing sector is also reflected in the pattern of industrial ownership. With the early phases of Iran's industrialization programme having been initiated and funded mainly by the state, a privately owned component of the industrial sector did not emerge until after the late 1960s. This consisted mainly of small and medium scale enterprises engaged in the production of consumer goods. The expansion of the private sector was arrested in the 1980s, however, which witnessed the widespread nationalization of privately owned firms. Some of these were placed under the control of the newly-established National Iranian Industries Organization (NIIO) affiliated to the Ministry of Industry, or the Industrial Development and Renovation Organization (IDRO), an umbrella organization established in 1967 for the management of state-owned heavy industries and affiliated to the Ministry of Heavy Industries since 1982, while others were taken over by a number of state-affiliated foundations.

Having been conceived primarily as an import-substituting activity, manufacturing industry has traditionally made only a relatively modest contribution to the country's export earnings. The available trade data thus indicate that petroleum has consistently accounted for the bulk of Iran's exports, with the share of non-oil/gas products in total exports fluctuating between 2 per cent and 16 per cent between 1971 and 1991. The share of manufactured goods, moreover, never exceeded 28 per cent of total value of non-oil/gas exports, with detergents and soap, chemicals, shoes, garments, transport equipment, cement and building materials constituting the bulk of these exports during the past 20-30 years. The export of cement has ceased in recent years, however, but copper ingots and products have become an important manufactured export since the mid-1980s.

Despite the efforts to expand its import-substituting domestic manufacturing base, Iran remains highly dependent on imports to satisfy its domestic demand for a wide variety of manufactured goods. A substantial proportion of these imports has traditionally consisted of capital goods needed for the establishment and expansion of the country's industrial and infrastructural capacity, with transport equipment and machinery accounting for about a third of its total expenditure on merchandise imports since 1980. In addition, Iran also continues to rely heavily on imports of manufactured intermediate goods, including chemicals, and a wide range of manufactured consumer goods.

The location of Iranian industry has been influenced not only by economic factors, such as the proximity to raw materials and markets, but also by a variety of social, administrative and historical factors. The country's first manufacturing plants, established in the 1920s and 1930s, were located in Tehran, Esfahan and the provinces bordering the Caspian Sea, which became the initial nuclei of the industrialization process. As the industrialization process continued, it became increasingly oriented towards the achievement of industrial self-sufficiency. This concept of self-sufficiency was gradually extended to the provincial level, resulting in a considerable dispersal of industry, which was reinforced during the early 1980s by the establishment of a number of industrial estates throughout the country. Despite this geographical spread of manufacturing activities, however, the capital Tehran and the areas surrounding it have become the principal hub of the industrial sector, and now account for about 40 per cent of the country's medium and large industrial enterprises. Other important industrial provinces include Esfahan, Khorassan, East Azerbaijan and, to a lesser degree, Kerman, Zanjan, Mazandaran, Gilan and Khuzestan.

The industrial development process has inevitably imposed serious strains on the environment, with the industrial sector accounting for much of Iran's air and water pollution. The country's public authorities have been keenly aware of the need to protect the environment for more than two decades, however, and have established a comprehensive legal and institutional framework for this purpose. Its strong commitment to environmental protection notwithstanding, the government has often lacked the means to implement its policies and regulations with the required rigour, and has given priority to the objective of economic growth and income creation where this has been in conflict with its environmental goals. This has resulted in a considerable neglect of the environment, involving a substantial loss of forestry resources, significant environmental damage during the 1980-88 war, the widespread dumping of unprocessed industrial and household refuse, and high levels of air and water pollution. The situation is especially serious in Tehran, but most of the other major cities, including Tabriz, Ahvaz, Arak, Shiraz and Esfahan, also suffer from high levels of pollution.

Since the end of the 1980-88 war, the Government of Iran has attempted to promote economic development and improve living standards. While seeking, as far as possible, to achieve this goal through the mobilization of the country's own resources, it has also recognized the benefits to be gained from increased international cooperation with bilateral and multilateral development assistance agencies, non-governmental organizations and private entrepreneurs. A partnership has also been created in this context between Iran and the United Nations development assistance system, including UNIDO. By mid-1994 the number of completed technical cooperation projects undertaken by UNIDO in Iran had reached 105, and a further 14 projects were in progress at this time, including a project to formulate a master plan for the development of national industrial research institutions, and two projects to convert Iran's refrigerator and foam producing industries from the use of chlorofluorocarbons (CFCs) to alternative non-ozone depleting substances.

The analysis of the manufacturing sector at an aggregated level in Chapter II is followed by more specific analyses of its various branches and industries in Chapter III. For ease of reference, each of these analyses follows a standardized pattern, assessing first the resource base, then recent development trends, and finally the constraints and prospects of each branch. All the major manufacturing branches, and many individual industries, are covered in detail in this chapter, which forms the core of the present Review.

Agro industries

Although it is a relatively arid country, of which only about 10 per cent is arable according to the most recent agricultural census undertaken in 1988, Iran produces a diversity of cereal, horticultural and industrial crops. These include wheat, rice, barley, maize, potatoes, a wide range of fruits, vegetables and nuts, sugar, tea, cotton, tobacco and several oilseeds. In addition, Iran has a long tradition of animal husbandry, with relatively large numbers of sheep, goats, cows and chickens. Finally, the country also has important fisheries resources both in the Caspian Sea to its north and in the Persian Gulf and Sea of Oman to its south.

Most of these agricultural raw materials are processed to a greater or lesser degree within the country, giving rise to a comparatively well-developed agro-industrial base. With wheat-based bread having traditionally constituted an important part of the Iranian diet, the large-scale milling of wheat flour and the baking of bread have become major components of the agro-industrial sector since mechanized milling began to be introduced in the 1950s. While data on the milling capacity or output of the large number of small-scale mechanized enterprises in the country are not available, official statistics released by the Ministry of Industry indicate that 288 medium and

large mechanized units with a combined production of 6.9 million tonnes were in operation in 1994, while a further 66 flour mills with a projected capacity of about 2.5 million tonnes were under construction. Other processing activities which have gained in importance in recent years include the production of pastry, biscuits and pasta.

Rice also forms an important part of the Iranian diet, and is grown in the northern, southern and south-eastern parts of the country. The crop was traditionally husked by hand-pounding, but this method has increasingly been replaced by mechanized milling since the 1920s and 1930s. The milling industry is divided into two distinct sectors, one consisting of relatively small scale enterprises scattered throughout the rural rice producing areas, and the other of more centralized larger firms. The former tend to concentrate on the milling of the more popular traditional long-grain rice varieties, and mill them to a high quality with a lesser percentage of broken rice. The latter, which can offer higher standards of polishing than their smaller counterparts, are mainly responsible for milling the short-grain high-yielding rice varieties.

Other starchy staple crops produced in Iran include barley and maize, of which the former is used almost entirely for the production of animal feeds, while the latter is consumed on the cob or used as animal fodder, although 21 firms with a combined capacity of 28,400 tonnes were reported to be involved in the production of snacks based on puffed corn in 1994. Potatoes are also widely consumed in Iran, and are increasingly being processed into crisps and unfried frozen chips by a number of small-scale enterprises. Since processed foods derived from potatoes and maize tend to be regarded as luxury foods, however, the prospects of these industries will depend to a considerable degree on the future patterns of income growth within the country.

Although most of the temperate fruits and vegetables produced in Iran are consumed fresh or cooked in traditional dishes, the abundance of the available produce attracted the interest of entrepreneurs in the canning industry at an early stage of Iran's industrialization process. After growing slowly between 1930 and 1956, the industry experienced a rapid expansion in the 1960s and 1970s as a result of rising per capita incomes and increasing urbanization. The growth of the industry accelerated further in the early 1980s in response to the granting of huge subsidies for the import of can-making machinery and galvanized steel sheet. The growth process suffered a setback after March 1993, however, when the complete elimination of foreign exchange subsidies following the unification of the exchange rate pushed up domestic prices and adversely affected domestic demand. At the same time, however, the currency depreciation of the post-war period generated strong hopes for an expansion of Iran's exports of fruit juice concentrates, and prompted a significant increase in investment interest in this field.

After registering low or negative growth rates during most of the 1970s, the output of most of Iran's other annual and perennial cash crops, such as oilseeds, pulses, olives, sugar beet and cane, lentils, tea, saffron, cumin seeds, tobacco, cotton and numerous varieties of nuts, has increased steadily in the 1980s and early 1990s in response government policy measures and an improvement in the agricultural terms of trade. Cotton represents an exception to this trend, however, with output falling sharply after 1979 as a result of the nationalization of large estates and their subsequent division into smallholdings and distribution to peasant cultivators. This had obvious implications for the milling industry, which remained stagnant for most of the 1980s. By contrast, production and exports of most varieties of dried nuts increased significantly after the 1970s, with most of this increase being recorded in the early 1990s in response to changing export regulations and the beneficial effect of the devaluation of the rial. The production of crude and refined edible oils, tea and sugar has also increased sharply during the past two decades, although the production of tobacco and cigarettes has remained virtually unchanged.

Despite considerable fluctuations in the fortunes of Iran's livestock farming industry, the country's output of meat and dairy products has increased significantly during the past three decades. The output of processed meats has grown particularly rapidly in recent years, initially in response to a growing demand resulting from western cultural influence, and subsequently in response to the high rates of urbanization in the last two decades. The dairy industry, which has its origins in the establishment of Iran's first pasteurization plant in Tehran in 1957, has also expanded dramatically and by 1993 consisted of more than 50 firms producing a wide range of goods including pasteurized milk, cheese, butter, yoghurt, ice cream and butter milk.

Iran also has a thriving apiculture industry, which is widely dispersed in many parts of the country. The industry has increasingly begun to use modern wooden hives and suitable foreign varieties of queen bee have also been imported and bred locally. The scope for further developing apicultural activities remains limited due to the comparatively high cost of production, however, and the absence of an institutional and technical support base, which is essential for advancing related skills and the application of new techniques. Such support is particularly urgent to combat bee diseases, which nearly devastated the industry in 1985.

With a 630 kilometre coastline in the north along the Caspian Sea, and 1,880 kilometres in the south along the Persian Gulf and the Sea of Oman, Iran enjoys access to substantial marine fisheries resources. In view of the very different forms of marine life inhabiting the country's two major fishing zones, however, its fishing industry has two distinct components in the north and south of the country. Fishing activities in both regions have increased rapidly since 1979, with the industry's total output almost having quadrupled during the 1980s. Although pollution and overfishing pose a threat to the further development of the industry, some scope for further expansion exists, especially in the south, if the necessary infrastructure, including ports, cold storage facilities and processing plants, can be established.

Iran's horticultural resources, and in particular its grapes and barley, have provided a strong base for the production of both alcoholic and non-alcoholic drinks, although the production of the former ceased on a commercial basis after the Islamic Revolution of 1979. Iran's carbonated drinks industry, which dates back to the 1950s, developed rapidly in the 1960s and 1970s, with the two international giants, Pepsi-Cola and Coca-Cola, having licensed 24 local bottling plants by 1979. The events of the late 1970s and early 1980s resulted in a rupture of working relations between the local bottlers and their parent companies, however, with the bottlers being forced to turn to a variety of sources for their concentrates, and in some cases even having to develop their own formulations. This resulted in a rapid deterioration in the quality of soft drinks produced in Iran, not only due to the poor ad hoc formulations but also because of the visible lack of competition. Ties were reestablished between Iran's sole remaining privately-owned bottler and Coca-Cola in 1992, and the production of Pepsi-Cola has also resumed from a plant at Mashhad in the province of Khorassan. This has helped to curb the inflow of expensive soft drinks from the United Arab Emirates through the Qeshm and Kish free trade zones, and other southern routes.

Textiles, garments, carpets and footwear

The Iranian textile industry mainly produces fabrics made entirely or partially of cotton. The sharp fall in cotton production in the 1980s following the distribution of large mechanized private cotton estates to smallholders therefore prompted the government to impose a ban on cotton exports in 1980 to ensure adequate supplies for the local textile industry. Shortages of cotton yarn persisted despite this ban, however, and resulted in the signing of a barter agreement with the

neighbouring Republic of Turkmenistan, stimulating a dramatic, but short-lived, surge in imports in 1991.

Although Iran remains entirely dependent on imports of cellulose-based fibres such as viscose, it does produce a variety of other synthetic fibres. This industry has, until recently, also been heavily dependent on imported petrochemicals, but the situation is beginning to change in response to the construction of a number of new petrochemical plants. This will substantially reduce the import dependence of the synthetic fibre and textile industries in coming years, and allow both industries to operate at much higher capacity levels than has been possible in the recent past.

Iran also produces significant quantities of wool, cashmere, jute and silk. Almost all of the domestically produced wool is used in the hand-made carpet industry, which also accounts for the bulk of the country's output of silk yarn. The relatively small local industry producing woollen fabrics therefore continues to rely on imports for most of its raw material requirements. By contrast, Iran's entire output of cashmere is exported in unprocessed form because of the absence of a processing capacity. Jute output, meanwhile, declined sharply between the early 1970s and early 1990s, as a result of which Iran now imports significant quantities.

Iran's modern textile industry came into being in the opening years of the present century, when imported American varieties of cotton began to be cultivated together with the various indigenous varieties. The industry took off with the establishment of a small cotton textile plant in Tehran in 1902, and expanded slowly to 40 firms by 1940, of which 30 were based on cotton and supplied half the domestic market. The expansion of the industry was interrupted in the 1940s by the unavailability of appropriate machinery because of the Second World War, but resumed its strong growth in the 1950s and by the end of the 1970s comprised 1.4 million spindles and 35,000 weaving and knitting machines. Many of the larger units of the hitherto mainly privately-owned textile industry were nationalized after 1979, following which the industry operated within a state-supported price regime. The availability of subsidized inputs and continuing high levels of domestic demand enabled the industry to maintain its output at a more or less stable level throughout the war years, but the relaxation of price controls and the lifting of subsidies after 1988 resulted in a significant, but short-lived, drop in output levels, which was exacerbated by large volumes of textile imports from eastern Asia. A gradual rise in *per capita* income and the granting of increased protection to local producers permitted a recovery in output after 1990.

The Iranian textile industry currently comprises a number of spinning, weaving, knitting, dying, printing and finishing plants producing a variety of woven and knitted fabrics with yarn spun from assorted natural and synthetic fibres. According to the latest available data, the total number of operating spindles amounted to about 1.5 million in 1993 while the number of weaving and knitting machines amounted to approximately 40,000. Other related activities include the production of miscellaneous textiles such as corduroy, hydrophile cotton, zips, ribbon, braid and felt.

Iran's ready-made clothing industry dates to the 1960s, when growing demand for such garments stimulated the gradual emergence of a number of small workshops. The industry did not make any significant progress until 1975, however, when two clothing companies, Jamco and Iran Barak, were established as joint ventures with Italian firms to manufacture suits. The further growth of such large firms was inhibited after 1979 by the introduction of different dress codes as a result of the Islamic Revolution, which in turn gave rise to the growth of a large but unquantifiable number of small and medium firms supplying such products as scarves and veils for women. With the exception of significant improvements in the quality and design of a few products, including children's wear, the progress of the ready-made garments industry was patchy during the 1980s.

Iranian hand-woven carpets, better known as Persian carpets, are internationally renowned. They are woven from wool, silk, or a blend of wool and silk, although all of these also use some degree of cotton for the base, onto which the pile is knotted. Wool, cotton and silk are thus the three principal raw materials utilized by the industry. Although all of these are produced locally in significant quantities, domestic production has generally been insufficient to meet the demands of the carpet industry. Consequently, substantial volumes of these inputs need to be imported.

Another important input of the hand-made carpet industry are dyes. It traditionally used a variety of natural dyes produced from vegetables and herbs including luteous, madder, indigo, turmeric, saffron, walnut and pomegranate skin. These are gradually being replaced by chemical dyes, however, many of which need to be imported.

Despite the patchy performance of the Iranian economy over the past two decades or so, the hand-made carpet industry has recorded considerable growth. This has been due to persistently buoyant levels of both external and domestic demand, since Iranians are themselves great admirers of hand-made carpets, which serve the functions of a status symbol and a hedge against inflation, as well as forming an integral part of the traditional dowry package still widely demanded in Iran.

The output of the carpet industry is closely linked to the business cycle. Output falters when the economy is in recession, and picks up in a boom. Fluctuations in global economic growth also affect the industry significantly as hand-made carpets constitute Iran's most important non-oil export item. The volume of exports was thus relatively low in the 1970s, when the unprecedented rise in real per capita income prompted a significant increase in domestic demand for carpets, and exports were further restrained by highly overvalued exchange rates and a comparatively low production capacity. The low recorded volume of exports during the first half of the 1980s, meanwhile, was caused by the so-called Payman-e-Arzi policy demanding the redemption of export revenues by the government and their conversion at unfavourable rates, which is widely believed to have resulted in illegal shipments of carpets on a vast scale during this period. The increase in exports since 1988 has been due to the cancellation of the redemption regulation, which diverted illegal exports back to official channels, and to the rapid depreciation of the rial and stagnant domestic demand.

The commanding position of the hand-made carpet industry in the national economy in terms of employment and foreign exchange potential has prompted a high degree of official intervention. This began with the establishment of the Iran Carpet Institute in 1930, which was replaced by the state-owned Iran Carpet Company (ICC) in 1935 to promote the industry, ensure quality improvements, protect the originality of Persian carpets, enhance exports, and develop the quality of the workforce. An important recent development has been the establishment of a number of carpet-weaving cooperatives in rural areas by the Ministry of Jihad-e-Sazandegi (Construction Crusade), which play a significant role in promoting carpet weaving in these areas through the provision of financial assistance for the procurement of raw materials and equipment. The programme has been relatively successful, and resulted in the Ministry becoming the largest single producer of hand-woven carpets in Iran.

Iran's resource base to support a footwear industry is modest. Although the country is a major producer of goatskins and sheepskins, and exports significant volumes of the latter, substantial quantities of hides need to be imported to meet the needs of the leather-based industries, including footwear. Most non-leather inputs required by the shoe industry, including rubber, canvas and similar fabrics, certain types of soles and insoles, imitation leather, and petrochemical products such as polyurethane (PU) and polyvinyl chloride (PVC), also need to be imported to

a large extent. In addition, the leather and footwear industries are heavily dependent on imported machinery.

Iran's footwear industry is very heterogeneous. At one end of the spectrum it comprises about 20,000 to 25,000 private workshops and individuals producing hand-made shoes, which account for a significant proportion of the domestic market for leather footwear. At the other end it comprises a few large corporations manufacturing assorted machine-made sports and leather shoes, military boots and rubber and plastic (PVC) footwear. Some of these firms have a high level of integration, and were nationalized after 1979.

The modern large-scale footwear industry emerged in the late 1950s with the establishment of three firms, the Melli Shoe Company, Wien Company and Bella Company. These firms gradually expanded their production capacity and diversified their range of products during the 1960s and 1970s in a largely protected market and in response to rising population and real per capita income. They have remained the largest footwear manufacturers in the country even though they differ widely in terms of size and degree of integration.

The production capacity of the machine-made footwear industry, consisting of 15 firms with legal permits, is estimated at about 125 million pairs per annum. The majority of these companies are of small to medium size, and specialize in the manufacture of plastic footwear. The combined production capacity of machine-made leather shoes is around 20 million pairs per year, while those of sports, rubber and plastic shoes is estimated at 25, 10, and 70 million pairs, respectively. The industry also comprises a large number of small workshops making a traditional type of footwear known as the *giveh* at a rate of about 2-3 million pairs a year.

Exports of footwear, particularly of plastic shoes, increased steadily during the 1970s, with the former USSR constituting the principal market. This was due mainly to the initiative of the Melli Shoe Company, which succeeded in penetrating the regional markets of the Central Asian republics to ensure further growth. Footwear exports began to decline after 1979, however, and fell to almost negligible levels by the end of the 1980-88 war. This was followed by a sharp increase in exports of plastic footwear in 1991-92, mainly through barter trade with the former USSR. While no firm statistics are available as yet, there are indications that this export surge has been reversed in subsequent years, partly because of the inability of the independent republics of the former USSR to increase their imports and partly because of the elimination of a variety of subsidies on exports, which included a significant implicit subsidy on raw materials through the substantially overvalued exchange rate of the rial.

Wood, wood products, pulp and paper

Since most of Iran is arid, its forestry resources are severely limited, with only about 10 per cent of the country's total land area being covered by natural forest or woodland. Much of this forest has been damaged through serious mismanagement, moreover, which has been particularly severe in the past few decades, resulting in both diminishing stocks and declining acreage. In addition, Iran also has forest plantations, established both by the government and by private investors, which were estimated to cover about 90,000 hectares in 1992.

The introduction of an import-substituting industrialization policy and the growing demand for building materials resulted in the emergence of a variety of wood processing industries from the 1960s onwards. These included a number of sawmills and factories producing doors and windows, chipboard, laminated boards, plywood, veneer, fibreboard, parquet, pulp and paper. Some of these industries were entirely dependent on domestic sources of raw materials, while others had to

import some of their needs. Chipboard is now manufactured by 13 companies, some of which came under state ownership after 1979, with a combined annual capacity of 350,000 tonnes. Ten firms, with a total production capacity of 40,000 cubic meters, produce plywood, while six firms with a production capacity of 17.5 million square meters produce veneer. Both industries operate below capacity due to an inadequate domestic supply of logs. Other important wood-based industries include the production of parquet flooring, fibre board, furniture and doors.

Iran's first pulp and paper production facility, the Pars Paper Company, was established in 1970 as an integral part of the Haft Tappeh agro-industrial complex producing cane-based sugar, and used bagasse as its main input. This complex has remained Iran's sole producer of printing and writing paper, and now has a total annual capacity to 105,000 tonnes. A second integrated pulp and paper production unit, the state-owned Chooka complex, was established in 1978 to process raw material from the Shafa Roud forest in northern Iran. It is equipped with sawmilling and plywood production facilities as well as a paper plant with an annual production capacity of about 150,000 tonnes producing a variety of products including kraft paper, wrapping paper, and corrugated medium. A further large-scale wood and paper plant is under construction in the northern province of Mazandaran.

While the Pars Paper Company and the Chooka complex are the only integrated producers of pulp and paper, several small factories with an estimated total production capacity of 50,000 tonnes per year are engaged in the production of paper board from wastepaper. In addition, Iran also has three tissue paper producing units with a combined annual production capacity of 35,000 tonnes, which use wastepaper, bagasse and imported pulp. A dramatic expansion of the paper industry is currently in progress in response to a steady rise in demand for all major varieties of paper in recent years. Fourteen projects with a combined production capacity of more than 500,000 tonnes (equivalent to 150 percent of the total existing capacity) have been approved since the early 1990s, of which three had already been brought on stream by late 1994.

Petroleum refining and natural gas processing

Iran is an important producer of hydrocarbons, and a leading member of the Organization of Petroleum Exporting Countries (OPEC). Apart from extensive reserves of crude oil, which are officially estimated at about 41 billion barrels (directly recoverable) but believed to exceed 90 billion barrels by some industry sources, the country also has the world's second largest natural gas resources. At almost 481 trillion standard cubic feet (tscf), Iran's recoverable reserves amount to about 14 per cent of the world's total proven gas reserves.

The oil refining industry dates back to the establishment of the Abadan refinery more than half a century ago. Located in the province of Khuzestan bordering Iraq, this refinery was completely destroyed at the outset of the Iran-Iraq war when parts of Khuzestan, including Abadan, came under Iraqi occupation. It was rebuilt from scratch when the region was liberated in 1985, but did not come on stream until 1989. In addition to the new Abadan refinery, Iran has six other refineries, located at Arak, Esfahan, Kermanshah, Shiraz, Tabriz and Tehran respectively, and one distillation complex at Lavan. The industry's total production capacity amounts to 965,000 barrels per day (bpd). Two other refineries, at Masjid Suleiman and Mahshahr, were also damaged in the Iran-Iraq war, and are still out of operation.

Iran's output of refined petroleum products has expanded rapidly, at a rate exceeding 10 per cent per year, since 1989. This reflects an attempt by the government to reduce the country's dependence on imports of refined products. In pursuit of this objective the government has

initiated a major refinery expansion programme, which includes the construction of three further oil refineries in Bandar Abbas, Arak and Bandar Taheri, with production capacities of 225,000 bpd, 130,000 bpd and 200,000 bpd respectively. The construction of these refineries is running behind schedule, and by early 1995 only the Arak refinery had become operational.

All refineries in Iran are state-owned, and the prices of petroleum products are heavily subsidized. In 1994, one dollar, converted at the market rate of exchange, could buy 50 litres of petrol, 170 litres of kerosene, 260 litres of gas oil, or 500 litres of fuel oil. These low prices are insufficient to cover even the distribution costs of the petroleum products concerned, and have also resulted in a highly wasteful consumption of such products, with per capita consumption increasing from approximately 850 litres per annum in 1978 to more than 1,000 litres per annum in 1993. The total consumption of petroleum products has more than doubled during the same period owing to the rapid growth of the country's population.

The commercial exploitation of Iran's natural gas resources dates back to the early 1960s when the Shiraz Petrochemical Complex came on stream. This plant utilized associated natural gas, produced as an oil by-product, as feedstock for production of fertilizers. The establishment of the Kharg Petrochemical Complex in 1966 to produce LPG for export represented a further important attempt to harness the country's associated gas resources that were otherwise flared.

The main impetus for the further development of Iran's gas resources was given by an agreement between the governments of Iran and the former USSR in 1966 providing for the export of Iranian natural gas in exchange for financial and technical assistance from the USSR for Iran's industrialization process. This agreement called for the laying of a 1,100-kilometre pipeline from the oil fields in southwestern Iran to the border town of Astara in the north, as well as the construction of the Bid Boland refinery with a capacity of about 30 million cubic metres per day. Significantly, this project also offered an opportunity for the internal distribution of natural gas, which had previously seemed economically unviable, and resulted in the construction of pipeline networks in several cities and towns as well as links to a number of major industries.

The following years witnessed a significant expansion of the natural gas extraction and processing industry. The development of the Khangiran field in the north of Khorassan Province, discovered in 1968, commenced in early 1975 and was completed in 1983. The project included the construction of the Hashemi Nejad gas refinery for treatment of sour gas with a designed capacity of about 35 million cubic metres per day, and a 640 kilometre long pipeline to the gas fired Neka power plant, which was also under construction at the time. A similar project to develop the Gaverzin and Sarkhun gas fields in Hormozgan Province in southern Iran was also initiated in the late 1970s, with the two fields becoming productive in 1980 and supplying the energy needs of a power plant at Bandar Abbas and a copper mill at Sarcheshmeh as well as a large number of domestic consumers. Another comparatively small gas field, Sarajeh in central Iran, has been exploited since 1986, and efforts have more recently been made to develop the Nar and Kangan fields in the province of Bushehr, of which the former is already in operation. The Vali Asr gas refinery, with a production capacity of 44 million cubic metres per day, was established in 1990 for the treatment of the raw gas obtained from these fields.

Although the export of natural gas to the former USSR was suspended in 1979, domestic energy consumption has grown rapidly during the past 15 years. The number of industrial plants using natural gas increased from about 280 in early 1980 to about 600 by 1985, and by early 1993 had risen further to more than 1,100. Similarly, the number of city-gas connections to residential and commercial users increased from about 150,000 in 1980 to about 1.6 million by the end of 1993. The domestic consumption of natural gas consequently grew at an average annual rate of 15 per

cent during 1981-92, from about 5,700 million cubic metres in 1981 to about 26,400 million cubic metres in 1992.

Apart from its importance in covering Iran's energy requirements, natural gas also has another significant role in the Iranian economy. It is used in enhanced oil recovery (EOR) techniques for the secondary recovery of oil. This is extremely important since the application of EOR techniques is expected to yield an additional secondary oil recovery in the order of 18 billion barrels - about 45 per cent of the country's total directly recoverable oil.

Domestic consumption of liquefied petroleum gas (LPG) has increased steadily since the mid-1960s in line with rising per capita incomes, the increased availability of domestically-produced gas burning consumer durables such as heaters and cooking ranges, and the establishment of efficient distribution networks for LPG. Despite the growth of domestic demand, significant quantities of LPG were also exported until 1979, but output declined sharply in the following years as a result of extensive damage to production capacity during the war. With domestic demand continuing to increase, however, Iran became a major importer of LPG in the 1980s, and has remained dependent on imports in the 1990s.

Natural gas and LPG now account for a significant proportion of the energy needs of the residential and commercial sectors, and are also used to fuel a number of power plants and several energy-intensive industries such as steel, copper, aluminum and cement. It is also utilized as feedstock in the country's expanding petrochemical industry. To further utilize the country's vast natural gas resources and help alleviate pollution, especially in Tehran, the government is also trying to promote the use of compressed natural gas (CNG). About 22,000 public transport vehicles were targeted to run on CNG fuel by the end of the 1994-95 Iranian year that ended in March 1995.

Petrochemicals, fertilizers and pesticides

Iran's potential for developing a broad-based and sustainable petrochemical industry was recognized as early as the mid-1960s, when comprehensive plans were drawn up to create such an industry in order to add increased domestic value to the country's abundant resources of fossil fuel. These plans were given a further boost by the oil price rise of the early 1970s, which substantially increased Iran's foreign exchange reserves and facilitated the launch of several government projects during the following years.

The first major attempt to develop the petrochemical industry involved the establishment of a chemical fertilizer plant in Marvdasht in Shiraz Province in 1963. This was subsequently reconstituted as the Shiraz Petrochemical Complex, and expanded twice by the end of the 1970s. Meanwhile, Iran's second petrochemical plant was established on Kharg Island in 1966, producing sulphur and liquefied petroleum gas (LPG) for export. This was followed by the opening of four further petrochemical plants during the 1970s - the Razi Chemical Complex (formerly known as the Shahpour Chemical Company), the Abadan Petrochemical Company, the Iran Carbon Company, and the Farabi Petrochemical Company (originally known as the Iran-Nippon Company). The largest project initiated during this period, the Iran-Japan Petrochemical Complex (IJPC), which was intended to be at the heart of Iran's petrochemical industry, did not come to fruition, however. It was abandoned only months before its commissioning on the eve of the 1979 revolution despite the investment of vast sums of money between 1973-79, and was severely damaged in the subsequent Iran-Iraq war.

Apart from an expansion of the fertilizer production capacity at the Shiraz Petrochemical Complex in 1985, no new petrochemical project came on stream during the 1980s, when existing capacity was significantly reduced as a result of war damage. The post-war years have witnessed a determined attempt by the government to revitalize the petrochemical industry, however, and all existing plants have been recommissioned. In addition, 12 further projects have been launched, at a projected hard-currency cost of more than $3.5 billion. The most important of these involves the rehabilitation of the IJPC, which has now been reconstituted as the Bandar Khomeini Petrochemical Complex (BKPC), and comprises an olefins as well as an aromatics centre, and is also equipped with units for the production of liquefied petroleum gas (LPG) and chlor alkali. The other new ventures begun in 1989-93 include the Arak Petrochemical Complex, whose hard currency needs were tagged at $1.1 billion; the Tabriz Petrochemical Complex, which has an estimated foreign exchange requirement of $860 million, and a petrochemical unit in Esfahan. Elsewhere, measures have also been taken to expand the capacity and output of existing plants, with a methanol production unit and an ammonium phosphates plant having been established at the Shiraz Petrochemical Complex in 1990 and 1992 respectively. The net effect of these developments has been a sharp increase in the output of the petrochemical industry from 870,000 tonnes in 1988 to almost 5.5 million tonnes in 1992.

While the upstream petrochemical base has mainly been built since 1988, a comparatively broad and diverse downstream industrial base was created before 1979 to manufacture a wide range of end-use products including detergent, rubber, plastics, resins, paint, PVC pipes and fittings, melamine ware, and textiles from petrochemical raw materials. Most of these industries remained heavily dependent on imported inputs until 1992, however, when the completion of upstream projects permitted a sharp reduction in the import of petrochemical raw materials. This trend is expected to continue into the foreseeable future as the other plants under construction come on stream and the domestic production of intermediate petrochemicals increases.

As yet there has been no private participation in the upstream parts of the industry. All activities related to the production of basic petrochemicals by state-owned and/or affiliated organizations (excluding the Ministry of Defence) fall under the supervision of the National Petrochemical Company (NPC), founded in 1964. The NPC is an arm of the Ministry of Petroleum.

Iran's fertilizer industry is limited to the production of inorganic fertilizers, for which the principal raw material is provided by its natural gas industry. The production of chemical fertilizers dates back to the establishment of the comparatively small facility at Marvdasht in Shiraz Province in 1963, which coincided with the government's efforts to introduce modern cultivation practices to boost agricultural output from the early 1960s onwards, partly through the distribution of subsidized fertilizers by the Ministry of Agriculture. Faced with a rapid growth in demand, the government initiated the continuous expansion of the Shiraz Petrochemical Complex as well as the construction of Iran's second fertilizer project, the Razi Chemical Complex (formerly known as the Shahpour Chemical Company), in 1966. This plant came on stream in 1970, was expanded considerably in 1974 and, after sustaining serious damage in the 1980-88 war, has now been restored.

The designed production capacity of the Shiraz Petrochemical Company and the Razi Petrochemical Company together equals about 1.1 million tonnes of ammonia, 1.2 million tonnes of urea, 380,000 tonnes of nitric acid, 255,000 tonnes of ammonium nitrates, 500,000 tonnes of DAP, 180 tonnes of MAP, 20,000 tonnes of phosphoric acid, and 20,000 tonnes of TSP. This is insufficient to meet domestic demand, however, and since 1980 Iran has become a major importer of chemical fertilizers. The import and distribution of inorganic fertilizers is conducted solely by the Iran Fertilizer Company affiliated to the Ministry of Agriculture, which distributes locally-produced and imported fertilizers at heavily subsidized prices.

In order to reduce the country's import-dependence, the establishment of a third plant for the production of urea has been proposed for the province of Khorassan. This project, estimated to involve a foreign exchange outlay of about $270 million, was begun in early 1990. As feedstock it will utilize the natural gas of the Khangiran field, and will have an annual production capacity of 420,000 tonnes of urea, 90,000 tonnes of sulphur-coated urea, and 60,000 tonnes of agricultural sulphur. The achievement of its proposed completion date of early 1995 was prevented by persistent foreign exchange difficulties, however, which have restricted the government's ability to import the necessary machinery and equipment.

The wide-ranging measures initiated by the government to boost agricultural output in the 1960s also included attempts to promote the use of pesticides in the traditional small-scale agricultural sector. The resulting increase in the use of pesticides led to the establishment of Iran's first pesticide formulation firm, the Karaj Chemical Factory, in 1965, with a production capacity of 4,400 tonnes per annum. This was followed by the establishment of several small-scale firms with production capacities of 500-1,000 tonnes per year by private entrepreneurs in the 1970s, and the large-scale Sherkat Melli Shemiai Keshavarz with a production capacity of 15,000 tonnes per year by the state-owned commercial bank, Bank Melli Iran, in the late 1980s.

Although the total number of firms engaged in the formulation of pesticides officially stands at 19, with a joint production capacity of about 50,000 tonnes per annum, only six plants are currently operating, with the remainder having been shut down for environmental reasons or having become unviable as a result of the imposition of price controls and new arrangements for the importation of active ingredients after 1979. These resulted in exclusive rights to import active ingredients being granted to the state-owned Plant Protection Production and Distribution Company affiliated to the Ministry of Agriculture, which distributed them only among firms that had a contract with the Ministry of Agriculture for the distribution of pesticides at the low administered prices. This practice had a devastating impact on many of the smaller firms that used to import their active ingredients individually and sell their products at market prices, but could not operate profitably at the government's administered prices because of their small scale. The annual capacity of the plants currently in operation is estimated at 30,000 tonnes, but will rise by about 5,000 tonnes per annum when another state-owned plant now under construction is completed.

Despite its considerable size, the pesticide formulation industry is entirely dependent on imports of active ingredients, and is likely to remain so for the foreseeable future since its ability to acquire the technical expertise for the development of a domestic active ingredients industry is hampered by a number of constraints. These include the country's ambiguous foreign investment laws as well as the prevailing scarcity of foreign exchange. In addition, Iran is still subject to a variety of sanctions on the transfer of technologies that could have possible military applications, including the production of potentially hazardous chemical compounds.

Pharmaceuticals

The foundations of Iran's modern pharmaceutical industry were laid in 1946 when the small Dr. Abidi Laboratory was established, but the industry did not take off until 1957, when a relatively large formulation firm known as the Towlid Darou Company came on stream, producing a variety of medicines under licence from several American and European multinational corporations. The next two decades witnessed a strong expansion of the industry, which benefited from substantial foreign investments. By 1979 no fewer than 17 multinationals had either established local subsidiaries or entered into joint ventures with Iranian partners.

The industry witnessed substantial changes after 1979. For one thing, all major firms and a number of small laboratories came under state control. For another, the generic system was introduced in 1980, as a result of which all locally manufactured products, which have on average accounted for about 80 per cent of total supply in recent years, carry only generic names and the names of the companies manufacturing them.

While these measures have been highly successful in providing good quality products at low prices to a wide range of consumers, they have also had a number of disadvantages. The nationalization of the industry resulted in the departure of the foreign multinationals and a decline in investment to negligible levels, while the move to generic medicines deprived the Iranian market of many specialized new products available in the world market. As a result, the pharmaceutical industry is mainly confined to formulation and packaging activities. It consists of 49 firms, most of which are small laboratories, with a further firm due to come on stream in 1995.

While Iran's pharmaceutical industry is mainly confined to formulation activities, a number of projects have been undertaken to establish a domestic production capacity for these materials. The most important of these is the Shahid Modarres Complex (SMC), which is still in the process of completion but has already been licensed to produce 51 pharmaceutical products including magnesium by-products and sorbitol. The production of a number of other raw materials, including ampicillin tri-hydrate, is also under evaluation. Other producers of pharmaceutical raw materials include a plant to produce dextrose established in the early 1990s and another plant established with the assistance of UNIDO, which came on stream in early 1994. Two further plants for the production of pharmaceutical raw materials, the Tenadiran and Shahid Razkani companies, are also in the final stage of completion.

Iran has a long history in the production and export of herbal drugs and their use in the manufacturing sector. A wide variety of such products, including liquorice, clover, hempseed, aniseed, coriander, madder, gum tragacanth, henna and linseed have been exported since the early 1900s. A report prepared by the Ministry of Agriculture in 1985 estimated the export potential of such products at about 140,000 tonnes per year.

Non-metallic mineral products

Iran is richly endowed with a wide range of non-metallic mineral resources, and therefore well placed for the mass production of building and refractory materials. With energy also playing a major role in the production of building materials such as cement, lime and plaster, Iran's cost advantage is further enhanced by the abundance of the country's energy resources. Gas oil and natural gas have emerged as a particularly important source of energy for these industries in recent years.

Iran's cement industry was created in 1933 when the state-owned Ciman-e-Ray plant went into operation with a daily production capacity of 100 tonnes. The industry grew steadily in the following decades, and by 1975 a total of twelve factories with a combined daily capacity of 24,000 tonnes were in operation. Rising cement prices in the wake of the demand boom triggered by the 1974 oil price increase stimulated a surge in investment in the latter part of the 1970s, when eleven proposals for the construction of new plants and/or the expansion of existing ones were approved by the Ministry of Industry and Mines and undertaken by the private sector. This resulted in an overall increase in the industry's production capacity of 26,500 tonnes per day.

While only two firms were state-owned before 1979, most of the existing firms were brought under full or partial state ownership in the following years. Local production nevertheless continued to

expand during the 1980s, mainly as a result of the completion of projects already started prior to 1979. By 1994, a total of 17 factories were in operation, of which 16 with a combined annual capacity of 17.3 million tonnes were producing grey cement, and one with an annual capacity of 78,000 tonnes was producing white cement.

Lime, obtained by the calcination of limestone and calcium carbonate, is another important building material used in Iran, especially in some rural areas of the country. The lime producing industry currently consists of two large factories with a capacity of 60,000 tonnes per annum, and a number of small manufacturers accounting for almost half of Iran's total output. The remainder is produced as a by-product by a range of other industries, including steel mills, the sugar industry and producers of petrochemicals and fertilizers. Since the late 1980s 25 new projects with a combined capacity of more than 1.2 million tonnes per annum have been licensed for the commercial production of lime by private investors, but only a few have been started.

The widespread availability of gypsum in shallow mines throughout Iran has permitted the use of plaster as a building material since antiquity. The first modern plaster manufacturing facility was established in 1971 with a nominal capacity of 720,000 tonnes of packaged plaster and 450,000 square metres of prefabricated plaster products per year. The industry has grown rapidly since then, fuelled by the high demand for plaster in the building trade. By 1992 the number of plaster factories amounted to 58, with a combined production capacity of 8 million tonnes per year, and 105 additional projects with a total annual capacity of 8.5 million tonnes had been licensed.

With rich deposits of all of the principal materials required for glass production, including silica and limestone, Iran is in a good position to produce glass on a mass scale. The country's easy access to cheap and diverse sources of energy reinforces its favourable position. The only major ingredient for the production of glass not produced in sufficient quantities within the country is sodium carbonate or soda ash.

The commercial production of glass has its origin in the establishment of the Iran Glass Company in 1940, which was originally a comparatively small facility producing glassware and sheet glass but has gradually been expanded to its present annual production level of 20,000 tonnes. A second glass manufacturing plant was set up at Qazvin in 1968 with an initial production capacity of 12,000 tonnes per annum, which has been increased in several phases to the present level of 120,000 tonnes per annum. A third important manufacturer, Abgineh, came on stream in 1972 with an annual production capacity of 20,000 tonnes.

Iran's total production capacity for sheet glass had risen to 200,000 tonnes by 1980, but declined considerably during the following years due to inadequate replacement investment. Two new projects to produce sheet glass with a combined annual production capacity of 125,000 tonnes are now in progress at Saveh in the Markazi province and at the Abgineh factory, however, and on completion will increase the country's total production capacity to about 285,000 tonnes per annum in the coming years. Two further projects with a combined capacity of 160,000 tonnes per annum were also authorized in the early 1990s but have not yet been implemented.

The production of bottles and glassware expanded rapidly after the establishment of the Iran Glass Company. This branch of the industry now comprises four major firms with a combined production capacity of 120,000 tonnes per annum and several small-scale traditional producers with an estimated production capacity of 8,000 tonnes per year. In addition, nine investment projects for the production of glassware with a total capacity of 106,000 tonnes per annum have been approved by the Ministry of Industry in recent years, of which three, with a total capacity of 64,000 tonnes per year, are in the process of completion.

Iran also has a significant security glass industry. The first Iranian manufacturer of this product, the Miral Glass Company, was established in 1965 with an initial production capacity of 70,000 square metres, or almost 1,000 tonnes, per year. The rapid expansion of the automotive industry as well as the construction boom in this period prompted a considerable expansion of this plant, with its production capacity being almost doubled to 1.3 million square metres, or about 20,000 tonnes, by 1966. Three further plants, with a combined capacity of 11,500 tonnes per annum, came on stream during the 1980s, increasing Iran's total production capacity to 31,500 tonnes per annum.

Huge deposits of raw materials for the production of ceramics are found throughout Iran, which has particularly large reserves of common clay, feldspar, kaolin and quartz. In addition, extensive resources of gypsum are also available, and the country also has most major outer lining materials, including glaze. The only important raw material that has to be imported in significant quantities is dye.

The production of ceramic tiles has traditionally enjoyed a great artistic importance in Iran and has special historic roots in the country's culture. The commercial production of tiles using modern industrial technologies dates back to 1960, when the first large factory, the Irana Tiles Company, started production. The construction boom of the 1970s supported a rapid expansion of the ceramic industry, and by 1979 it comprised 14 large and medium-sized manufacturing units with a combined production capacity of almost 16 million square metres of wall and floor tiles. After a period of stagnation in the early 1980s caused by the nationalization of its larger producers and the imposition of a number of restrictions on the market for tiles, the industry recovered its growth momentum in the late 1980s and early 1990s as a result of the post-war economic reforms and price deregulation measures. By 1994 the Iranian ceramics industry had expanded to 45 factories with a total production capacity of 38.5 million square metres of wall and floor tiles.

Another important segment of the ceramics industry that has experienced rapid, albeit irregular, growth during the past 25 years is the sanitary fittings industry. The first unit producing a wide range of sanitary wares came into existence in 1969 with an initial production capacity of 2,000 tonnes per annum, but by 1993 the industry comprised eight major producers with a total annual production capacity of 31,000 tonnes. The deregulation of the industry during the post-war period has also resulted in a marked improvement in output quality and the introduction of more innovative designs, which, in turn, has helped to improve its export potential. The Pars Seramco Company, one of the oldest and largest producers of sanitary wares in Iran, exported as much as 30 per cent of its total output during 1992.

With the many advantages provided by the abundant availability of the principal raw materials, the ceramics industry has the potential to become a thriving export industry. While exports of ceramic products, including tiles, sanitary ware and chinaware, are almost certain to increase to some degree in the coming years, the development of the industry into a major exporter will require substantial further improvements in quality and design. This, in turn, will require significant investments to upgrade and modernize many of the existing production facilities and to introduce new technologies for the processing of raw materials and the production of high-quality dyes and powdered glaze.

Iron and steel

Iran is richly endowed with the principal raw materials required for the establishment of iron and steel industries, although substandard qualities of many of these materials obtained from the existing mines have been causing operational problems. The latest available data on proven

reserves of iron ore indicate a total of 1,070 million tonnes in the five most important mines currently in operation. Iran's coal reserves are also substantial, although as yet still largely unquantified. In addition, the country is extremely rich in many of the other resources required by the iron and steel industry, including natural gas, limestone, and various types of refractory sands.

After a series of unsuccessful attempts by various Iranian governments since 1926 to establish an iron and steel industry, the country's first steelworks was eventually set up in 1972 near the city of Esfahan. This plant was established as part of a package deal between the governments of Iran and the former USSR, under which the latter provided a loan to finance the project, which was to be amortized through shipments of natural gas from Iran to the USSR. At its inception this fully integrated state-owned facility consisted of four production units, all based on blast furnace processing technology, and had a production capacity of 600,000 tonnes per annum. The Esfahan complex was enlarged significantly in the following years, and a second plant with a production capacity of 1.3 million tonnes per annum was established at the site in 1983. The current annual capacity of the two plants amounts to 1.9 million tonnes of pig iron and 1.7 million tonnes of billets.

The development of direct reduction processing technology during the 1960s augured well for the government's long desire to expand Iran's iron and steel industry, that had hitherto been handicapped by the low quality of the coke produced from Iranian coal. The abundant supplies of natural gas and increased oil revenues during the 1970s prompted the government to embark on an ambitious industrial programme that included five steel complexes based on direct reduction processing in Ahvaz, Bandar Abbas, Esfahan, Kangan and Mashhad. The construction of the Ahvaz steel complex, which was intended to have a total production capacity of 2.53 million tonnes per annum, began in 1975, but its final completion was delayed until 1989 due to the revolution and war. After 1979 a new feasibility study of the remaining four projects resulted in the cancellation of the Kangan and Mashhad projects and the merging of the Bandar Abbas and Esfahan projects. This merger led to the establishment of the Mobarakeh Steel Complex in Esfahan, which became operational in 1992 and is equipped with three midrex units and a continuous casting bloom plant.

Iran's iron and steel industry also comprises two other bloom plants for processing sponge iron, which were established in the early 1970s by the private Shahryar Industrial Group but were nationalized after 1979 and now operate under the auspices of the Iran National Industrial Group. Feasibility studies have also been conducted for the construction of three new steel complexes in the provinces of Khorassan, Hormozgan and Azerbaijan. Preliminary work for construction of the Khorassan steel complex has already commenced. A small alloyed steel production unit has also been authorized in the central province of Yazd.

The steel products required for downstream manufacturing activities are now largely provided by Iran's upstream industry. The establishment of the Esfahan steelworks in 1972, which produces H beams, reinforcing rods and profiles, helped to meet the demand for these goods from the construction sector. The growing demand for pipes by the oil industry caused by the increased production and distribution of oil and natural gas during the early 1970s also set the pace for the establishment of a downstream pipe manufacturing industry. On the other hand, the substantial increase in demand for steel sheets arising from the growth of the manufacturing sector in general and the automotive industry in particular after the late 1960s was not met from domestic sources until the early 1990s.

Non-ferrous metals

Iran has extensive deposits of copper. The largest mine currently under exploitation is the Sarcheshmeh copper mine in Kerman Province with total reserves of 1,223 million tonnes. The Midouk copper mine, located 130 kilometres northwest of Sarcheshmeh, is also being readied for exploitation. A third copper mine, Songoun, located in the town of Ahar in East Azerbaijan Province, also appears promising, and is scheduled for exploitation by the year 2000.

Plans to develop the copper mining industry and associated activities were initially formulated in the early 1970s. Although copper processing had started earlier with the creation of the Ghaniabad Copper Complex affiliated to the Ministry of Defence, the most important result of this policy initiative was the development of the Sarcheshmeh Kerman Copper Complex (SKCC), which came on stream in 1982 and is currently the largest integrated project for copper mining and processing in Iran. In addition to its mining activities, SKCC is also engaged in the production of copper concentrates, anodes, cathodes, slabs, billets and wire. The output of the SKCC has expanded gradually over time, resulting in a steady increase in the domestic use of locally produced copper metal and a significant decline in imports of copper products.

The Shahid Bahonar Copper Industry (SBCI) established in the 1980s, 21 kilometres from the city of Kerman, is the largest downstream copper manufacturer, producing a wide range of copper and copper-alloyed products including sheets, pipes, wire, bars and strips. The plant is equipped with a slab and billet mill, a cold rolling mill and a copper extrusion plant. Its total production amounted to 11,946 tonnes in 1992, of which about 30 per cent was exported.

While an unknown number of small firms and workshops produce an assorted range of copper products with a combined annual production capacity estimated at 8,000 tonnes, the electrical cable industry has emerged as the most prominent copper-based manufacturing activity. It started as a small plant in 1965, but has expanded rapidly since then and now comprises 34 enterprises of varying size with a combined annual production capacity of about 130,000 tonnes. It is mainly geared to the manufacture of low voltage electrical cables with the exception of one firm, Alborz Cable Company, which also has a small production capacity for high voltage electrical cables of up to 20 kVA. In addition, four firms produce telecommunication cables, of which three also produce electric copper cables.

The Iran National Copper Industries Company, affiliated to the Ministry of Mines and Metals, has exclusive rights for copper mining and production, and has conducted a series of feasibility studies to raise the country's copper production. These include a project scheduled to boost the sulphedite ore production at the Sarcheshmeh mine by 6.8 million tonnes per annum, a processing unit for copper concentrates with an annual capacity of 240,000 tonnes, and a smelter with a capacity of 80,000-100,000 tonnes per annum, all of which are scheduled to be completed by 1998. A leaching plant is also under construction to process oxidized ore from the Sarcheshmeh mines, and is scheduled to come on stream by 1997.

The resource base for Iran's aluminium industry is limited. The country has only modest deposits of bauxite, but it does possess abundant deposits of alumite (hydrous potassium aluminum sulphate) and of nepheline with an alumina content of up to 20 per cent. In view of the highly energy-intensive nature of the upstream aluminium industry, however, Iran's principal resource base for the development of a production capacity in this field lies in its hydrocarbon resources. Natural gas plays a particularly important role in this context, and provides the main source of fuel for the Iranian aluminium industry.

Iran's upstream aluminium industry consists of a single firm, the Iran Aluminum Company (IRALCO), which was established in 1972 with an annual production capacity of 45,000 tonnes of aluminium ingots and gradually expanded in subsequent years. Apart from being equipped with a smelter, IRALCO is the only company with casting facilities for the production of aluminium slabs and billets. After sustaining damage during the war, IRALCO rapidly restored its earlier production capacity in the post-war period, and now has a production capacity of 120,000 tonnes per annum. In view of the limited availability of bauxite and the still inadequate exploitation of Iran's nepheline resources, however, IRALCO is entirely dependent on imported alumina powder.

Plans to construct a large smelter with an initial annual capacity of 200,000, expandable to 300,000 tonnes, were announced by the government in 1991. This plant, to be known as the Al-Mahdi Complex, was to be established in the southern port city of Bandar Abbas as a joint venture between the Iranian government and a private business group at a total investment cost of $1.5 billion. Despite a significant scaling down of its proposed original capacity, however, the project failed to meet its initial completion target of 1992 because of the unavailability of sufficient financial resources to meet the cost of the necessary imports of plant and equipment.

Further downstream, Iran produces a wide range of intermediate and end-use aluminium products. The aluminium sheet industry, which rolls both imported and locally produced slabs into sheets, comprises two firms, Aluminum Sazi Arak and Alum Pars in the cities of Arak and Saveh in the Central Province. Increasing construction activity since the mid-1960s has also attracted substantial investments in the extrusion industry producing aluminium profiles, which are rapidly replacing wood and steel in the manufacture of doors and windows. This industry now comprises 87 enterprises of various sizes, three of which also have anodizing units. The casting industry has also grown rapidly since the mid-1970s, and consists of several enterprises producing an assortment of goods, including five specializing in the production of heating radiators.

Iran has large deposits of lead and zinc. The mining of lead dates back to before the Second World War, although the production of lead concentrate through flotation was first practised in 1957 at the Nakhlak mine in Esfahan Province, where a small smelter was also established. The lead and zinc mining industry developed steadily after the 1950s and by the early 1970s about 40 mines were in operation. The output of most of these mines was intended primarily for the export market, and the collapse of international lead prices in later years consequently resulted in the closure of a number of these mines. At present only nine mines are in operation, with a total capacity of 625,000 tonnes and a processing capacity of 195,000 tonnes of concentrates. The main mining firms, all of which are state-owned, are the Kaliesman Company, the Bafq Mines Company, and the Bama Mining Company.

With the smelter at Nakhlak being shut down in 1974 due to its uneconomical scale of 500 tonnes per annum, the only available facility for the further processing of lead and zinc concentrates in Iran until 1992 was a smelter with an annual capacity of 16,000 tonnes at the Ghaniabad Copper Smelter Complex affiliated to the Ministry of Defence. This small plant, which is only capable of recovering lead from scrap, supplies a portion of the lead requirements of Iran's two car battery manufacturers, Nour and Niro, which are also affiliated to the Ministry of Defence.

In 1986 a project was launched by the Iran Lead and Zinc Company to establish a smelter to process lead concentrates obtained from the Dandee flotation plant at the Angoran mine in the province of Zanjan. The project, undertaken largely to supply the domestic market, was completed in mid-1992. The plant is operated by a consortium of state enterprises and has an annual production capacity of 40,000 tonnes of lead metal.

Gold, silver and molybdenum are also found in modest quantities. The Mouteh gold mine near Esfahan has known deposits of 1.7 million tonnes with an average gold content of 5 grammes per tonne. Gold is also extracted from associated deposits. The Sarcheshmeh copper mine yields modest quantities of both gold and silver. While molybdenum is mainly extracted from this copper mine, its total known reserves throughout the country are estimated at 68,000 tonnes of metal.

Even though comparatively small quantities of precious metals are obtained from local mines, the use of gold and silver has traditional roots in Iran's craft works industry. A wide range of gold and silver products, including jewellery, tableware and cutlery are produced locally. Production of chiselled silver has traditionally been an important craft, but its popularity has diminished in recent times. The bulk of the molybdenum produced in Iran is exported, however, with only a small volume being utilized within the country in the production of ferrous metal products.

Engineering

Although Iran's resource base for the development of a machinery industry is tenuous, the country's economic policy-makers have nevertheless considered it a high priority. Faced with the reluctance of the private sector to invest in economically uncertain ventures, the government negotiated a deal with the former Czechoslovakia to establish an integrated plant, Machine Sazi Tabriz (MST), for the production of a wide range of machinery and equipment in 1966. The project was scaled down significantly during the course of its implementation, however, and eventually became operational in 1972 with an annual production capacity of about 7,000 lathes and drilling machines. While MST has remained the most important producer of these goods, two small privately owned firms assembling drilling machines and lathes have also been established since 1979. In addition, several small privately owned firms have been established to produce sawing, grinding, folding, rolling and cutting machines, which are able to satisfy a substantial proportion of domestic demand.

The continued importance of the agricultural sector in the Iranian economy has ensured a persistently strong demand for farming tools and agricultural implements, which in turn has prompted the establishment of a large number of small workshops as well as several medium and large-scale producers of such equipment. Until the late 1960s the industry was geared mainly to the production of simple tools and machines required by the then still largely traditional agricultural sector, but it later underwent a significant transformation as a result of the government's decision to mechanize the agricultural sector in the mid-1960s. Two firms, the Iran Tractor Manufacturing Company and Iran Jandier, were set up in the late 1960s to manufacture tractors and combines, followed by a further plant for the assembly of hand tractors and several medium sized enterprises for the production of cultivation tools and irrigation pumps. The development of the agricultural equipment industry slowed in the 1980s, however, when the private sector decided to halt mechanized farming on large estates and the government redistributed some of the large and medium-sized farms to smaller farmers using traditional farming practices.

Iran's capacity for the production of construction machinery is modest. While a few firms are periodically engaged in the assembly of cranes and road rollers, only one enterprise, the state-owned firm Hepco, assembles other heavy construction machinery. The production of light construction machinery, including concrete mixers, stone crushers and concrete dumpers, has also remained constrained by comparatively low levels of demand arising from the typical Iranian practice of using steel structures rather than reinforced concrete for construction. Other construction and related machinery produced in Iran includes asphalt mixers and sprayers, which are manufactured by three firms with a combined capacity of 80 units per year, stone crushers, which are produced by two firms, and concrete mixers and dumpers, which are produced by 15

firms. In addition, forklifts are also produced by the Sahand Forklift Manufacturing Company established in 1976 with a designed annual capacity of 1,300 units. After initially producing forklifts under licence from a UK company, Sahand switched to a Bulgarian firm in 1979.

The production of diesel engines in Iran began in the early 1970s with the establishment of the Iran Diesel Motors Company (IDM) and Iran Bonyan Diesel Company (IBD), formerly known as the Iran Dorman Diesel Company. This was followed by the setting up of two other plants, Charkhashgar, formerly known as Iran Leyland Diesel, and Saane Company, formerly known as Hoxiran Diesel, in the mid-1970s. All four companies were joint ventures with foreign participation: Daimler-Benz in the case of IDM, the British companies Dorman and Leyland in the case of IBD and Charkhashgar, and a number of British suppliers of non-automotive diesel engines in the case of the Saane Company. The assembly of Leyland engines by Charkhashgar ceased in 1982, however, after which the plant assembled Land Rover engines from kits supplied by Land Rover from Spain and the UK. During the 1980s another plant, Motor Sazan Tractor Sazi Company (MSTS), was established in cooperation with the Perkins Company. The firm is affiliated to the Iran Tractor Manufacturing Company, and produces diesel engines under licence from Perkins.

The Iranian generator industry evolved during the 1970s as an activity involving the coupling of imported alternators with locally produced diesel engines, and attracted the interest of a large but unknown number of small-scale enterprises and workshops. Several projects were subsequently approved by the Ministry of Heavy Industries in the 1980s for the local assembly of generators. Of these only two, Maah Niroo with a capacity of about 6,000 sets per annum and Pars Generator with a capacity of 1,000 sets per annum, became operational in the early 1990s. They are mainly involved in the assembly of low capacity generators of up to 50 kVA.

Iran's electric motor industry is older than its diesel engine and generator industries, and dates back to 1957 when a small privately owned firm was set up. It only took off after a long break, however, when the state stepped in with a joint venture formed in 1973 between several state--affiliated organizations and the Gold Century Company of the USA to produce various types of electric motors. In 1976 Gold Century's stake was bought out by the state, and the company changed its name to Motogen.

Transport equipment

Iran's transport equipment industry developed under a restrictive trade regime that imposed quotas and a multitude of tariff barriers against imports of such equipment. Nurtured by a high degree of protection over the years, it has grown into an inefficient and high cost industry which continues to depend on imports for many of its principal materials, including steel sheets, engines and spare parts. The component producing industry, which developed in a similarly protected environment, is also marked by a variety of inefficiencies, and may even have become a burden rather than a source of support for the automotive industry, which is obliged by existing regulations to maximize the use of locally produced components.

The first motor vehicle assembly plant in Iran was established by the Iran Jeep Company in the early 1960s with a total capacity of 3,000 jeeps per year. By the end of the decade several other plants had been set up to assemble passenger cars from CKD kits supplied by the UK firms Rootes, Leyland and Rover, and by American Motors, Daimler-Benz and Citroën. Plants were also established to assemble trucks under licence from Volvo and Mitsubishi. The market soon came to be dominated by the passenger car Paykan (Arrow), a locally assembled version of the

Hillman Hunter produced by the former Iran National Company from CKD kits supplied by Rootes. The firm had initially been established in 1963 to assemble Mercedes-Benz buses and mini-buses, and added the Paykan assembly lines in 1967.

The Iranian automotive industry experienced a significant transformation during the 1970s when *per capita* incomes soared after the rise in oil prices, which stimulated a sharp increase in demand for more and better motor cars. This prompted the import of an increasing number of European and Japanese cars between 1973 and 1979 despite the prevailing high tariffs, and forced the domestic automotive industry to make a number of significant changes. The American Motors plant was taken over by General Motors in 1974, which initially assembled six-cylinder Chevrolets, but later added Buicks and Cadillac Sevilles to its range. Similarly, the former Iran National Company entered into negotiations for the local assembly of certain models of Peugeot cars, although these were interrupted by the 1979 revolution. After the revolution the privately owned automotive industry was fully nationalized and the previously imposed import tariffs were replaced by a complete ban on imports until the mid-1980s.

The need to produce new models of passenger cars embodying advanced design and technology caused serious problems for the Iranian automotive industry after the end of the 1980-88 war. Attempts to introduce a locally-designed "national car" to replace the existing types failed. This underlined the fact that the industry had not been able to create a significant base for automotive design and engineering in all the many years it had been in existence. Even the Paykan, which had become the most popular of all Iranian-assembled cars, was produced as initially designed for more than a quarter of a century with no notable alteration or improvement. Eventually, the path followed by Pars Khodrow, the former assembler of General Motors vehicles which began assembling the Nissan Patrol, was also pursued by Iran Khodrow, the former Iran National Company, and Saipa, which had previously assembled Renault cars. These two companies started assembling Peugeot models and Kia models from the Republic of Korea, respectively.

In addition to the companies mentioned above, the Iranian automotive industry comprises eight other firms producing vehicles including Land Rovers, pick-ups, trucks, fire engines, buses and mini-buses. Since most of the country's internal transport takes place by road, the demand for these vehicles is quite high. They have consequently accounted for 15-33 per cent of Iran's total output of motor vehicles between 1982 and 1991, although this share has shown a gradually declining trend from the early 1980s.

The production of automotive components grew simultaneously with the expansion of the motor vehicle industry, and was stimulated further by the imposition of strict local content requirements on the motor vehicle assemblers. The parts and components industry now consists of some 30 state-owned and privately-owned firms producing and/or assembling about 20 different types of automotive components such as engines, radiators, exhaust systems, cabins, carburettors, water pumps, pistons, chassis, axles, engine valves, shock absorbers, transmissions and electrical equipment including batteries, spark plugs, starters, dynamos and delco points. An associated sector is the tyre industry, which dates to the establishment of a manufacturing plant in 1958 by local investors in partnership with BF Goodrich. A second plant was established in 1963 as a joint venture between local industrialists and General Tires, and further plants in later years in collaboration with Bridgestone and Pirelli. All of these firms were nationalized after 1979, however, and a further state-owned firm, the Kerman Tyre Company, was set up in 1992.

The Iranian motorcycle industry is based on five companies assembling CKD kits imported from Japan and Italy. The first of these, the Jahan Rex Company, was established in 1968 to assemble an outmoded German scooter. The second firm, Iran Docharkh, went on stream in 1972 and assembles two Peugeot models and a number of Yamaha models with engine capacities ranging

from 80 cc to 125 cc. With an annual assembling capacity of 60,000 scooters and 120,000 motorcycles, Iran Docharkh is currently the largest producer of such vehicles in Iran. The next firm to enter the market was the Jahan Rou Company (formerly known as Tahari), which was established in 1973 to assemble Kawasaki motorcycles. This was followed by the Tiz Rou Company in 1976, which assembled Honda motorcycles. After a long break, a fifth plant, Iran Niro Mohreke, was established by the state in the early 1990s to assemble Vespa scooters from CKD kits imported from the Italian firm Piaggio.

Iran's bicycle industry was created in 1960 by the establishment of the Tehran Sakai Bicycle Company as a joint venture between Iranian and Japanese investors. Since then the industry has established a modest assembling capacity and now comprises six manufacturers, three of which are also engaged in the motorcycle industry. In addition, a small plant for the production of wheelchairs was inaugurated during the 1980s to meet the increased demand from people wounded in the 1980-88 war.

Electronic and electrical products

Iran lacks a specific resource base to support a sustainable electronic and electrical goods industry. At present, the country's abundant supply of low-cost labour lends only a modest advantage to the engineering industry, as it often does not have the necessary technical skills. The same is true to some degree of its relatively large population of high school and university graduates, who could be an important source of comparative advantage in this value-adding sector.

Over the past few decades Iran has established, in a highly protected market environment, a considerable production capacity for a number of components used in the manufacture of electronic and electrical goods. They are frequently not competitive in terms either of price or quality with similar goods available from external suppliers. Current regulations nevertheless prohibit the import of any components that can be produced locally, regardless of their price and quality.

The electronic and electrical industry was created in the early 1960s when the government adopted a blanket import-substitution programme for a wide range of consumer durables as part of its overall strategy to restructure the otherwise essentially traditional agricultural-based economy. This policy had some initial successes, boosted by the availability of substantial volumes of low-cost labour released from the increasingly mechanized agricultural sector, and by the growing number of high school and university graduates. On the job training and special training courses provided by the industry and public institutions during the 1960s and the early 1970s also helped to enhance the quality of the workforce, although the supply of skilled and semi-skilled labour was not able to keep pace with the rapid expansion of the industry.

The production of television sets began in 1962 when two assembly plants became operational. The industry expanded during the following three decades, and now consists of nine firms with a combined annual assembling capacity of about 1 million sets. Eight of these firms also have a production capacity for radios and cassette recorders, with two other firms producing only audio equipment. The refrigerator industry has expanded in a broadly similar pattern to the TV and radio/cassette recorder industries, and now consists of 17 plants with a total capacity of about 1 million units per year. Other important electronic and electrical appliances produced locally include water coolers, vacuum cleaners, meat mincers, juicers, rice cookers, and electric fans. Electric plugs and light bulbs and tubes are also produced by three firms with a capacity of about 70 million units.

Telephone receivers and telephone exchange equipment, including PABX, are produced by two companies established by the state-owned Iran Telecommunication Industries (ITI) in 1963 in a joint venture with Siemens, the Ministry of Posts, Telegraphs and Telephones, and the Bank of Industry and Mines. In 1987 ITI signed a new contract with Siemens and SEL to produce digital telephone exchanges with a capacity of up to 1 million lines by 1994 to replace the existing outdated analogue system. Two other government companies also produce PABX systems, and a further two firms affiliated to the Ministry of Posts, Telegraphs and Telephones produce telephone exchanges.

I. THE MACROECONOMIC AND INDUSTRIAL POLICY ENVIRONMENT

A. RECENT ECONOMIC TRENDS

Developments to 1989: external shocks and disrupted development

The Iranian economy has been subject to a number of external shocks during the past few decades, which have seriously disrupted its development process. Periods characterized by a relatively favourable international and domestic business environment, providing the economy with an opportunity for rapid growth and development, have alternated with periods during which the operating environment has deteriorated dramatically and sharply restrained the economy's developmental momentum. The net effect of these events has been a history of interrupted growth and unattained economic potential.

As a major producer of crude oil, Iran benefited from growing international demand for fossil fuels during the 1960s. The resulting availability of substantial additional resources permitted investments to be made in a variety of development projects and generated a steady growth of national income, with gross domestic product (GDP) expanding at an annual average rate of almost 10 per cent in real terms between 1959 and 1973.[1/] This rapid economic growth was accompanied by a high degree of price stability, reflected in an annual rate of consumer price inflation of 3.4 per cent, and broad equilibrium in Iran's external accounts.

The fourfold increase in international oil prices in 1973-74 resulted in a corresponding increase in Iran's export earnings and government revenues, with the current-account surplus surging from $154 million in 1973 to $12.3 billion in 1974, and the government's budget revenues rising from IR491 billion to IR1,427 billion during the same period. This prompted a significant upward revision of the targets set for the then prevailing Fifth Five-Year Development Plan (1973-78), and a sharp acceleration of the industrialization process. Large numbers of new projects, especially in the manufacturing sector, were begun during this period, with emphasis being placed on the expansion and development of the engineering and chemical/petrochemical industries.

In practice, however, the Iranian economy proved unable to absorb the dramatic increase in financial resources. Despite substantial outward capital flows of more than $4 billion per year domestic liquidity quadrupled between 1973 and 1977, stimulating a rise in the annual average rate of inflation to 15.3 per cent. The impact of this erosion of economic stability was exacerbated by the stagnation of international oil prices in 1977-78, which prompted the government to increase its domestic borrowing to enable it to finance its ambitious economic development programmes, further fuelling the already strong inflationary pressures. Even so, the government was unable to prevent a sharp decline in GDP in 1978, which fell by 21 per cent in real terms to a level only marginally above that recorded in 1975.

The dramatic increase in Iran's foreign exchange reserves from some $980 million in 1973 to $7.7 billion in 1974 and $10.8 billion in 1977 caused a significant strengthening of the Iranian currency. This, in turn, stimulated a sharp increase in imports and undermined the ability of Iran's non-oil products to compete in domestic as well as external markets, leading to a growing dualization of the Iranian economy. This increasing dependence on imports and the declining competitiveness of the domestic non-oil industries reinforced the deterioration in the balance-of-payments, with the current-account surplus narrowing to $104 million in 1978 from a peak of $7.7 billion in 1976. The impact of the recession induced by the softening oil prices was felt particularly strongly by the domestic producers of non-oil goods, who had already suffered a significant loss of market share in the preceding years.

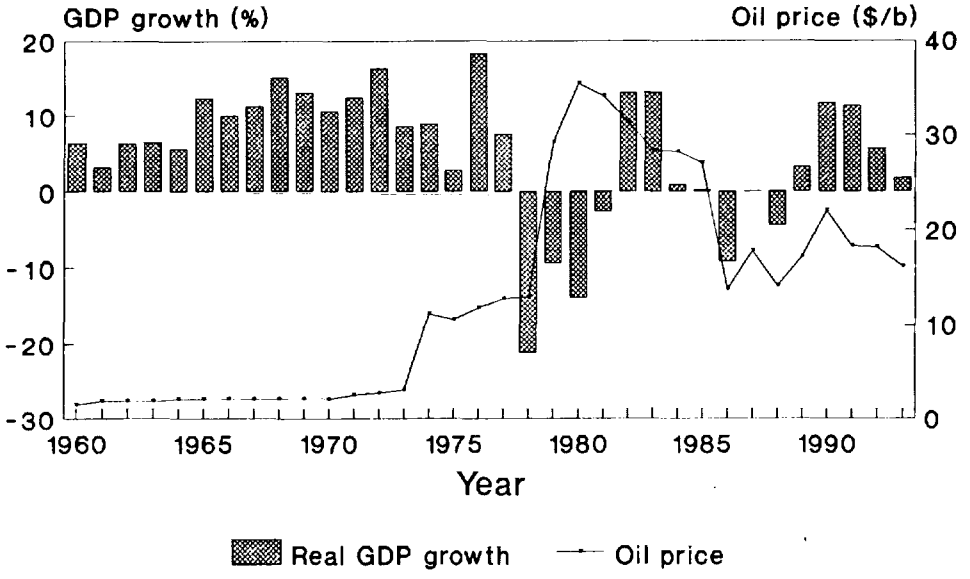
The combination of rising inflation and deepening economic recession reinforced widespread public discontent with the status quo, and helped to stimulate a popular uprising against the government in late 1978, which led to the establishment of the Islamic Republic in early 1979. The Islamic Revolution had a wide-ranging impact on the Iranian economy, resulting in the nationalization of a large number of industrial, commercial and financial enterprises, the flight of vast amounts of capital and skilled personnel, and the rupture of many of Iran's existing global economic and trade links. As a result, the economy suffered a further contraction of 6.4 per cent in 1979, while the price level rose by almost 11 per cent. At the same time, however, the second international oil shock, triggered by the events in Iran itself, allowed the country to record a substantially increased current-account surplus of almost $12 billion, and an increase in its foreign exchange reserves from below $10 billion in 1978 to more than $14.5 billion in 1979.

Soon after the establishment of the Islamic Republic, Iran suffered another shock when it was invaded by Iraqi forces in October 1980. The resulting conflict, which developed into an eight year war of attrition, further retarded Iran's economic development, both by necessitating a reallocation of resources from developmental objectives to the conduct of the war, and through the extensive damage and destruction it wreaked upon the country's infrastructure. The situation was aggravated by the downturn and eventual collapse of international oil prices between 1982 and 1986, which substantially reduced Iran's export earnings and government revenues, resulting in a significant deterioration in the country's balance of payments and a renewed increase in the government's domestic borrowing. Total liquidity consequently increased at an annual average rate of almost 18 per cent between 1979 and 1988, which helped to stimulate an average inflation rate of 19.3 per cent per year. Meanwhile, Iran's economic growth remained disappointing, with GDP expanding only slowly between 1980 to 1983 at an average annual rate of 1.8 per cent in real terms, before stagnating in the following two years and then contracting rapidly by almost 4.4 per cent per year between 1985 and 1988.

Developments since 1989: reform, recovery and retrenchment

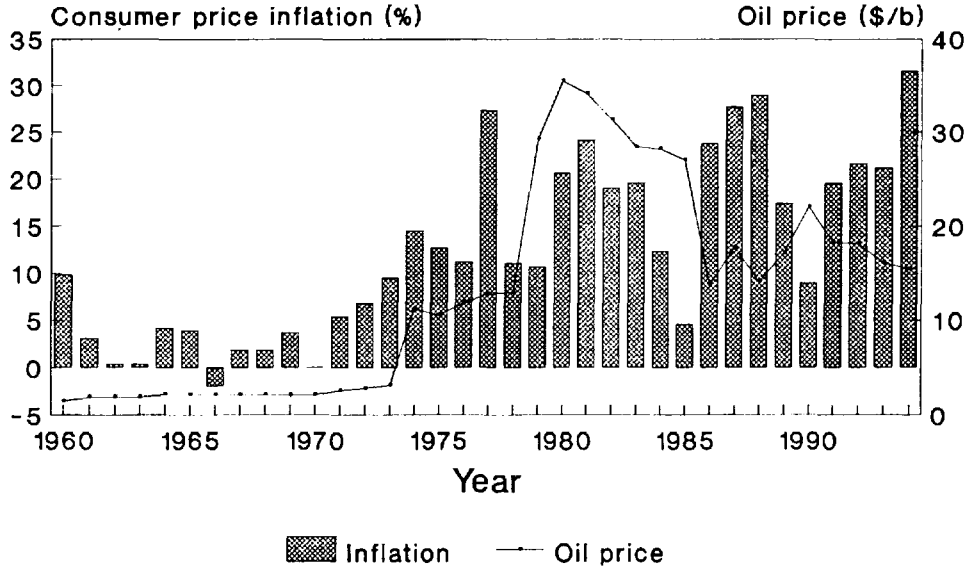
Although Iran eventually succeeded in recovering most of the territory lost to Iraq in the early course of the conflict and ended the war undefeated, the conflict weakened its economy considerably. With the population estimated to have grown from 37.2 million to 51.9 million, and GDP (in constant 1990 prices) to have fallen from IR37,227 billion to IR31,742 billion between 1979 and 1988, per capita incomes registered a substantial fall in real terms during the war years. The effects of this decline in overall national income were felt especially strongly by the poorer sections of the community in general and manual workers in particular, who suffered a considerable loss of job opportunities as a result of the damage and disruption of these years, and a sharp fall in real disposable incomes as a result of the sharply increasing prices of basic necessities.

Fig.I.A. Annual growth of gross domestic product (GDP), 1960-93
(Percentage)



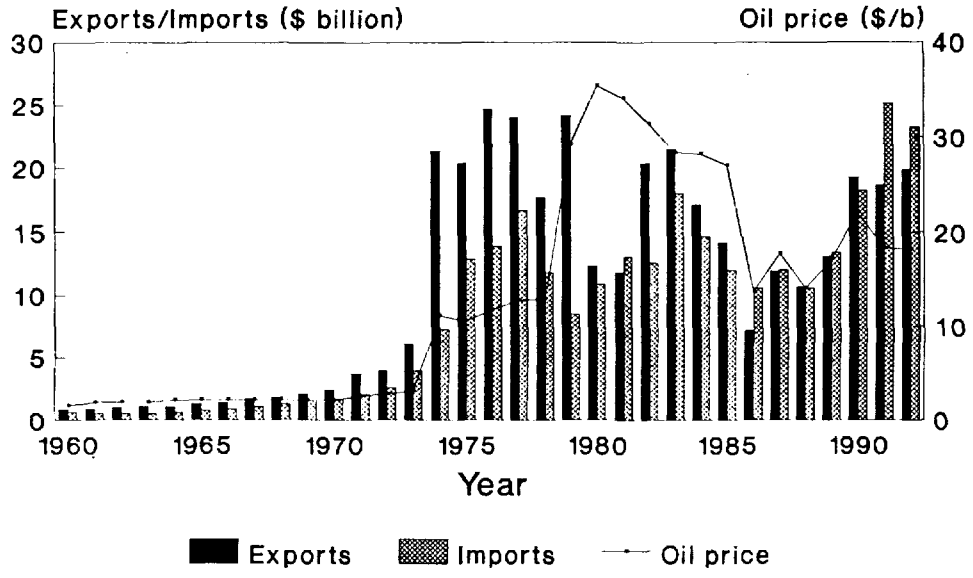
Source: International Monetary Fund, *International Financial Statistics,* various issues.

Fig.I.B. Annual change in consumer prices, 1960-94
(Percentage)



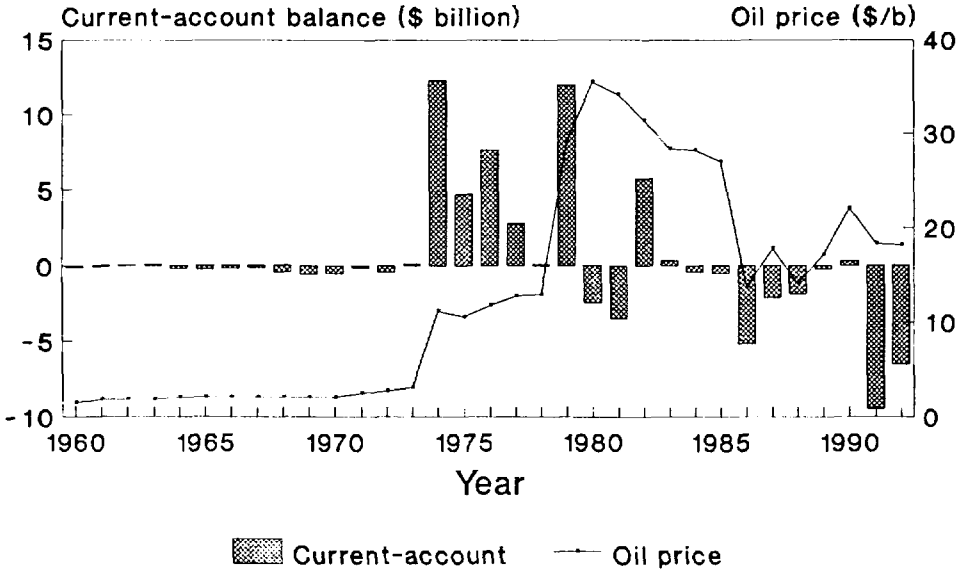
Source: International Monetary Fund, *International Financial Statistics,* various issues.

Fig.I.C. External trade flows, 1960-92
($ billion)



Source: International Monetary Fund, *International Financial Statistics,* various issues.

Fig.I.D. Current-account balance, 1960-92
($ billion)



Source: International Monetary Fund, *International Financial Statistics,* various issues.

Recognizing the serious deterioration suffered by the economy during the previous decade, the Government of Iran accepted the promotion of economic recovery as its most pressing policy priority after the signing of the cease-fire in August 1988. The vehicle chosen for this purpose was the First Socio-Economic and Cultural Development Plan of the Islamic Republic of Iran, drawn up to cover the five year period from March 1989 to March 1994. One of its most important features was an attempt to revive market mechanisms and reverse the extensive accretion of administrative restrictions over the economy that had occurred during the preceding ten years. As indicated in Box I.A, particular attention was paid in this connection to fiscal and monetary stabilization, the gradual removal of price controls and subsidies, the establishment of realistic interest and exchange rates, the liberalization of trade and investment regulations, and the restoration of incentives for the development of private entrepreneurship.

The following years consequently witnessed the introduction of a number of fundamental economic policy reforms. In the field of fiscal policy, measures were taken to improve the country's tax administration in order to strengthen the government's revenue base and reduce its high dependence on the petroleum sector. At the same time, steps were taken to improve the efficiency of monetary policy by removing credit ceilings and raising the rates of return on bank deposits and credits, which for much of the previous decade had remained negative in real terms. This was accompanied by the reactivation of the Tehran Stock Exchange in September 1989, which in turn was followed by the introduction of a privatization programme in 1991. These measures were complemented by a significant liberalization of price policy, with the number of price-controlled items being reduced from 296 (representing approximately 75 per cent of the items and value weight of the consumer price index) in 1988/89 to 22 (representing less than 5 per cent of these variables) by the middle of 1991. Efforts were also made to promote international trade, with many of the quantitative controls on exports and imports being lifted and a new, reduced, tariff schedule being introduced. In a particularly important but short-lived development, the complex system of multiple exchange rates prevailing in 1988 was gradually simplified, and eventually unified at a sharply depreciated market-related level in 1993.

These measures, supported by a strengthening of international oil prices in the wake of the Iraqi invasion of Kuwait in August 1990, resulted in a marked improvement in Iran's economic performance. From 4.5 per cent in 1989 the rate of GDP growth increased to 11.2 per cent in 1990 and remained above 10 per cent in 1991 before dropping to a still impressive 5.8 per cent in 1992. This period also witnessed rapid progress in repairing the damage caused by the war, with a number of major industrial facilities damaged or destroyed during the 1980s, including the important refinery of Abadan in the province of Khuzestan, being brought on stream by 1992. A significant, albeit only partially successful, beginning was also made in the privatization of commercial and industrial enterprises, with shares of some 40 companies being floated on the Tehran Stock Exchange by the end of 1992 and shares in a substantial number of other firms being transferred to employees.[2/]

This recovery in economic activity was accompanied by a sharp drop in the inflation rate in 1989 and 1990 as the government's budget deficits were reduced, although a combination of credit expansion, exchange rate realignments and price deregulation prompted an acceleration of inflation in 1991-94. The need to import a wide range of capital and intermediate goods required for the reconstruction process also imposed a considerable strain on Iran's external balance, which was reinforced by a renewed weakening of international oil prices. After registering a modest deficit of $191 million in 1989 and a small surplus of $327 million in 1990, the current-account balance deteriorated dramatically in 1991 and 1992, when deficits of approximately $9.5 billion and $6.5 billion respectively were recorded. With the country's foreign exchange reserves having been depleted in the preceding years by the need to finance the war effort and the substantial

compensation payments awarded to foreign owners of firms expropriated by the government in the early 1980s, this dramatic widening of the current-account deficit provoked serious cash flow problems from mid-1992 onwards. This forced the government to take firm measures to restrain non-essential imports, which are believed to have stimulated a gradual recovery in the balance of payments by 1994, albeit at the cost of higher inflation and restrained growth.[3/]

Box I.A.
Principal features of the new economic policies contained in the First Socio-Economic and Cultural Development Plan of the Islamic Republic of Iran (1989-94)

- The lifting of price controls.
- An increase in the share of development expenditure in the government budget.
- The planned divestiture of hundreds of state-owned enterprises.
- The partial lifting of foreign exchange controls, and the activation and legalization of a free foreign exchange market.
- The adoption of measures to stimulate the inflow of capital, mainly through the promotion of joint-venture projects with foreign partners and the encouragement of expatriate Iranians to repatriate capital held abroad.
- The adoption of sounder monetary and credit policies to stimulate the growth of private savings.
- The establishment of industrial free trade zones.
- The promotion of non-oil exports through the provision of appropriate incentives.
- The revocation of unjustified rules and regulations.
- The deregulation of pricing and investment decisions by public enterprises.
- The relaxation of import controls.
- The adoption of measures to increase the rate of industrial capacity utilization to international levels.

The rapid build-up of arrears on Iran's trade-related debt resulted in the country's total stock of external debt rising from a mere $5.9 billion, or 5 per cent of GDP, to $14.6 billion, or 13 per cent of GDP, in 1992, and further to an estimated $18.6 billion, equivalent to 34 per cent of GDP, by 1993. During the same period the accrued debt service obligations increased from $457 million, representing 3 per cent of the value of total exports, to $3.0 billion and $11.3 billion, or 15 per cent and 65 per cent of total export value respectively. This sharp growth in the external debt burden was accelerated by the depreciation of the US dollar, in which most of Iran's export income is denominated but which accounts for less than 20 per cent of the country's external debt stocks.

By the beginning of 1993 Iran's external payments position had become precarious, with the total value of arrears estimated to have risen to $2 billion. This prompted the government to enter into negotiations with the country's creditors to reschedule its debt service payments, with the first such agreements being signed with French, German and Japanese banks and trading companies in April-June 1993. As the arrears continued to accumulate, to an estimated at $5-10 billion by the second half of 1993, the rescheduling negotiations continued, and by the end of 1994 wide-ranging agreements had been reached with most of Iran's major creditors.[4/]

The unfavourable balance of payments and external debt situation inevitably prompted a steady weakening of the rial in the foreign exchange markets. This increasing pressure on the currency severely tested the government's resolve to maintain a liberal exchange rate policy, and after allowing a gradual depreciation of the rial's official "floating" exchange rate from IR1,538:$1 at the time of the unification of the exchange rate in March 1993 to approximately IR1,750:$1 by May 1994, the government was forced by a widening gap between the official and free market rates to introduce a new secondary rate. This rate, known as the export-import rate, was intended to be used for most current-account transactions, and was initially set at IR2,585:$1, IR50 below the free-market rate. Its subsequent movements have not entirely followed the free-market rate, however, which by March 1995 had fallen to some IR4,450:$1 while the export-import rate stood at IR4,380:$1.

Meanwhile, the government proceeded with the drafting of the Second Socio-Economic and Cultural Development Plan of the Islamic Republic, which was presented to the *majlis* (national parliament) for deliberation and approval on 21 December 1993, and was scheduled to come into force upon expiry of the First Plan on 20 March 1994. The main objective of this Plan was to improve the macro-economic management of the economy through increased reliance on monetary and fiscal instruments; to promote a more efficient use of public resources; to improve the structure of factor and product markets through the promotion of competition and the prevention of monopolies; to reform the structure of government along lines consistent with the promotion of rapid economic growth; and to enhance the level of social development and social justice. As summarized in Box I.B, this Plan consequently called for a continuation of the liberalizing economic reforms introduced during the First Plan, with a number of deregulatory measures being proposed in the fields of trade, monetary, fiscal, exchange rate, and price policies, and special emphasis being given to job creation.

The mounting economic pressures during 1992 and 1993 prompted a gradual shift in public attitudes towards the reform process, however, which were reflected particularly strongly in the *majlis*. The presentation of the draft Second Plan to the *majlis* consequently elicited only a lukewarm response, with several parliamentary leaders suggesting that the Plan's implementation should be postponed until a more favourable economic environment had been created. This proposal, though contested by the government, was adopted by the *majlis* in March 1994, which scheduled a debate on the Plan for August 1994 and its tentative introduction on 21 March 1995. The draft Plan document was approved, with a number of modifications, by the *majlis* at its August 1994 debate, which also confirmed that the Plan's implementation would proceed on 21 March 1995.

The revised Plan document, as approved by the *majlis* in August 1994, continues to focus on a gradual liberalization of the economy and calls for the achievement of an annual average GDP growth rate of 5.1. per cent in real terms, with the agricultural sector projected to grow by 4.3 per cent per year, the oil sector by 1.6 per cent per year, the industrial sector (comprising both manufacturing and mining) by 5.9 per cent per year, the public utilities sector by 8 per cent per year, the construction sector by 4 per cent per year, the transport sector by 4.7 per cent per year, the communications sector by 6.8 per cent per year, and the residual services sector by 3.1 per cent per year. In addition, the Plan proposes a real annual average increase in private and public consumption expenditure by 4 per cent and 0.9 per cent respectively, and an annual average growth of investment by 6.2 per cent. Oil and non-oil exports are projected to grow at an annual rate of 3.4 per cent and 8.4 per cent respectively, and more than 2 million jobs are expected to be created.

Box I.B.
Principal objectives of the original draft of the Second Socio-Economic and Cultural Development Plan of the Islamic Republic of Iran (1994-98)

Foreign trade:

- The creation of an environment conducive to the development of an export-oriented economy based on the principle of comparative advantage.
- The maintenance of a managed floating exchange regime marked by the revocation of the exchange-delivery-requirement, the convertibility of the rial, and a unified exchange rate.
- The reduction of quantitative restrictions on imports.
- The prevention of monopolies and the promotion of external trade.
- The provision of "reasonable" price support to producers and consumers in line with the prevailing international situation.
- The centralization of duty collection on foreign trade.

Money and financial markets:

- The granting of credit solely on the basis of economic criteria.
- The reintroduction of bonds as an instrument for mobilizing public funds.
- An appraisal of all existing monetary and financial rules and regulations.
- The rationalization of profit (interest) rates in order to ensure a positive real rate of return on deposits and credits.
- An increased participation by the private and cooperative sectors in the provision of banking services.

Budget:

- An increase in the share of direct taxes in government revenues.
- A gradual elimination of tax exemptions.
- A reform of the prevailing tax laws.
- The use of tax incentives to stimulate investment.
- A balanced budget.
- A reduction of the government's recurrent expenditure through a "rolling back of the frontiers of the state".
- An increased reliance on economic criteria in the allocation of development expenditure, with particular priority being given to the completion of unfinished projects.
- The granting of contracts according to bids and tenders.

Prices:

- The adoption of economic pricing policies for utilities.

Employment and manpower:

- The creation of increased employment opportunities.
- The development and promotion of handicraft, cottage and small industries, especially in rural areas.
- The channelling of non-agricultural activities to rural areas.
- A reduction in the dependence on foreign labour.

Source: Government of Iran, Plan and Budget Organization, *Draft Second Socio-Economic and Cultural Development Plan of the Islamic Republic of Iran,* 1993.

The government has meanwhile responded to the growing concern over rising inflation and the worsening external payments situation by reimposing a variety of economic controls from mid-1994 onwards. While the reintroduction of these controls constitutes a short-term setback to the reform programme initiated in the late 1980s, and will have to be reversed in the coming years in order to ensure the removal of the existing economic distortions and the sustainability of Iran's economic recovery and future growth, the longer-term outlook remains promising. The country has a substantial resource potential on which to diversify its economy from its present high dependence on the hydrocarbon industries provided an appropriate incentive structure is established and maintained. Much of this potential is of an industrial nature, moreover, and the development of an efficient and competitive manufacturing sector based closely on Iran's natural and human resources will play a major role in stimulating the country's overall economic development.

B. ECONOMIC STRUCTURE

The physical environment

Iran is a large and geographically diverse country, stretching almost 2,000 kilometres from West to East and covering an area of 1.65 million square kilometres. The northern part of the country has a semi-tropical climate, while the central and southern parts are relatively arid with an annual average rainfall of about 250 millimetres. This climatic diversity enables Iran to produce a variety of agricultural crops for most of the year, and its long coastlines along the Caspian Sea in the north and the Persian Gulf and Sea of Oman in the south give it substantial territorial waters and fisheries resources. In addition, the country is also endowed with a wide range of minerals, most of which have not yet been developed despite extensive plans to do so stretching back for almost two decades.

The demographic base

The most recent census, conducted in 1990, indicated a total population of 55.8 million. This represents an average annual increase of 3.4 per cent in the 15 years since 1976, when a similar enumeration yielded a figure of 33.7 million. Although this overall growth rate masks a decline from an average of 3.9 per cent per year in 1976-86 to 2.5 per cent per year in 1986-91, even the latter growth rate remains relatively high, and implies a doubling of the population in less than 30 years.

The high population growth rates recorded during the past two decades reflect both a vigorous encouragement of large families by the government during the 1980s, *inter alia* through the provision of a wide range of social subsidies, and the influx of vast numbers of refugees from Afghanistan and Iraq. Recognizing the strains that such high rates of population growth place on the development process, the government initiated a family planning programme in 1989. This policy, combined with the increasing repatriation of refugees, is officially estimated to have resulted in a reduction of the population growth rate to 1.8 per cent by 1993, and is projected to lead to a further decline to 1.5 per cent within the next five years.[5/]

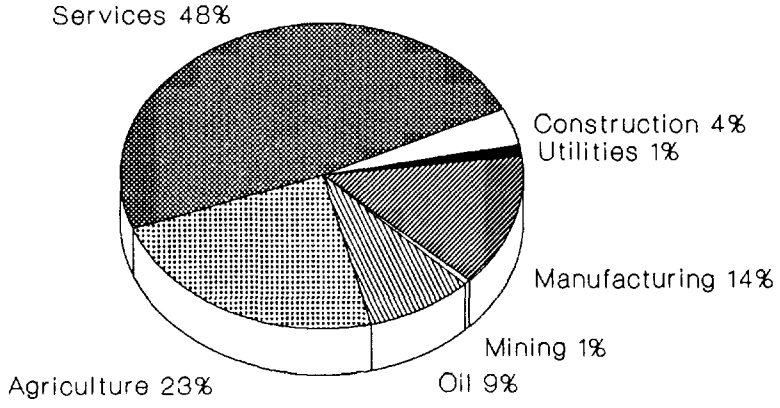
The age structure of Iran's population is now heavily weighted towards younger age groups. The 1991 census showed that 44 per cent of the population was below the age of 15 years, and that a further 10.6 per cent was aged between 15 and 20 years. This heavy preponderance of the younger age groups will inevitably result in heavy demands being placed on the economy in coming years for such basic requirements as education, medical care, housing and, above all, job opportunities.

It will also strain the government's efforts to reduce the rate of population growth as these young people enter the prime reproductive age.

The geographical distribution of Iran's population is very uneven, with 59 per cent of the total population residing in the northern, north-western and central parts of the country to the west of the salt deserts. This uneven distribution is primarily a reflection of regional variations in the agricultural and mineral resource base. The coastal regions bordering the Caspian Sea in the north and the Persian Gulf and Sea of Oman in the south are endowed with particularly fertile land, and have consequently developed into major agricultural centres. The central parts are more arid and hence less suitable for cultivation, but have substantial mineral resources to support industrial development.

The last three decades have witnessed a dramatic shift in the rural-urban distribution of Iran's population, with the urban population having increased by 5 per cent per year between 1976 and 1991 while the rural population grew by only 2 per cent per year. This has resulted in a transformation of the country from a predominantly rural society to one in which about 60 per cent of the population lives in urban areas. This process of urbanization is continuing to advance rapidly, moreover, as a result of insufficient job opportunities in rural areas and the attractiveness of urban life with better job prospects, more developed health and educational services, and wider availability of consumer goods.

Fig. I.E. Distribution of gross domestic product, 1992
(Percentage)



Source: Central Bank of Iran.

Agriculture, forestry and fishing

Agriculture, comprising arable farming and horticulture, animal husbandry, forestry and fishing, is still the most important sector in Iran in terms of its contribution to GDP and job creation. The share of agriculture in GDP at current market prices actually increased from 17.6 per cent in 1980 to 22.7 per cent in 1992. The latest available statistics on the sectoral distribution of employment show that although the share of agriculture in total employment declined from 56.3 per cent in 1956 to 29 per cent in 1986 and further to 22.4 per cent in 1992 as a result of the declining capacity of the sector to absorb additional labour, the actual number of people employed in agricultural activities increased from 3.3 million to 3.4 million during this period.

Although mechanization is quickly gaining ground in Iranian agriculture, the sector continues to be dominated by traditional methods of cultivation. Despite the growth of large-scale mechanized farming and animal husbandry units, smallholdings therefore continue to comprise the bulk of the sector. According to the 1988 agricultural census, the average size of holding amounted to 5.87 hectares and was often divided into several smaller units.

Manufacturing

The manufacturing sector in Iran has evolved over a period of more than five decades as a result of the government's import-substituting economic development strategy, with the establishment of a wide-ranging industrial base. At the same time, however, the objective of industrial self-sufficiency has not been achieved, and the manufacturing sector has remained heavily dependent on imported raw materials and capital and intermediate goods, which in turn has rendered it highly vulnerable at times of foreign exchange shortages. The overall contribution of manufacturing, especially outside the oil sector, to the Iranian economy has also remained limited.

The latest available data indicate that the share of non-oil manufacturing in GDP increased from 9.2 per cent to 13.6 per cent between 1980 and 1992. During the same period the share of the oil sector, which consists mainly of extraction activities but also includes an undefined component of refining and other processing, declined from 12.6 per cent to 8.4 per cent. Assuming, generously, that the relative share of oil refining in the overall oil sector increased from about one-third to one-half between 1980 and 1992, the combined share of oil and non-oil manufacturing in total GDP would only have increased from 13.2 per cent to 17.8 per cent during this period.

The contribution of manufacturing to employment creation has also been comparatively modest. Although the share of manufacturing employment in total employment increased sharply between the 1956 and 1966 censuses from 13.8 per cent to 18.2 per cent, its growth slowed significantly in the following decade to 19 per cent in 1976. By 1986 the share had contracted to 13.2 per cent - below the 1956 level, as a result of the external shocks suffered by the economy between the mid-1970s and the mid-1980s - and in 1992 it was estimated at a mere 12.3 per cent.

Mining and energy

Iran is well endowed with a wide range of mineral resources, and the mining industry has made a major contribution to the country's economy. Hydrocarbons, including crude oil and natural gas, constitute the most valuable of these resources, although the country also has substantial deposits of other metallic and non-metallic minerals. The bulk of these mineral resources are owned by the state and exploited by government enterprises, although steps have been taken in recent years to involve the private sector in the mining industry.

The extraction of hydrocarbons is the most important activity in the mining sector. Crude oil has traditionally been the most important source of public revenue and foreign exchange, and has retained its dominance in these fields despite persistent efforts by the government to diversify Iran's budget revenues and export earnings. Even in the mid-1990s crude oil continues to account for about 70 per cent of government revenues and more than 80 per cent of Iran's export income.

Oil is still the main source of energy in Iran, although plans are under way to expand the use of natural gas for domestic and industrial use. A network of natural gas supply lines for domestic consumption has already been created, and is expected to be extended to almost all cities and some rural areas in the next few years. Plans to promote the use of gas-driven motor vehicles are also seriously being considered in order to reduce pollution and utilize the huge deposits of natural gas in the country.

Apart from substantial deposits of crude oil and gas, Iran is also rich in other minerals. According to a 1988 survey, the total proven reserves of non-oil minerals in Iran exceeded 10 billion tonnes. This total comprised 24.9 million tonnes of coal, 24.7 million tonnes of iron ore, 1.05 million tonnes of copper ore, 646.2 million tonnes of decorative stones, 1.47 billion tonnes of building stone, 5.1 billion tonnes of limestone, 237 million tonnes of silica and 1.3 billion tonnes of gypsum. In addition, Iran also has considerable deposits of lead and zinc, kaolin and fire-clay, asbestos and numerous other metallic and non-metallic minerals.

Non-oil mining activities in Iran have hitherto concentrated on the extraction and processing of iron ore, copper, and various building materials. The total production of non-oil minerals currently amounts to about 60 million tonnes, with, *inter alia*, a total of 5.7 million tonnes of iron ore, 106,500 tonnes of copper and 44 million tons of various construction stones being produced in 1992.[6/] Recognizing the considerable contribution that the non-oil mining industry can make towards the diversification of Iran's economy, the government attaches great importance to its further development.

Iran also generates a considerable amount of electrical power. The country's total generating capacity amounted to 15,724 MW in 1992, when a total of 65.8 billion kWh of electricity was produced. The 1989-94 Plan projected the expansion of Iran's generating capacity by 14,349 MW, of which only 2,200 MW had been installed by early 1993. The electricity generating industry consists of steam, gas-fired, hydroelectric and diesel power plants. Nearly half of the installed capacity is accounted for by the steam generators, about 3,900 MW by gas-fired generators and 1,953 MW by hydroelectric generators.

Banking and finance

The formal banking system in Iran is entirely state-owned and composed of a central bank, six commercial banks and four specialized banks. The central bank, Bank Markazi, implements the government's monetary policies and oversees the operation of the banking system. The commercial and specialized banks offer an extensive branch network, with almost 1,000 domestic and 55 foreign branches at the end of 1992, although this tends to be concentrated mainly in the major cities and towns. These banks are supplemented by a number of non-bank institutions known as *gharz-ol-hasaneh* funds, which accept deposits from the general public and extend short term loans for a 1 per cent service charge.

The banking system itself has been based on the Islamic principle of interest-free banking since 1983. This requires the banks to share proportionately in the profits or losses accruing to their borrowers from investments made with the borrowed funds, and to recompense their creditors

according to their own profits or losses. In practice, the commercial banks' credit policies, the distribution of their credits according to various economic activities, and the rate of return (profit) they offer on deposits are determined by the government through the Monetary and Credit Council of the central bank. This, in turn, bases its decisions on the financial requirements of the public and private sectors specified by the government's annual budget.

The ability of the banking system to attract savings has been limited since the introduction of Islamic banking practices because the rate of profit on deposits has been maintained at levels well below the rate of inflation.[7/] As a result, private funds have tended to be channelled into the purchase of fixed assets, such as foreign currency, gold and real estate. The traditional practice of lending and borrowing money at market rates of interest is widely reported to have continued at an informal level, however, despite the fact that it has been banned since the enactment of the Islamic banking regulations.

A capital market, the Tehran Stock Exchange, was established in 1967. Its development has been hampered by excessive government supervision, which is conducted through the central bank. Although the government has attempted to enhance the role of the stock exchange in recent years and use it as a vehicle for the privatization of state-owned enterprises, the value of the shares transacted on the bourse amounts to less than 2 per cent of private sector liquidity and only about 5 per cent of the industrial sector.

Trade and services

The services sector has traditionally played an important role in the Iranian economy as a source of employment and income, and has at times accounted for almost half of the value added generated in the country. The emergence of this large services sector has been facilitated by Iran's rapid population growth and the government's commitment to the provision of schooling, health and medical services, and by the creation of a large administrative apparatus determined in part by the sheer size of the country.

The coexistence of a highly capital intensive and economically dominant oil industry with a relatively undeveloped non-oil industrial sector has also meant that the creation of a services sector, providing both public and personal services, represented the only means of distributing the proceeds of the oil industry.

Iran's economic infrastructure has improved greatly during the past four decades or so, although much still needs to be done to bring it to international standards. The latest available data show that the country had more than 5,000 kilometres of railways, 67,518 kilometres of main roads, over 80,000 kilometres of rural and earth roads, five multi-purpose ports with an installed capacity of 750,000 tonnes and 30 airports in 1991. The country had a total road length of about 56,000 kilometres, and a rail network of 4,500 kilometres in the mid-1970s. During the coming five years the government plans to build a further 20,000 kilometres of roads, lay 3,800 kilometres and upgrade 1,800 kilometres of railway lines, and establish 6 million tonnes of new commercial port capacity, in part through the construction of four new ports.[8/]

The telecommunications industry has also grown rapidly in recent years. In 1993 Iran had almost 2.6 million private telephone lines, 18,800 public telephone lines, 3,630 long-distance lines, a mobile telephone network, and many other telecommunications facilities such as telex and facsimile services. The country also has a satellite communication system, which is to be further developed.[9/]

C. THE POLICY ENVIRONMENT

Macroeconomic policy framework

The economic policy environment in Iran has been subject to considerable changes over the past 15 years. Economic policy-making in the late 1970s and early 1980s exhibited strong centralizing tendencies, and resulted in the ownership of most major industries and enterprises being transferred to the public sector. This trend was reinforced by the effect of the protracted war from 1980-88, during which the need to mobilize sufficient resources to sustain the war effort accelerated the move toward a centrally-planned and government-managed economy.

One of the most direct effects of these developments was the squeezing aside of the private sector into a peripheral economic role. This was most evident in the industrial sector, where the ownership or control of hundreds of firms was transferred to the public sector. With the state-owned oil sector accounting for almost all of Iran's foreign exchange earnings, moreover, the government was also able to control the allocation of foreign exchange. The impact of these developments was exacerbated by the government's monetary and fiscal policies, the increasing centralization and regulation of the economy through the increased adoption of price controls and rationing, the continued pursuit of an import-substituting industrial strategy, the imposition of tight controls on foreign exchange and foreign trade, and managerial inefficiencies at the factory level. The resulting decline in productivity significantly aggravated the effects of the war and falling real petroleum prices, which combined to cause the contraction of the Iranian economy in the years to 1988.

With the end of the war, the authorities were able to turn their attention towards reviving the economy, and initiated a number of economic policy reforms aimed at reviving the Iranian economy's growth momentum. This change of course was formalized in the introduction of the First Socio-Economic and Cultural Development Plan discussed above, which provided for a significant liberalization of the macroeconomic policy environment. Although the adoption of these measures helped to stimulate a strong recovery in 1989-92, it also resulted in a temporary rise in inflationary pressures as price controls were removed, and in a deterioration in Iran's external balance as the growth of economic activity stimulated an increased demand for imports and weakening oil prices reduced Iran's export earnings. This resulted in the reintroduction of some controls in 1993-94, although it is widely expected that the process of economic liberalization will be continued once circumstances improve.

Price policy

The distortion of the relative price structure has been one of the main macroeconomic characteristics of the Iranian economy for the past two decades. The sudden increase in crude oil revenues in 1974 and the desire to stimulate a rapid development of the economy through the provision of cheap credits and the adoption of import-substituting policies resulted in the introduction of widespread price subsidies. The manufacturing sector benefited in particularly large measure from this policy stance, and was granted access to subsidized raw material imports and bank credits as well as a variety of tax concessions and export incentives.

The new government established in 1979 took the prevailing price structure as given and attempted to maintain it during the war through a rationing system which encompassed almost the whole economy. This inevitably led to the emergence of a parallel market with prices several times higher than the administered prices, and a thriving illicit trade in foreign exchange. It also prompted a decline in domestic production as the widening gap between official and market prices

prevented the largely state-owned industries from obtaining cheap raw materials or selling their goods profitably.

Having been formulated under these conditions in 1988/89, the new economic policy adopted in 1990 placed particular emphasis on permitting market forces to play a greater role in determining prices. This transition was to be accomplished within the framework of a Five-Year Economic Development Plan, however, with administered prices being phased out gradually and replaced with market pricing practices over a five year period. In the meantime price subsidies were to remain in force for some basic consumer goods and essential industrial inputs.

This process of price adjustment could not be completed during the period of the First Plan. Some foods and raw materials continued to be subsidized, although the effect of these remaining subsidies became progressively less significant as the introduction of economic prices elsewhere in the economy resulted in a steady decline in the number of goods covered by the subsidies. The price liberalization process suffered a setback in the second half of 1994, however, when mounting inflationary pressures forced the government to respond with the re-institution of price controls. It nevertheless remains committed to the introduction of market prices over the longer term, and is expected to resume the liberalization process once economic circumstances have improved sufficiently.

Fiscal policy

Public spending plays a major role in the economy of Iran, with budget expenditures often amounting to about 50 per cent of the total national income of the country. Government spending is classified under the headings of recurrent and development expenditures, with the former consisting mainly of public procurements and payments of wages and salaries to public sector employees, and the latter comprising expenditures on physical investment by the government. A further distinction is also drawn between the general budget and the overall budget, of which the first relates to the budget of the government and some public enterprises while the second relates to the general budget as well as the accounts of enterprises affiliated to the government. In addition, the government also collects "special revenues", comprising contributions to the Social Security Organization and surcharges on selected taxes and fees, and extra-budgetary revenues collected and spent by the Organization for the Protection of Consumers and Producers (OPCP). These were not consolidated into the general budget until 1993.

One of the main characteristics of the government's fiscal policy has been the running of substantial deficits, at times amounting to almost 50 per cent of total budget expenditure. This feature was particularly apparent during the war years of 1980-88, when fiscal discipline was subordinated to the exigencies of war. Another important characteristic of fiscal policy in Iran has been the high reliance on oil and gas revenues in the government budget, which have accounted for more than 50 per cent of the government's general budget income for most of the past quarter century.

In response to the fall in international oil prices since the mid-1980s, the government has begun to take steps to broaden its revenue base. In this context it is seeking to increase its tax revenues in particular, and a major effort is currently under way to expand its collections of corporate taxes and taxes on private property, wealth and profit, which have hitherto made only a negligible contribution to the government's total tax revenues. For the first time in 25 years the government also attempted to balance its budget in the 1993/94 fiscal year, although the available indicators suggest that it achieved only partial success in this endeavour.

On the expenditure side, the late 1980s witnessed a sharp decline in the share of development spending in the government's total general budget outlay to about 20 per cent in 1987-89. This reflected a policy of reducing capital rather than recurrent expenditure whenever revenue shortfalls necessitated budgetary spending cuts. Recognizing the growing need to maintain and expand Iran's economic infrastructure, however, the government has more recently begun to place a higher priority on capital spending, resulting in an increase in its share to about 30 per cent in 1990-92.

Monetary policy

Iran's monetary and credit policies are determined by the Monetary and Credit Council, which is headed by the governor of the central bank. One of the principal aims of the Council has been the promotion of non-inflationary economic growth, the achievement of which has been rendered difficult by frequent external economic and political shocks. Consequently, Iran has suffered double-digit inflation and only modest rates of real GDP growth for most of the past two decades.

The task of the Monetary and Credit Council has been complicated further by the need to conform to an economic system based on Islamic precepts, which prevent the payment of interest. The activities of the Council have therefore been largely limited to the establishment of credit ceilings for various economic activities and the announcement of the annual rate of profit share paid on bank deposits.

As an instrument of the government, which was primarily concerned to mobilize funds for its own budgetary requirements, the Council has often also been forced to approve high levels of public borrowing even though they undermined the country's financial stability. In line with the need to minimize the cost of government borrowing, moreover, the Council has had to adopt policies leading to low nominal rates of return on borrowing and lending by the banking system, which have usually fallen well short of the rate of inflation, occasionally by a margin of 20 per cent.[10/] This, in turn, has resulted in the diversion of loanable funds from bank deposits to the purchase of durable goods, real estate, gold and foreign currency, often with speculative intent.

The inability of the prevailing monetary control mechanisms to contain inflationary pressures, combined with the broader reconsideration of economic policies after the 1980-88 war, have prompted some adjustments in monetary policy during the past few years. The profit-share rates on bank borrowing and lending were increased in 1991 and 1992, for example, and attempts have also been made to replace the direct controls on the banking system with indirect market-oriented methods of supervision. The reform process has been very hesitant, however, with the banks' borrowing and lending rates still remaining negative in real terms. Some direct controls were also reintroduced in 1993 as a temporary response to the external payment arrears and related domestic financial difficulties that emerged in mid-1992.

Trade policy

Iran's foreign trade policy during the past two to three decades has been greatly influenced by developments in the international oil market. While the average share of oil and gas exports in the country's total foreign exchange receipts amounted to 50-60 per cent in the 1950s, it increased to 80-90 per cent in the 1970s and 1980s, and has fallen only marginally in the early 1990s. Consequently, the imposition or relaxation of trade restrictions has been influenced directly by developments in international oil markets and their impact on Iran's foreign exchange earnings. During periods of relatively abundant foreign exchange availability the government has tended to allow easier terms for imports and neglected the promotion of non-oil exports, while during

periods of foreign exchange shortage it has tried to restrict imports and grant incentives to exporters.

Another important determinant of Iran's foreign trade policy, especially during the past ten years or so, has been the excessive overvaluation of the domestic currency. This practice, which had the effect of subsidizing imports and taxing domestic production and exports, became increasingly unsustainable in the early 1990s. In April 1993, therefore, the government initiated a unification of the previously prevailing multiple exchange rates and a comprehensive realignment of the rial's international parity. Although the subsequent two years have witnessed the re-emergence of three different exchange rates, the central bank remains committed to the principle of unifying exchange rates.

Further reforms are being introduced to liberalize the existing quantitative restrictions on foreign trade. The first step in this direction was taken in September 1993 with the passage of a new trade law. This distinguishes three categories of goods, in which trading is freely allowed, conditionally allowed with the permission of the relevant government authorities, or banned on religious or legal grounds. In addition, this law permits Iranians working abroad and travellers coming to Iran to import a certain amount of goods at concessional rates of import tax, and also permits the establishment of "border markets" in frontier areas to facilitate trade with neighbouring countries. Other provisions of the law include a number of measures to promote non-oil/gas exports and restrain private imports of consumer goods.

Despite the recent reimposition of some trade restrictions in response to the deteriorating balance-of-payments position, the trade liberalization process is expected to be continued into the foreseeable future. The Second Socio-Economic and Cultural Development Plan of the Islamic Republic of Iran, adopted by the *majlis* in August 1994, specifically calls for the introduction of further trade policy reforms and the reduction and simplification of the prevailing import taxes and tariffs. Further measures are also expected to be taken to re-unify the three-tier exchange rate regime that has emerged since mid-1994, followed by the abandonment of the existing foreign exchange allocation system.

Labour policy

Iran's labour policy is governed by a comprehensive labour law intended to protect workers and maintain employment. The law specifies conditions of work and payment as well as dismissal procedures. The observance of the law is overseen by a High Council of Employment comprising the minister of Employment and Social Affairs, two social and economic experts proposed by the minister and approved by the cabinet, three representatives chosen by the employers and three representatives nominated by labour organizations known as the Islamic Councils of Labour. Its decisions are taken by majority vote, with the minister of employment and social affairs having the casting vote.

Minimum wages, bonuses and other payments are determined by a directive issued annually by the Ministry of Employment and Social Affairs (MESA). The minimum wage currently stands at 110,000-130,000 rials per month, which at a "floating" exchange rate of 1,750 rials to the US dollar amounts to $62-74. Employers are also legally required to provide recreational facilities and training for their labour force, as well as a number of additional benefits, such as family allowances, housing benefits, travel expenses, end-of-year and productivity bonuses, a profit share, and payments to MESA for the provision of essential food items. These additional payments can amount to about 100 per cent of the regular pay, especially in production units owned and operated by the government or the public sector.

Industrial development policies

Official attempts to develop Iran's manufacturing industry date back to the middle of the nineteenth century, when the Industrial Revolution and the spread of industrialization in the West prompted Iran, to become an "industrial imitator" of the developed world. The first major effort to develop a domestic industrial base was initiated in the 1850s by the then prime minister Amirkabir, whose government encouraged local craftsmen to manufacture some of the goods produced in the industrial countries of the day, and employed consultants from the West to assist in the establishment of modern mills and workshops. These new workshops were located in the country's major towns, including Tabriz, Esfahan, Rasht and Tehran.[11/]

Successive Iranian governments adopted the classical model of import-substituting industrial development spearheaded by the promotion of the textile industry, with the first modern textile mill being set up in Tehran in 1901. Over the following decades, and especially during and after the 1920s, a number of textile, sugar and cement mills were set up. This was followed by a major industrialization effort in the 1930s and 1940s, which again concentrated on the building of mills modelled on those in Europe for the provision of basic necessities and household goods. This time, however, the government's industrial policy was influenced by developments in the former USSR after the 1917 Revolution, which resulted in the emergence of the concept of economic planning.

Iran's First Economic Plan was drafted in the 1920s but never implemented due to a lack of funds. The interest in economic planning continued to gain strength before and during the Second World War, and Iran's First Seven-Year Development Plan (1949-55) was formulated and implemented in the immediate post-war era. It was followed by a succession of seven- and five-year development plans. To date, nine such plans have been formulated in the country, of which six have been implemented. The latest, as discussed above, was originally scheduled to commence in April 1994 but was postponed until April 1995.

The First Seven-Year Plan was formulated at a time of limited funds, and was aimed primarily at developing Iran's agricultural sector, transportation network and social services. It provided for 28.5 per cent of the total expenditure to be devoted to social affairs, 25 per cent to the agricultural sector, 23.8 per cent to the construction of transport infrastructure, 14.3 per cent to the development of industry and mining, and the remainder to the expansion of the oil industry and communication facilities. In fact, the first two years of the Plan were devoted to the establishment of a planning organization and the restructuring of a number of industries, following which an interruption in the flow of oil revenues prevented the implementation of many of the proposed projects. The sugar and cement output of state-owned companies did increase, however, from 27,000 tonnes and 56,000 tonnes in 1949 to 55,000 tonnes and 62,000 tonnes in 1950, respectively.[12/]

The Second Development Plan (1956-62) also emphasized the development of agriculture and infrastructure, with agriculture and irrigation being allocated 31.1 per cent of the Plan's budget, transport and communications 39.8 per cent, social services 17.3 per cent and industry and mining 11.8 per cent. The main achievements of the Plan included the establishment of economic development as a national objective, the training of manpower for the execution of development plans, the initiation of agricultural mechanization as a basis for agro-industrial development, and the construction of roads, railways, ports, airports, telecommunications facilities, hospitals and clinics, and electricity and piped water systems. In the industrial sector priority continued to be given to the establishment of textile, cement and sugar plants, with the production of fabrics increasing from 60 to 418 million meters, the output of cement increasing from 82,000 tonnes to

1.2 million tonnes, and the production of sugar increasing from 85,000 tonnes to 217,000 tonnes. In overall terms, GNP increased by 34 per cent and the ground was paved for the execution of future development plans.

Iran's Third Development Plan (1963-67) stressed the country's industrialization as the prime instrument of economic development, and provided for the public sector to undertake investments in large, capital-intensive and heavy industries while encouraging the private sector to invest in light industries. During the Plan period the textile, cooking oil, sugar, dried fruits, dates, preserved food, tea, tobacco, fish processing, carpet weaving, leather, glass and fertilizer industries were further developed, with special attention being paid to small and medium sized industries, and steel, paper, synthetic fibre and petrochemical industries were set up. By the end of the Plan period an inward-looking industrial base had been created, with several of the industries established during this period lacking a distinct comparative advantage, the legacy of which still remains with the country.

The Fourth Development Plan (1968-72) was intended to transform Iran's oil-based economy into a non-oil-based one by continued import-substituting industrialization, first in the production of raw materials and subsequently in the production of capital goods. Thus, industry and mining were allocated 25.6 per cent of the planned national investment expenditure, while agriculture was allocated 8.2 per cent, the oil and gas sector 11.7 percent, water and electricity 12.3 per cent, and transport and communications 13 per cent. Moreover, the contribution of the private sector in achieving the objectives of the Plan was projected to increase substantially, with the share of private investment in the total projected capital formation in agriculture, industry and mining, oil and gas, water and electricity, and transport and communication being set at 62.2 per cent, 58.1 per cent, 55.3 per cent, 1.2 per cent, and 19 per cent, respectively. Industrial output doubled during the Plan period, with the establishment or expansion of production facilities for a wide range of manufactured goods, including steel, heavy metal equipment, machine tools, aluminium, tractors, defence equipment, petrochemicals, paper, cement, synthetic fibres, tyres, fertilizer, processed foods, glass, chinaware, bicycles and motorcycles, transport vehicles, electronic and mechanical products, pharmaceuticals, textiles and leather goods.

The Fifth Development Plan (1973-78) commenced shortly before the surge in international oil prices, which resulted in its revision in mid-stream and a trebling of the originally proposed expenditures. This sharp increase in the availability of financial resources proved to be beyond the absorptive capacity of the Iranian economy, however, and resulted in the flooding of the domestic market with imported goods to the detriment of the many of the internationally uncompetitive industries established during the previous plans. The Plan called for 16.6 per cent of the total investment expenditure to be channelled into the manufacturing industry, with the private sector accounting for a substantial proportion of this investment. The main thrust of the Plan in the industrial sector was to increase value added and output, maximize industrial capacity utilization, establish new industries and develop existing ones on the basis of comparative advantage, and promote industrial exports as the main source of foreign exchange income. The main emphasis was placed on the metal and chemical/petrochemical industries, which were allocated 29.8 per cent and 20.9 per cent respectively of the total investment funds earmarked for the manufacturing sector.

Many of the projects initiated during the Fifth Development Plan were not completed during the Plan period, and were therefore intended to be carried over into the next Plan scheduled to begin in 1979. The start of the new Plan coincided with the Islamic Revolution, however, which was soon followed by the outbreak of the eight year war with Iraq. These events resulted in a serious disruption of the economy, with many industries suffering severe war damage and the completion

of unfinished projects being delayed. The planning process was also interrupted, and although a Five-Year Plan covering 1983-87 was drafted by the new government, its implementation was prevented by the war.

The 1983-87 Plan was revised and updated after the end of the war, and implemented during 1989-93 as the First Socio-Economic and Cultural Development Plan of the Islamic Republic of Iran. This Plan was introduced at a time when the country had suffered major economic setbacks. The real GDP index had fallen from 100 in 1977 to 80 in 1988, while the per capita private consumption index had decreased to 64 during the same period and the share of investment in GDP had decreased from 27.4 per cent to 15 per cent. Even more importantly, the preceding decade had witnessed the introduction of a widespread misallocation of resources, monetary disorder, breakdown of fiscal discipline, and uneconomic pricing.

Against this background, the First Plan of the Islamic Republic sought to raise real incomes, increase the share of investment expenditure and private consumption and bring down unemployment. It also sought to deal with the economic inefficiencies and monetary mismanagement that had arisen, and to restore fiscal discipline. In the industrial field it embodied a mixture of import-substituting and export-oriented policies, paying special attention to the achievement of economic self-sufficiency while at the same time aiming to promote non-oil exports.[13/]

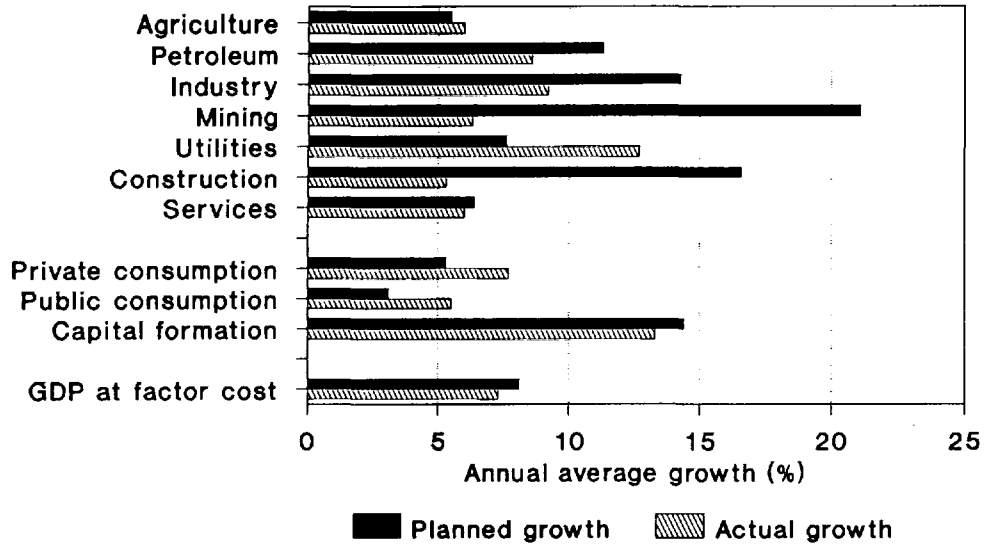
The Plan did not achieve all its goals, especially in the industrial sector and with regard to non-oil/gas exports. Preliminary outturns for the Plan period estimated by the Government of Iran indicate that the average annual growth rates of most sectors fell short of the targets set by the Plan in a number of cases, often by a substantial margin. A breakdown of the national income estimates by sector of origin reveals that actual growth exceeded the targeted rate only in the electricity, gas and water industries and, to a lesser extent, the agricultural sector. A similar breakdown by expenditure shows that both private and public consumption expanded much more rapidly than planned, while investment spending fell below target. In overall terms, the achieved annual average rate of growth amounted to 7.3 per cent, as against a target of 8.1 per cent.

One of the main underlying causes of the failure to meet the Plan targets was the weakness of international oil markets, which resulted in significant foreign exchange shortages. Although the industrial sector received more than its planned allocation of foreign exchange resources its poor performance was due, *inter alia,* to its continuing high dependence on imported raw materials and capital goods, and its inability to compete in international markets. In order to help the industrial sector overcome these inefficiencies, the government plans to proceed with the deregulation of the economy and the divestment of many publicly-owned companies.

The Second Socio-Economic and Cultural Development Plan of the Islamic Republic thus provides for the introduction of a number of measures designed to increase manufacturing output, balance Iran's trade in industrial products, improve and develop domestic technology, and make more efficient use of the country's existing industrial potential. These proposals involve adjustments to the industrial sector in order to ensure that domestic manufacturing activities are based more firmly on the principle of comparative advantage, the reduction of tariff rates to stimulate increased efficiency in domestic production, the continued establishment of industrial estates by the government and the private sector, the privatization of "unstrategic" industries, a liberalization of the investment code and the provision of increased protection for foreign investors in order to encourage the transfer of advanced technology, and the promotion of regional industrial development. A particularly important proposal in this connection calls for the establishment and

development of small, high-technology industries linked to medium and large industries through a variety of subcontracting arrangements.

Fig. I.F. Economic growth trends in the First Socio-Economic and Cultural Development Plan period, 1989-94
(Average percentage growth per year)



Source: Government of Iran, Plan and Budget Organization.

Foreign investment policy

Iran's foreign investment policy is governed by two sets of laws: the rules and regulations derived from the constitution of the Islamic Republic of Iran, and the law on the Attraction and Protection of Foreign Investment in Iran (APFII), which was enacted in the 1950s to provide a framework for foreign investment in the country. While requiring foreign investors to have the permission of the Iranian government, APFII allows for such investments to be made "either in cash or in the form of factories, machinery and parts, equipment, patent rights, expert services and the like, for development, rehabilitation and productive activities in industry, mining, agriculture, and transport". According to data collected by one study, IR55.4 billion worth of investments from 27 countries were approved under the terms of APFII during 1955-77. In terms of foreign currency, these investments amounted to a total of about $11 billion.[14/]

The establishment of the Islamic Republic, governed as it was by strong revolutionary sentiment and the widespread nationalization and confiscation of private enterprises, resulted in a virtual cessation of foreign investment. As "self-reliance" became the main theme of economic policy following the Islamic Revolution, moreover, and as the relatively high oil prices prevailing until the mid-1980s enabled Iran to earn substantial foreign exchange revenues, the country gradually began to disregard the importance of foreign investment, and the APFII became practically dormant.

Following the end of the war, policy sentiment changed gradually and Iran began to adopt a more open approach towards foreign participation. Initially, the country sought to finance its industrial development through buy-back arrangements with foreign investors, whereby the investing company would buy a proportion of the goods produced in its Iranian plants. This only attracted investments worth $1 million during the First Plan, as against a planned figure of $10 billion.[15/]

As a result, a debate ensued over the interpretation of the foreign investment law. This resulted in new regulations being approved by the cabinet and submitted to the parliament for deliberation and approval.[16/] It may be added that foreign investment in the service and trade sectors is not subject to APFII. The direct purchase of industrial establishments is also not forbidden, but does not automatically entitle the purchaser to the benefits offered by the APFII.[17/]

In summary, whatever legal position may emerge, it is clear that Iran is in need of substantial foreign investment. It is equally clear that the authorities have realized this need, and are seeking to introduce new measures to promote such investment while also looking for ways to re-interpret the existing laws. This may include the privatization of state-owned industries with the intention of paving the way for their transfer to foreign nationals, and/or providing a stable and secure investment policy environment.

NOTES TO CHAPTER I

1/ The macroeconomic data cited in this section are sourced from various issues of the *International Financial Statistics* published by the International Monetary Fund, Washington D.C.

2/ For a detailed analysis of the progress achieved by the privatization programme by 1992/93 see Kazmi, A., *The Privatization Programme in Iran - An Evaluation*, monograph prepared for UNDP Tehran, January 1994.

3/ The Economist Intelligence Unit, *Country Report - Iran, 1st quarter 1995*, London, 1995, p. 3.

4/ Details of the debt rescheduling agreements reached by Iran with its external creditors are given in the quarterly Country Reports of Iran published by The Economist Intelligence Unit. See, in particular, the Reports for the second quarter of 1993, page 24; the third quarter of 1993, pages 23-24; the fourth quarter of 1993, page 26; the first quarter of 1994, page 25; the second quarter of 1994, pages 24-25; the third quarter of 1994, page 21; the fourth quarter of 1994, page 23; and the first quarter of 1995, pages 23-24.

5/ "Bevölkerungswachstum auf 1,8 Prozent zurückgegangen", *Iran Report*, Embassy of the Islamic Republic of Iran in the Federal Republic of Germany, Vol. 2, No 30 (76), 28 July 1994, pp. 6-7.

6/ Ministry of Culture and Islamic Guidance, *After Four Years*, 1992.

7/ Rostami-Nasfi, Fereidoun, *Performance of the Banking Sector in the Last Ten Years*, Iran Chamber of Commerce, Industries and Mines Bulletin, September-October 1993.

8/ Government of Iran, Plan and Budget Organization, *Second Socio-Economic and Cultural Development Plan of the Islamic Republic of Iran - Annex 1*, 1993.

9/ Government of Iran, Plan and Budget Organization, *Second Socio-Economic and Cultural Development Plan of the Islamic Republic of Iran - Annex 1*, 1993.

10/ Rostami-Nasfi, Fereidoun, *Performance of the Banking Sector in the Last Ten Years*, Iran Chamber of Commerce, Industries and Mines Bulletin, September-October 1993.

11/ Barouei, A. A., and Aryafar, A., *Economic Planning in Iran: Roots, Processes and Prospects*, Asian and African Studies, No. 25, 1991.

12/ Government of Iran, Plan and Budget Organization, *Performance of the First Development Plan*, Tehran, 1994.

13/ Government of Iran, Plan and Budget Organization, *First Socio-Economic and Cultural Development Plan of the Islamic Republic of Iran*, Tehran, 1989.

14/ Ravasani, Shahpour, *Government and the State in Iran* (Persian), n.p., n.d. See Annex Table A-27.

15/ Ministry of Finance and Economic Affairs, College of Economic Affairs, *Proceedings of the Third Privatization Seminar*, Tehran, 1994.

16/ Ministry of Finance and Economic Affairs, *Foreign Investment Bill*, Tehran, 1994.

17/ Ministry of Finance and Economic Affairs, College of Economic Affairs, *Proceedings of the Third Privatization Seminar*, Tehran, 1994.

II. THE MANUFACTURING SECTOR

A. GROWTH AND STRUCTURAL CHANGE

Growth

The Iranian economy was essentially agrarian in character until well into the present century, and the few manufacturing activities that did exist during its early decades were mainly cottage-based. The building of the modern manufacturing sector can be traced back to the 1930s, when a number of textile mills, cement plants and sugar refineries were established. These industries were expanded and developed during the first two development plans (1949-62), following which a variety of basic consumer goods industries were established during the Third Plan (1963-67) and the foundations were laid for the iron and steel, automotive, and petrochemical and chemical industries.

After gathering pace during the Fourth and Fifth Plans (1968-78), the industrialization process slowed for almost a decade during the 1980s, partly as a result of a shift from the previous emphasis on industry as the main agent of economic growth, to a greater stress on the agricultural sector. It also reflected a virtual cessation of the private foreign and domestic investment that had begun to play an increasingly important role in the growth of the manufacturing sector by the late 1970s, as a response both to the self-reliant policies pursued by the new government and to the widespread expropriation of private industrial enterprises during its early years in power. The situation was exacerbated by the extended war during 1980-88, which resulted in a significant diversion of resources and severe damage to many of Iran's leading industrial facilities.

The end of the war and the subsequent adoption of more liberal economic policies, culminating in the introduction of the First Socio-Economic and Cultural Development Plan of the Islamic Republic (1989-94), paved the way for a resumption of industrial growth and development. Many of the installations damaged during the war were rebuilt during these years, and many of the projects delayed by it were completed. The restoration of stability also stimulated a gradual recovery in private investment interest, especially among the Iranian business community, which began to move from short-term intermediation activities to longer-term industrial capital formation.

The somewhat fitful nature of industrial growth in Iran during the past two decades is indicated in Table II.1, which shows that neither the economy as a whole nor the manufacturing sector recorded a steady growth trend between the mid-1970s and the early 1990s. Indeed, manufacturing value added (MVA) outside the petroleum sector suffered a real contraction in five of the eleven years from 1976 to 1986, while the mining and quarrying sector, consisting almost entirely of petroleum-related industries, contracted in six of these years. Consequently, the share of non-petroleum MVA in GDP was only marginally higher in 1986 than in 1975, while that of the mining

and quarrying sector was substantially lower. Both the non-petroleum manufacturing industries and the mining and quarrying sector have experienced steady growth since 1986, however, resulting in significant increases in the contribution of both to overall GDP between 1987 and 1992.

Table II.1. Contribution of industry to the national economy, 1975-92

Year	GDP	Agriculture	Combined industry	Mining	Manu-facturing	Utilities	Construction	Other
	A. GDP growth by sector (Percentage change at constant 1980 factor cost)							
1976	20.6	7.3	10.8	10.5	14.4	2.9	52.0	42.9
1977	0.9	0.3	0.0	-1.6	9.4	32.3	-21.7	11.8
1978	-13.0	7.7	-27.5	-31.1	-2.1	-9.5	-13.2	7.7
1979	-8.7	1.1	-14.2	-17.7	0.5	14.8	-27.6	-0.7
1980	-18.3	8.9	-55.0	-68.2	-2.7	-18.2	8.8	8.9
1981	-3.1	2.0	4.9	2.0	8.0	14.0	-12.1	-7.1
1982	13.6	7.1	61.7	114.5	-4.4	19.8	3.8	-7.4
1983	10.7	4.9	5.3	3.2	11.8	3.9	34.6	14.2
1984	0.1	7.3	-9.3	-18.2	12.3	12.1	-5.0	6.1
1985	1.6	7.8	0.4	0.9	-2.1	9.5	-13.1	2.5
1986	-8.9	4.5	-11.0	-14.6	-6.3	7.4	-16.0	-12.0
1987	0.0	2.5	12.6	13.6	11.1	10.9	-15.3	-8.0
1988	-3.0	-2.5	5.9	8.8	2.0	-3.6	-21.4	-8.6
1989	4.1	3.7	8.2	7.6	8.9	11.3	-1.6	0.9
1990	11.8	8.1	18.4	19.5	16.0	19.3	2.9	8.1
1991	9.4	5.1	13.9	9.6	20.5	27.1	8.9	6.9
1992	6.7	7.4	7.1	9.6	3.2	3.2	3.3	6.0
	B. Distribution of GDP by sector (Percentage share of current factor cost)							
1975	100.0	8.54	47.97	39.09	7.78	1.10	5.78	37.73
1976	100.0	8.09	43.90	36.10	6.93	0.87	8.71	39.29
1977	100.0	8.07	40.57	32.22	7.31	1.04	7.98	43.37
1978	100.0	9.88	30.41	22.13	7.33	0.95	8.81	50.90
1979	100.0	10.67	34.61	26.24	7.42	0.95	6.71	48.02
1980	100.0	17.47	23.44	13.16	9.20	1.08	8.10	50.99
1981	100.0	21.06	23.90	12.94	9.76	1.20	6.89	48.15
1982	100.0	19.98	29.97	19.23	9.53	1.21	6.65	43.41
1983	100.0	17.95	25.75	15.91	8.78	1.06	8.96	47.33
1984	100.0	19.71	22.24	12.28	9.09	0.87	8.79	49.27
1985	100.0	20.38	19.88	10.46	8.50	0.92	7.69	52.04
1986	100.0	23.91	14.41	4.76	8.62	1.03	7.35	54.33
1987	100.0	25.36	15.77	5.21	9.52	1.04	6.05	52.82
1988	100.0	23.79	16.66	5.02	10.45	1.19	5.07	54.46
1989	100.0	24.54	18.61	6.79	10.70	1.12	4.74	52.13
1990	100.0	23.36	24.36	11.01	12.25	1.10	3.99	48.28
1991	100.0	23.06	25.54	10.33	14.04	1.17	3.73	47.69
1992	100.0	23.32	25.37	10.30	13.96	1.11	3.54	47.76

Source: UNIDO, Industrial Development Review Information Base.

Structural change

Its patchy growth performance of the past two decades notwithstanding, Iran's industrial sector has come a considerable way from its modest beginnings in the 1930s. As late as the mid-1950s the country's manufactured output consisted primarily of processed foods and textiles, but the

following four decades have witnessed a substantial increase in the volume and variety of this output. By the early 1960s the range of products manufactured in Iran had been expanded to include a number of basic chemicals, including fertilizers, paints and soap. This was followed by the development of the electrical and mechanical engineering industries in the 1960s and 1970s, resulting in the emergence of a highly diversified product range by the 1980s. An indication of this expansion and diversification of the range of industrial output is provided in Table II.2, which traces the development of the industrial sector since the mid-1950s.

Table II.2. Manufacturing production, 1955-92, selected years

Production	Unit	1955	1962	1967	1972	1986[a/]	1992
Conserved fruit	Thousand tonnes	-	2.2	8.1	..	21.0	..
Preserved fish	Thousand tonnes	-	-	-	-	12.5	..
Edible vegetable oil	Thousand tonnes	-	64.5	118.0	178.9	401.3	608.3
Wheat flour	Thousand tonnes	-	435.0	2,039.0	407.0	..	..
Biscuits and wafers	Thousand tonnes	-	6.6	16.5	18.7	69.0	..
Sugar	Thousand tonnes	75.0	292.0	553.0	669.0	511.0	871.0
Tea	Thousand tonnes	7.0	14.3	18.8	..	48.0	44.0[b/]
Animal feed	Thousand tonnes	-	-	-	-	415.0	..
Non-alcoholic drinks	Million bottles	-	29.0	52.1	..	2,269.0	2,209.6
Cigarettes	Million pieces	6.0	8.4	10.6	12.9	15.3	10.5
Cotton fabrics	Million metres	76.0	364.0	454.0	..	562.0	569.0
Blankets	Thousand pieces	-	504.0	1,286.0	..	6,034.0	..
Knitted fabrics	Thousand pieces	-	-	-	-	13.7	..
Machine-made carpets	Million square metres	-	-	-	-	7.5	8.9
Moquette	Million square metres	-	-	-	-	17.3	24.8
Leather	Million feet	-	11.4	16.2	..	63.1	..
Leather shoes	Million pairs	-	9.5	24.1	..	8.1	13.5[c/]
Non-leather sport shoes	Million pairs	-	1.6	7.0	..	17.1	22.2[c/]
Plastic shoes and slippers	Million pairs	-	4.4	7.0	..	4.1	6.8[c/]
Wooden and formica veneer	Million square metres	-	-	-	-	8.8	..
Neopine	Thousand square metres	-	-	-	-	431.0	..
Writing paper	Thousand tonnes	-	-	-	-	60.0	116.1
Cardboard	Thousand tonnes	-	4.9	5.4	..	7.5	..
Cartons	Thousand tonnes	-	7.7	39.3	..	117.1	154.1
Paper tissues	Thousand tonnes	-	0.8	2.4	..	3.0	4.0
Wall paper	Million square metres	-	-	-	-	19.5	..
Pesticides	Thousand tonnes	-	-	-	-	24.0	18.6
Chemical fertilizer	Thousand tonnes	-	45.7	..	..	163.3	1,300.0
Paint	Thousand tonnes	-	2.8	9.7	21.0	26.9	..
Soap	Thousand tonnes	15.0	53.7	34.4	..	31.1	..
Washing powder	Thousand tonnes	-	3.1	31.1	..	132.8	..
Matches	Million boxes	365.0	524.0	447.0	..	1,844.0	..
Automotive tyres	Thousand tonnes	-	215.0	463.0	..	43.1	89.0[b/]
Automotive tubes	Tonnes	-	-	195.0	..	1,299.0	..
Bicycle and motorcycle tyres	Tonnes	-	-	-	-	2,957.0	..
Nylon bags and plastic rolls	Thousand tonnes	-	-	-	-	18.8	..
Plate glass	Billion square metres	-	0.3	1.2	15.1	0.1	..
Safety glass	Thousand square metres	-	-	-	-	297.0	1,204.6
Bricks	Thousand million	-	3.5	4.3	..	8.4	..

(continued)

Table II.2. (continued)

Production	Unit	1955	1962	1967	1972	1986[a/]	1992
Tiles	Million square metres	-	0.2	1.8	..	15.9	24.5[c/]
Gypsum	Million tonnes	-	-	-	-	3.5	..
Cement	Million tonnes	0.1	0.7	3.4	..	13.1	16.0
Copper products	Thousand tonnes	-	2.1	1.9	..	7.0	..
Iron products	Thousand tonnes	-	11.1	73.3	..	149.0	..
Aluminium products	Thousand tonnes	-	1.4	2.9	..	38.6	..
Bulldozers, loaders and mechanical shovels	Units	-	-	-	-	424.0	520.0
Tractors	Thousands	-	-	-	-	10.6	9.3
Tillers and threshers	Units	-	-	-	-	11,916.0	..
Combines	Units	-	-	-	-	338.0	573.0
Water pumps	Thousand sets	-	5.7	6.4	..	42.8	..
Radio and cassette players	Thousand sets	-	8.6	129.6	222.0	245.2	144.0
Television	Thousand sets	-	0.6	24.9	1.9	330.8	678.0
Telephones	Thousand sets	-	-	-	-	259.0	353.0
Electrical heaters	Thousand sets	-	-	-	-	10.2	..
Coolers	Thousand sets	-	1.6	6.4	143.0	238.0	309.0
Refrigerators and freezers	Thousand sets	-	-	-	-	434.4	860.0
Washing machines	Thousand sets	-	-	-	-	73.8	65.0
Meat mincers	Thousand sets	-	-	-	-	27.8	93.0
Juice extractors	Thousand sets	-	-	-	-	95.9	107.0
Rice cookers	Thousand sets	-	-	-	-	76.4	224.0
Car batteries	Millions	-	-	-	-	2.6	..
Light bulbs and tubes	Millions	-	-	-	-	44.1	48.0
Sockets and plugs	Millions	-	-	-	-	17.7	28.0
Cables	Thousand tonnes	-	-	-	-	17.7	..
Wires	Thousand tonnes	-	-	-	-	8.8	..
Motor vehicles	Thousands	-	-	-	-	61.7	75.3
Motorcycles	Thousands	-	-	-	-	110.3	109.8
Bicycles	Thousands	-	-	-	-	35.0	37.8

Sources: Plan and Budget Organization, *Preliminary Report of the Third Plan on Industry and Mines,* 1961; Ministry of Industries and Mines, *Data on Industrial and Mining Activities in Iran,* 1960; Ministry of Economics, *Report on the Results of the Industrial Census,* 1965; Central Bank of Iran, *Annual Report and Balance Sheet,* 1974; Statistical Centre of Iran, *Statistical Yearbooks,* various issues; Plan and Budget Organization, *Second Socio-Economic and Cultural Development Plan of the Islamic Republic of Iran,* Annex 1, Tables from Chapter III.

a/ Large industrial establishments only.
b/ 1991.
c/ 1993.

A quantitative indication of the structural changes experienced by the manufacturing sector in Iran is provided by data on the distribution of MVA by major industrial branches between 1975 and 1992 compiled by UNIDO (see Table II.3). This shows that the manufacturing sector has traditionally been dominated by the textiles, food processing (including beverages and tobacco manufactures), and transport equipment branches, whose combined share remained almost unchanged at about 41 per cent between 1975 and 1992. Important changes did take place within these branches, however, with the share of the textile industry declining from 20.5 per cent to 14.6

per cent, while the shares of the food processing and transport equipment industries increased from 12 per cent to 13.7 per cent and from 8.6 per cent to 13.1 per cent respectively during this period.

Table II.3. Structure of manufacturing value added, 1975-92, selected years
(Percentage)

	1975[a/]	1980	1985	1988	1989	1990	1991	1992[a/]
Food products	5.47	11.47	11.02	12.72	11.61	9.23	10.38	10.48
Beverages	2.38	1.79	2.64	2.69	2.68	1.90	1.52	1.54
Tobacco manufactures	4.18	1.38	0.90	2.53	1.40	1.03	1.77	1.76
Textiles	20.51	16.40	18.55	19.18	18.47	16.98	14.85	14.63
Wearing apparel other than footwear	0.44	0.96	0.66	1.31	1.12	1.06	0.59	0.58
Leather and leather substitutes	0.70	0.44	0.59	1.15	0.87	0.86	0.57	0.57
Leather footwear	1.53	1.23	1.44	1.81	1.74	1.06	0.88	0.88
Wood and cork products excluding furniture	1.05	0.83	1.05	1.96	1.99	1.35	0.96	0.95
Furniture and fixtures of wood	0.33	0.41	0.42	0.48	0.54	0.40	0.42	0.42
Paper and paper products	3.42	1.67	2.29	1.45	1.56	1.63	1.83	1.80
Printing, publishing and allied industries	2.16	0.98	0.85	1.17	2.06	1.42	1.16	1.16
Industrial chemicals	4.84	1.15	2.03	1.92	3.10	2.84	2.62	2.59
Non-industrial chemicals	4.02	3.42	5.31	4.64	6.47	5.16	3.79	3.73
Petroleum refineries	1.61	20.38	0.53	0.50	0.36	0.20	0.28	0.28
Miscellaneous products of petroleum and coal	0.07	0.02	0.28	0.42	0.62	0.48	0.31	0.31
Rubber products	2.38	1.15	1.58	1.50	1.97	1.46	1.40	1.40
Plastic products	1.45	2.44	2.06	2.47	2.32	2.06	1.69	1.67
Pottery, china and earthenware	0.34	0.56	0.66	0.53	0.51	0.52	0.38	0.37
Glass and glass products	1.61	1.41	1.46	3.23	1.29	0.91	1.59	1.57
Other non-metallic mineral products	6.84	10.10	11.98	10.57	10.41	8.62	8.50	9.35
Basic iron and steel industries	7.85	4.52	6.24	7.85	6.56	11.20	9.55	9.51
Basic non-ferrous metal industries	0.71	0.60	1.67	2.34	2.14	5.18	3.76	3.72
Metal products excluding machinery and equipment	2.65	3.94	4.86	3.85	5.18	4.24	4.23	4.22
Non-electrical machinery	6.54	2.56	5.53	7.13	7.88	9.08	10.12	9.96
Electrical machinery, apparatus and appliances	7.22	4.82	6.56	2.86	2.46	4.16	2.61	2.57
Transport equipment	8.56	4.93	8.12	3.21	4.14	6.32	13.35	13.13
Professional and scientific equipment	1.01	0.29	0.48	0.25	0.29	0.29	0.44	0.43
Miscellaneous manufacturing	0.11	0.14	0.23	0.27	0.27	0.35	0.45	0.47
Total manufacturing	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Source: UNIDO Industrial Development Review Information Base.

a/ Estimates.

Other major areas of manufacturing are the non-metallic mineral products industries (including ceramics and glass), the metal and metal products industries (excluding machinery and equipment), and the electrical and non-electrical machinery industries. As indicated in Table II.3, each of these branches contributed more than 10 per cent to total MVA in 1992, with the non-metallic mineral products industries accounting for 11.29 per cent, the metal and metal products industries for 17.5 per cent, and the electrical and non-electrical machinery industries for 12.5 per cent. In the case of the first two of these three groups the 1992 share was well above the corresponding figure for 1975, which amounted to 8.4 per cent and 11.2 per cent respectively. By contrast, the 1992 share of the electrical and non-electrical machinery industries fell short of the 13.8 share registered in 1975, principally because of a sharp decline in the share of the electrical machinery sub-group.

Most other branches recorded small but noticeable decreases in their share of total MVA during 1975-92. This was especially true of the paper and printing industries, most sections of the chemical industry including petroleum refining and the manufacture of rubber products, and the professional and scientific equipment industries. Modest gains, by contrast, were made by the wearing apparel, furniture and plastics industries.

B. INDUSTRIAL EMPLOYMENT

Quantitative trends

Employment data collected by the various population censuses conducted since the 1950s show that the impact of the manufacturing sector on labour absorption has been less than impressive. After rising sharply from 13.8 per cent in 1956 to 18.2 per cent in 1966, the share of the labour force employed in the manufacturing sector rose only marginally to 19 per cent in 1976 before falling back to a mere 13.2 per cent in 1986. While this last figure is no doubt distorted to some extent by political events, in particular the war of 1980-88, it nevertheless underlines the limited capacity of the manufacturing sector to absorb the rapid growth in population and the labour force in the recent past.[1/]

The census data on changes in the absolute level of industrial employment closely reflect the trends indicated by the data on the share of total employment accounted for by the manufacturing sector. Between 1956 and 1966 an average of 48,200 new jobs per year were created in manufacturing activities. Over the following decade this rate of increase slowed down quite markedly to 37,400 jobs per year, and during 1976-86 the number of manufacturing jobs actually contracted by an average of 22,100 per year.

More recent employment statistics, though not directly comparable with the census data of 1956-86, have been published by the Central Bank of Iran in its annual reports. The latest of these, covering 1992, show that the total number of persons employed in manufacturing, mining and petroleum industries amounted to 2 million, or 14.9 per cent of the total employed workforce of 13.5 million. In view of the capital-intensive nature of the petroleum extraction and mining industries, it may be assumed that the bulk of these workers were, in fact, employed in manufacturing activities. Thus, although a slight increase appears to have taken place in both the absolute number of industrial workers and the share of industrial employment during the late 1980s and early 1990s, the respective figures have nonetheless remained relatively low by international standards.

Two principal causes can be identified for the comparatively low absorption of labour by the manufacturing sector in Iran. The first is the import-substituting industrialization strategy pursued by both the present and the former governments of the country, which promoted the establishment of capital-intensive industries and was supported by expansionary monetary policies and an overvalued exchange rate. The second was the emergence of the petroleum industry as the dominant player in the economy, which at times accounted for more than 30 per cent of GDP, even though its share in employment generation was minimal and seldom exceeded 1 per cent of the employed labour force.

The structure of manufacturing employment is reasonably well balanced between various industries. Although the textile industry has traditionally been the most important source of employment creation, the food processing, non-metallic mineral products, basic metals and engineering industries have also made an important contribution to the creation of industrial employment over the past two decades. By contrast, the leather, wood, paper and professional equipment industries have taken a small share of the industrial labour force. The contribution of the chemical industries (comprising industrial chemicals, non-industrial chemicals, petroleum refining, miscellaneous coal and petroleum products, and rubber and plastic products) has also been significant in overall terms, although the share of the individual components has historically been relatively small.

According to data for medium and large scale industrial enterprises compiled by UNIDO from official sources (see Table II.4), the textile industry accounted for about 21 per cent of industrial employment in 1992, while the food industry (including beverages and tobacco manufacturing) accounted for a further 13.9 per cent. Significant job opportunities were also created by the non-metallic mineral products industries (including ceramics and glass), which absorbed 13.3 per cent of the industrial labour force, and by the basic metals and machinery industries, which absorbed 15.1 per cent and 11.8 per cent respectively. The transport equipment industry, meanwhile, accounted for 5.6 per cent of industrial employment, and the chemical industries (including petroleum refining, rubber and plastics) for 9.9 per cent.

Comparable data for 1975 show that the food industry accounted for about 11 per cent, indicating a modest overall growth during the intervening period. This growth was mainly concentrated in the food processing industry itself, however, with the relative shares of the beverages and tobacco manufacturing industry declining significantly between 1975 and 1992 from 2.3 per cent to 1.4 per cent and from 3.1 per cent to 1.3 per cent respectively. The textile industry, meanwhile, played a much more dominant role in 1975, when it provided employment for 31.2 per cent of the industrial labour force. Its share declined rapidly to slightly over 20 per cent by the late 1970s, and has remained at approximately that level ever since. Meanwhile, the share of the non-metallic mineral products industries (including ceramics and glass) has increased steadily from 9.2 per cent in 1975, as has that of the basic metals industries. The overall share of the engineering and transport equipment industries has fallen, by contrast, although the non-electrical machinery industry has made some modest gains from the late 1980s onwards after having suffered an extended contraction in the late 1970s and most of the 1980s.

In assessing the employment generating role of manufacturing industry in Iran, it needs to be borne in mind that the country also possesses an extensive informal cottage-based handicraft sector in addition to the formal manufacturing sector. This sector, which consists of a vast number of small workshops throughout the country carrying out a wide range of labour-intensive activities, is widely acknowledged to be very effective in providing full-time, part-time and seasonal employment opportunities. Its impact is virtually impossible to measure, however, owing to the small and dispersed nature of the enterprises involved and the lack of any proper records.

Table II.4. Structure of manufacturing employment, 1975-92, selected years
(Percentage)

	1975	1980	1985	1988	1989	1990	1991	1992[a/]
Food products	5.58	12.43	11.31	11.27	11.81	10.34	11.17	11.20
Beverages	2.28	1.75	1.78	1.43	1.34	1.30	1.40[a/]	1.42
Tobacco manufactures	3.11	2.13	1.24	1.74	1.69	1.61	1.27	1.26
Textiles	31.19	21.00	20.68	22.93	22.07	20.31	21.34	20.97
Wearing apparel other than footwear	0.49[a/]	1.00	1.14	1.41	1.53	1.58	1.14	1.12
Leather and leather substitutes	0.63	0.56	0.73	0.82	0.67	0.66	0.54	0.54
Leather footwear	1.81	1.67	1.77	1.60	1.91	1.73	1.72	1.73
Wood and cork products excluding furniture	1.37	2.07	1.83	1.76	1.97	2.04	1.33	1.31
Furniture and fixtures of wood	0.28[a/]	0.51	0.72	0.49	0.49	0.67	0.61	0.60
Paper and paper products	1.83	1.69	1.75	1.36	1.62	1.50	1.96	1.92
Printing, publishing and allied industries	1.52[a/]	1.19	0.83	0.95	1.20	1.51	1.27	1.26
Industrial chemicals	1.89	1.05	1.79	2.09	2.13	2.33	1.73	1.70
Non-industrial chemicals	3.84	3.17	3.36	3.25	3.60	3.86	3.62	3.55
Petroleum refineries	0.34	3.96	0.20	0.38	0.41	0.17	0.39	0.39
Miscellaneous products of petroleum and coal	0.07[a/]	0.04	0.18	0.40	0.50	0.41	0.33	0.33
Rubber products	2.04	1.17	1.62	1.60	2.05	1.67	1.79	1.78
Plastic products	1.52	2.88	2.04	2.05	2.14	2.19	2.16	2.12
Pottery, china and earthenware	0.58	0.71	0.63	0.60	0.56	0.52	0.68	0.67
Glass and glass products	1.43	1.40	1.18	1.35	1.28	1.27	1.31	1.29
Other non-metallic mineral products	7.18	14.08	14.39	13.83	12.71	12.62	10.35	11.35
Basic iron and steel industries	6.89	3.86	5.83	6.10	5.88	7.31	8.42	8.36
Basic non-ferrous metal industries	0.54	0.61	0.97	1.82	1.70	1.81	1.82	1.79
Metal products excluding machinery and equipment	2.39	4.77	4.35	4.42	4.75	5.19	4.99	4.97
Non-electrical machinery	7.14	3.91	5.31	8.37	8.35	8.98	9.16	8.99
Electrical machinery, apparatus and appliances	5.64	5.34	6.01	2.93	2.79	2.65	2.89	2.84
Transport equipment	7.68	6.63	7.71	4.38	4.21	4.87	5.73	5.61
Professional and scientific equipment	0.63[a/]	0.31	0.44	0.38	0.33	0.49	0.60	0.60
Miscellaneous manufacturing	0.11[a/]	0.12	0.21	0.27	0.32	0.43	0.31	0.32
Total manufacturing	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Source: UNIDO Industrial Development Review Information Base.

a/ Estimates.

The role of women[2/]

For religious and cultural reasons segregation of the sexes is observed in Iran, where women are expected to limit their activities to the domestic sphere and avoid contact with non-related men. However, this has not entirely prevented women from engaging in gainful employment, and women

make an important contribution to both the formal and informal sectors of the economy. Their economic role was also strengthened by the 1980-88 war, which resulted in a sharp increase in the number of female-headed households and forced many women to take paid employment out of economic necessity.

Although quantitative data on the economic role of women in Iran are patchy, it nevertheless remains true that women account for only a relatively small proportion of the Iranian labour force. The 1986 census revealed that only 8 per cent of the female population aged 10 and above was economically active, compared with 45 per cent of the male population, and that women therefore accounted for only 9 per cent of the total labour force. This census also showed that large numbers of employed women in the private sector are engaged in unpaid work, with unpaid family workers representing 42 per cent of the female private-sector work force as against 4 per cent of the male private-sector work force.

Because of legislation enforcing sexual segregation, women tend to be confined to a comparatively narrow range of occupations. Most women are employed in the service sectors, especially in education and the social services. Agriculture is the second most important area of employment for women, followed by industry. Within these sectors, women are employed in professional and technical capacities and as agricultural, production and transport workers.

Industrial employment for women is believed to have decreased sharply since the mid-1970s. As indicated in Table II.5, the main source of industrial employment for women is carpet-weaving, which is carried out mainly in small rural workshops. Other important employers of women are the textile, garment, leather and footwear industries, although they have suffered some of the most dramatic declines in female employment over the past two decades. The food and beverages industries are also significant employers of women, as is the electrical goods assembly industry.

Table II.5. Share of women in manufacturing employment by major ISIC category, 1987
(Percentage of total)

ISIC	Industry	Share of women in industrial employment (Percentage)
31	Food, beverage and tobacco	5.6
32	Textile, clothing and leather	18.9
33	Wood and wood products	0.5
34	Paper, cardboard, printing	2.3
35	Chemical, petroleum, coal, rubber and plastic	6.7
36	Non-metal minerals, except petroleum and coal	3.2
37	Basic metal production	0.8
38	Machinery, equipment, tools and metal products	2.4
39	Other	1.7
Total (Thousands)		**8.2 (118 out of 1,441)**

Source: Statistical Centre of Iran, *Statistical Yearbook*.

Rural women in Iran participate in a wide range of agricultural activities, including the primary processing of food and cash crops and livestock products. In addition, rural women are also involved in a variety of handicrafts, including carpet-making, weaving, embroidery, mat-making, the production of *gillims* (hand-woven floor coverings) and sericulture, which represent an important source of income for rural households. Since much of this work takes the form of unpaid family labour, however, it tends to be substantially underreported, with official estimates suggesting that women account for only about 22 per cent of the rural labour force.

C. PRODUCTIVITY AND PERFORMANCE

Output

Data compiled by UNIDO indicate that the share of value added in the gross output of the manufacturing sector rose significantly in the early 1980s from 41.6 per cent in 1975 to 51.3 per cent in 1981, and then fluctuated modestly around the 50 per cent mark before dropping to about 45-46 per cent towards the end of the 1980s and in the early 1990s (see Table II.6). Consequently, this share was only marginally higher in 1992 than in 1975, implying that little success had been achieved during this period in raising the efficiency of the industrial sector and reducing the proportion of input costs in total output value. On the contrary, the sharp decline in the share of MVA in gross output between 1988 and 1989, when the government began to introduce more market-oriented policies, suggests that much of the apparent improvement between 1980 and 1988 was due to the high level of subsidies and distorted price structures prevailing during that period.

A more disaggregated analysis of the data in Table II.6 reveals considerable variations in the performance of various individual industries. By far the most impressive results have been recorded by the food processing, beverage and tobacco manufacturing industries, all of which substantially increased their share of MVA in gross output between 1975 and 1992, albeit with occasionally substantial fluctuations in the intervening years. The only other industries to have recorded a noticeable increase in this share were the basic iron and steel, the non-electrical machinery and the transport equipment industries, in most cases as a result of the increased availability of cheap local inputs to replace more expensive imports. All other industries suffered a reduction in this share, reflecting their declining efficiency and productivity.

A separate set of data, not entirely comparable to that presented in Table II.6 because it excludes the petroleum refining industries, is provided in Table II.7 to show variations in the performance of the manufacturing sector by size of enterprise. This shows a steady improvement in the efficiency of large enterprises between the mid-1970s and 1990, although this trend appears to have been reversed in the early 1990s. Small enterprises, by contrast, recorded a steadily decreasing share of value added in gross output, with the decline being particularly severe in rural areas. The result of these developments has been a comprehensive reversal of the comparative efficiency of large and small enterprises during the past two decades, although the share of value added in the gross output of the manufacturing sector as a whole has risen significantly because of the predominance of the larger enterprises in the sector.

Table II.6. Share of MVA in gross output, 1975-92, selected years
(Percentage)

	1975[a/]	1980	1985	1988	1989	1990	1991	1992[a/]
Food products	12.40	36.40	34.82	36.62	30.39	30.18	34.08	34.08
Beverages	55.20	59.59	63.22	64.61	71.96	59.38	60.53	60.52
Tobacco manufactures	63.96	59.47	58.75	83.96	74.41	75.39	83.12	83.12
Textiles	62.14	51.16	51.90	51.28	48.23	54.42	45.61	45.61
Wearing apparel other than footwear	61.55	65.24	48.59	42.61	28.92	33.43	43.26	43.27
Leather and leather substitutes	42.66	26.74	23.64	27.97	25.50	33.85	30.81	30.81
Leather footwear	63.50	49.65	50.68	50.58	42.81	42.63	41.85	41.84
Wood and cork products excluding furniture	89.73	43.46	50.46	57.42	50.75	47.97	45.52	45.52
Furniture and fixtures of wood	74.04	54.89	52.38	47.93	46.58	39.41	42.53	42.53
Paper and paper products	72.50	40.00	50.96	42.86	37.80	43.77	40.00	40.00
Printing, publishing and allied industries	76.70	50.72	62.86	55.52	59.37	61.22	65.06	65.06
Industrial chemicals	63.85	61.68	50.36	50.95	54.51	46.38	52.77	52.77
Non-industrial chemicals	36.77	40.66	47.75	50.26	43.91	49.04	36.15	36.15
Petroleum refineries	57.28	84.55	71.43	69.42	52.48	56.03	57.01	57.01
Miscellaneous products of petroleum and coal	56.47	36.71	59.18	59.16	69.83	63.35	50.56	50.55
Rubber products	58.39	49.18	54.85	51.64	44.94	51.22	48.12	48.12
Plastic products	63.24	40.14	47.98	45.10	30.59	26.66	35.93	35.93
Pottery, china and earthenware	72.95	74.18	81.18	67.94	69.60	74.35	65.48	65.48
Glass and glass products	78.45	60.37	64.68	73.81	61.79	55.11	65.54	65.55
Other non-metallic mineral products	63.22	68.20	66.21	59.40	61.72	59.23	57.43	57.43
Basic iron and steel industries	28.50	43.90	39.96	61.88	44.98	40.34	41.13	41.13
Basic non-ferrous metal industries	38.58	44.87	41.63	50.65	36.87	43.42	37.78	37.78
Metal products excluding machinery and equipment	71.42	46.67	54.48	59.72	43.42	38.09	45.89	45.89
Non-electrical machinery	42.26	42.92	44.71	46.53	48.51	48.85	47.64	47.64
Electrical machinery, apparatus and appliances	70.21	50.27	53.62	53.75	51.50	64.25	45.54	45.54
Transport equipment	23.34	33.94	38.95	33.50	53.67	61.24	52.71	52.71
Professional and scientific equipment	68.02	59.65	63.29	57.53	51.76	36.78	46.04	46.05
Miscellaneous manufacturing	62.58	61.54	58.54	95.75	33.74	48.35	60.42	60.42
Total manufacturing	**41.62**	**51.31**	**47.99**	**49.64**	**45.01**	**45.99**	**45.29**	**45.36**

Source: UNIDO Industrial Development Review Information Base.

a/ Estimate.

Table II.7. Share of MVA in gross output by size of enterprise, excluding petroleum processing, 1974-92, selected years
(Billion rials)

	1974	1978	1983	1988	1990	1992
Large industrial establishments						
Gross output	564.3	878.9	2,156.7	3,322.3	6,636.3	15,592.2
Value added	186.3	316.8	919.4	1,532.3	3,178.5	6,705.0
Share of value added	33.0	36.1	42.6	46.1	47.9	43.0
Small urban industries						
Gross output	106.6	175.7	225.0	1,467.9	2,570.9	5,563.3
Value added	49.2	87.3	97.2	557.2	975.9	2,058.0
Share of value added	46.2	49.7	43.2	38.0	38.0	37.0
Small rural industries						
Gross output	31.0	86.6	267.5	455.4	595.1	1,220.0
Value added	16.7	44.0	125.2	198.6	259.5	455.0
Share of value added	53.9	50.8	46.8	43.6	43.6	37.3
Total manufacturing						
Gross output	701.9	1,141.2	2,649.2	5,245.6	9,802.3	22,375.5
Value added	252.2	448.1	1,141.8	2,288.1	4,413.9	9,218.0
Share of value added	35.9	39.3	43.1	43.6	45.0	41.2

Source: Central Bank of Iran, *National Accounts and Annual Report*, various issues.

Productivity

As may be expected, labour productivity rates vary significantly between industries. This is indicated in Table II.8, which shows a substantial spread in this productivity rate, defined as MVA per employee, on either side of the average figure for the manufacturing sector as a whole. Inevitably, the highly mechanized or capital-intensive industries are shown to enjoy the highest levels of labour productivity, with the transport equipment and non-ferrous metal industries recording productivity rates more than twice the average level of the manufacturing sector as a whole, and the beverages, tobacco processing, leather, chemicals, glass, iron and steel, and machinery industries also reporting above-average productivity rates in 1992. Relatively low rates, by contrast, are recorded by the traditional low-value-added labour-intensive industries, such as garments, footwear and ceramics.

The data in Table II.8 also show considerable changes in relative labour productivity rates between 1975 and 1992. In most cases the changes have been negative, with a particularly sharp fall in relative labour productivity having taken place in the petroleum refining industry and significant falls also having been recorded in the leather footwear, furniture, paper and publishing, industrial chemicals, rubber and plastics, metal products, electrical machinery and scientific equipment industries. They have been offset, however, by significant improvements in the non-ferrous metal, non-electrical machinery, transport equipment and miscellaneous manufacturing industries.

Table II.8. Labour productivity in manufacturing, 1975-92, selected years
(Index: Total manufacturing = 100)

	1975[a/]	1980	1985	1988	1989	1990	1991	1992[a/]
Food products	98	92	97	113	98	89	93	93
Beverages	104	102	148	189	201	146	108	109
Tobacco manufactures	135	65	73	145	83	64	139	139
Textiles	66	78	90	84	84	84	70	70
Wearing apparel other than footwear	89	96	58	93	73	67	52	52
Leather and leather substitutes	110	80	81	140	130	131	106	106
Leather footwear	85	74	82	113	91	62	51	51
Wood and cork products excluding furniture	77	40	57	112	101	67	72	72
Furniture and fixtures of wood	115	81	59	98	110	60	69	70
Paper and paper products	187	99	131	106	96	109	93	94
Printing, publishing and allied industries	142	83	101	123	172	94	92	92
Industrial chemicals	256	110	114	92	146	122	152	152
Non-industrial chemicals	105	108	158	143	180	134	105	105
Petroleum refineries	480	514	266	132	89	116	71	71
Miscellaneous products of petroleum and coal	103	51	151	107	123	116	93	93
Rubber products	117	99	97	94	96	88	78	78
Plastic products	95	85	101	121	109	94	78	79
Pottery, china and earthenware	59	78	106	88	90	99	55	55
Glass and glass products	113	101	124	240	101	72	122	122
Other non-metallic mineral products	95	72	83	76	82	68	82	82
Basic iron and steel industries	114	117	107	129	112	153	113	114
Basic non-ferrous metal industries	131	98	173	128	126	287	207	207
Metal products excluding machinery and equipment	111	82	112	87	109	82	85	85
Non-electrical machinery	92	66	104	85	94	101	110	111
Electrical machinery, apparatus and appliances	128	90	109	98	88	157	90	90
Transport equipment	111	74	105	73	98	130	233	234
Professional and scientific equipment	159	94	109	66	87	59	72	72
Miscellaneous manufacturing	97	112	108	100	85	82	149	149
Total manufacturing	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Source: UNIDO Industrial Development Review Information Base.

a/ Estimate.

Despite the apparent increases in productivity recorded in some individual industries in recent years, which themselves are often a reflection of distorted prices and subsidies rather than real improvements in efficiency, there can be little doubt that the manufacturing sector in Iran has suffered a sharp decline in productivity during the past two decades. The latest available data, covering the period to 1987, show that manufacturing value added per worker in large industrial

establishments fell from 806,000 rials in 1974 to 625,000 rials (in constant 1974 prices) in 1987 (see Table II.9). This represents an overall decline of more than 27 per cent in real terms, or an average decline of almost 2 per cent per year. To some extent this reflects over-manning in the predominantly state-owned component of the industrial sector, where large workforces are often retained for social reasons.

Table II.9. Labour productivity in large industrial establishments, 1974-86, selected years
(Constant 1974 prices)

Year	1974	1976	1978	1980	1981	1982	1983	1984	1985	1986
Value added generated factor cost (Billion rials)	186.3	259.4	239.5	244.1	285.0	324.5	369.5	357.1	305.0	318.4
Manpower (Thousand persons)	231.1	271.2	292.6	316.3	486.4	567.1	593.3	578.0	559.0	509.8
Productivity (Thousand rials)	806	957	820	772	586	572	623	618	546	625

Sources: Central Bank of Iran, *National Accounts of Iran, 1974-87,* 1991, and *Census of Large Industrial Establishments,* various years.

The fall in productivity can be ascribed to a number of causes, many of which have their origins in the political developments of the past two decades and the economic policies adopted during this period. This has had a considerable impact on the operating environment faced by manufacturing enterprises, affecting the availability of appropriate factors of production, management, investment, technology, and markets. In many cases, the availability of these resources has been severely limited, leading to sub-optimal decision-making and the choice of second-best options.

A major constraint on the growth of productivity in the manufacturing sector has been Iran's limited access to suitable technologies, both as a result of frequent foreign exchange shortages and its poor trade relations with some of the major international suppliers of technology. An example of the effect of these developments has been the growing trend towards the centralized importation of machinery through state-run procurement and distribution centres since the late 1970s, often from eastern Europe and the former USSR. As this machinery is not always cost-competitive and the technology embodied in it does not always meet the needs of the firms concerned, many enterprises have continued to use their existing obsolescent machinery, with the new machinery being utilized below its full capacity or even being left idle.

A further constraint to the growth of industrial productivity is the limited availability of qualified and skilled manpower. Although there has been a conscious attempt by successive Iranian governments to upgrade the educational capabilities of the country's manpower, which has resulted in an increase in the literacy rate from 47.5 per cent in 1976 to 61.8 per cent in 1986 and 74.1 per cent in 1991, a substantial gap remains between the demand for and supply of suitably qualified industrial manpower. The situation has been exacerbated by the fact that many highly-trained technical and managerial personnel, often with overseas degrees or diplomas, have been unable to find suitable employment in Iran since the early 1980s, and have either migrated abroad or are engaged in activities within Iran which do not enable them to utilize their skills and abilities fully.

In an attempt to overcome this constraint, the government has expanded the provision of technical education in a number of specialized schools, which are mainly under the general supervision of the Ministry of Employment (see Table II.10), and encouraged the growth of tertiary educational institutions, which release thousands of graduates into the job market every year (see Table II.11). As a result of these measures, the proportion of the work force with a tertiary education increased from only 2.5 per cent in 1976 to 4.5 per cent in 1986, and has almost certainly grown further in the intervening years. This increase in quantity has not been matched by a corresponding increase in quality, however, since government regulations require that a proportion of all university places be allocated on grounds other than academic merit, such as to veterans of the 1980-88 war and their relatives, and to people from underprivileged backgrounds.

Table II.10. Graduates of technical, professional and agricultural schools

Year	Total		Technical		Professional		Agricultural
	Male	Female	Male	Female	Male	Female	Only male
1985-86	12,961	4,209	10,123	12	2,355	4,197	483
1986-87	17,698	7,964	12,917	19	4,147	7,945	634
1987-88	15,756	9,941	11,059	6	3,857	9,935	840
1988-89	13,796	6,427	9,846	11	3,204	6,416	746
1989-90	13,098	5,713	9,381	0	2,901	5,713	816
1990-91	14,577	6,536	10,492	0	3,187	6,536	898
1991-92	22,023	6,772	16,066	0	4,603	6,772	1,354

Source: Statistical Centre of Iran, *Statistical Yearbook 1992.*

Table II.11. Graduates of universities and higher education institutes according to educational levels, 1984-92

Year	Associate degree	Bachelor	Masters	Doctorate
1984	5,084	13,553	1,143	164
1985	7,586	19,346	1,755	181
1986	10,000	14,640	2,044	243
1988	10,987	15,034	2,319	297
1989	13,359	19,868	3,723	434
1990	13,287	24,376	4,825	369
1991	12,836	31,515	7,401	601
of which:				
Medicine	4,213	6,790	4,363	567
Humanities	1,026	11,977	1,401	20
Basic Sciences	392	4,305	463	12
Engineering	5,968	5,074	560	0
Agriculture and Veterinary	852	2,373	504	2
Arts and Architecture	385	996	110	0

Source: Statistical Centre of Iran, *Statistical Yearbook 1992.*

Cost structure and profitability

The cost structure of Iranian industry has been influenced very significantly by a number of favourable government policies over the past two decades. These have included the maintenance of an over-valued exchange rate and deliberate efforts to reduce the real cost of credit, which have enabled the industrial sector to meet its import requirements and domestic financial needs on highly beneficial terms. At the same time, however, these policies have distorted the operation of the price mechanism, resulting in the emergence of inefficient and uncompetitive industries. While the precise impact of these subsidies on the industrial sector is difficult to determine, the fact that they have substantially distorted its cost structure must always be borne in mind when attempting to assess its profitability.

An overview of the manufacturing sector's profitability trends since the mid-1970s is presented in Table II.12, which shows the share of gross profits in MVA. Confirming the points made above about the sector's highly subsidized cost structure, this table shows it to be very profitable in nominal terms. These profits were especially large in the mid-1970s, when the surge in oil prices effectively removed the government's resource constraints and permitted a particularly high degree of subsidization. The situation deteriorated during the first half of the 1980s, when political developments and weakening oil prices reduced the government's capacity to provide such extensive subsidies. The late 1980s witnessed a partial recovery in nominal profitability levels, as the end of the 1980-88 war and the restoration of some stability in international oil markets increased the government's resource base and permitted increased subsidization.

This recovery has been hampered by the government's efforts to rationalize its economic policies in the early 1990s, which have included attempts to realign the exchange rate, liberalize prices, reduce the budget deficit and raise the cost of credit. If these policies are sustained in the coming years, they will result in a further rationalization of the manufacturing sector which will lead to significant changes in relative prices and cost structures. This will, in turn, force the closure or restructuring of commercially unviable enterprises and promote the growth of efficient ones able to compete in an open market. Such a development is almost certain to provoke protests from some quarters, with a number of industrialists already having begun to talk of their inability to cope with the new situation and warning of the social consequences of widespread bankruptcies. Under these circumstances it appears highly likely that the pace of these reforms will slow in the coming years.

More comprehensive data on the cost structure of large industrial establishments are given in the periodic industrial surveys conducted by the Statistical Centre of Iran. As indicated in Table II.13, which presents the results of the latest available survey conducted in 1987, raw materials and wages constitute the two most important cost items for manufacturing enterprises. Raw material costs account for more than 50 per cent in almost all 2-digit ISIC branches, rising as high as 95 per cent in the case of the wood-based and paper-related industries (ISICs 33 and 34). By contrast, the share of raw material costs is lowest, and that of wage costs highest, in the non-metallic mineral industries (ISIC 36). An indication of the distortions arising from the overvalued exchange rate prevailing at this time is given by the relatively low capital stock value ascribed to the petroleum and chemical industries (ISIC 35), which is based on the book-value of its imported machinery and capital goods at official exchange rates.

Table II.12. Share of gross profits in MVA, 1975-92, selected years
(Percentage)

	1975[a/]	1980	1985	1988	1989	1990	1991	1992[a/]
Food products	71.00	43.41	43.80	60.83	59.10	66.48	69.75	69.75
Beverages	75.86	45.66	59.06	75.10	80.68	76.73	66.76	66.76
Tobacco manufactures	58.95	8.47	1.81	70.73	50.25	58.50	72.80	72.80
Textiles	69.79	30.11	35.17	49.44	50.16	64.54	53.96	53.96
Wearing apparel other than footwear	30.02	59.49	26.23	69.41	57.27	68.41	51.92	51.92
Leather and leather substitutes	78.90	33.46	38.68	72.49	68.53	77.19	74.48	74.48
Leather footwear	77.14	26.10	36.93	67.52	57.82	52.52	47.56	47.55
Wood and cork products excluding furniture	77.09	-16.53[b/]	11.93	65.65	61.91	70.33	45.02	45.03
Furniture and fixtures of wood	60.00	51.27	10.90	60.37	64.04	52.69	56.54	56.54
Paper and paper products	81.76	35.98	46.05	54.44	45.98	67.60	60.83	60.84
Printing, publishing and allied industries	41.77	30.02	41.82	64.59	73.21	67.18	58.24	58.25
Industrial chemicals	71.98	6.36	40.00	38.82	58.20	68.19	68.99	68.99
Non-industrial chemicals	70.48	47.30	61.16	66.54	72.81	74.08	64.33	64.33
Petroleum refineries	83.39	82.02	74.91	69.05	52.97	64.46	67.05	67.02
Miscellaneous products of petroleum and coal	27.60	11.92	66.45	69.73	64.84	78.05	72.62	72.62
Rubber products	68.73	28.83	31.59	34.17	44.70	59.36	50.52	50.52
Plastic products	78.49	38.51	44.30	63.79	56.55	68.02	58.86	58.86
Pottery, china and earthenware	62.92	38.24	47.10	44.94	49.42	69.01	39.88	39.91
Glass and glass products	72.54	42.03	45.59	78.19	48.59	57.52	72.01	72.02
Other non-metallic mineral products	69.36	36.90	36.36	46.33	52.66	58.55	57.87	57.87
Basic iron and steel industries	68.36	39.92	40.71	62.60	54.86	71.60	58.14	58.14
Basic non-ferrous metal industries	71.69	35.25	62.77	59.10	60.78	86.20	75.74	75.74
Metal products excluding machinery and equipment	75.05	35.05	48.52	49.04	57.29	62.50	59.44	59.43
Non-electrical machinery	68.87	15.94	39.24	45.74	49.94	65.23	64.08	64.08
Electrical machinery, apparatus and appliances	78.26	30.91	42.52	53.58	51.40	79.87	62.00	62.00
Transport equipment	71.63	13.16	33.54	28.25	41.57	69.35	83.75	83.75
Professional and scientific equipment	82.86	35.75	44.58	32.62	50.66	50.12	57.32	57.33
Miscellaneous manufacturing	65.03	65.00	57.50	70.45	63.27	69.06	81.20	81.21
Total manufacturing	**70.69**	**43.21**	**40.80**	**55.50**	**55.80**	**67.93**	**64.56**	**64.49**

Source: UNIDO Industrial Development Review Information Base.

a/ Estimate.
b/ Results are negative because salaries are greater than MVA.

Table II.13. Industrial cost distribution by ISIC, 1987

Cost	ISIC Code 31	32	33	34	35	36	37	38	39	Total value (Billion rials)
Raw materials	73.3	64.6	95.4	95.2	65.1	41.0	54.9	66.3	78.2	2,113.3
Contracting	0.2	0.8	0.2	-	0.3	1.5	0.8	0.7	1.2	21.3
Minor repairs and maintenance	0.9	1.0	0.2	0.2	1.5	2.7	1.2	1.0	1.2	39.7
Communication	0.1	0.1	-	-	0.2	0.2	0.2	0.2	-	4.8
Commercial insurance	0.2	0.2	-	-	0.3	0.3	0.1	0.2	0.4	28.5
Rent (building, machinery)	1.9	2.5	0.4	0.6	3.4	2.6	4.0	3.0	1.6	87.6
Fuel	1.1	0.4	0.1	-	1.0	4.1	1.3	0.6	0.4	35.8
Electricity	0.8	0.9	0.2	0.1	1.0	3.5	1.5	0.9	0.8	38.2
Water	0.1	0.1	-	-	0.2	-	0.3	-	-	3.5
Wages, salaries	21.0	28.3	3.3	3.6	26.4	42.6	35.4	26.0	14.1	888.8
Others	0.5	0.9	0.2	0.1	0.7	1.4	0.4	1.0	2.0	7.5
Value of capital stock (Billion rials)	12.9	5.5	2.0	1.3	3.6	9.9	1.2	8.2	0.4	

Source: Calculation based on data extracted from 1987 Industrial Survey, Statistical Centre of Iran.

D. INSTITUTIONS AND SUPPORT SERVICES FOR INDUSTRIAL DEVELOPMENT

Until September 1994 the manufacturing sector in Iran was organized into four groups, each covered by a separate ministry. Light industries, including food processing, textiles and leather, chemicals and pharmaceuticals, non-metallic minerals, light metal products and electrical and electronic appliances, were placed under the supervision of the Ministry of Industry, while the automotive, machine tools and heavy engineering industries were supervised by the Ministry of Heavy Industries. The basic metals industry, meanwhile, was allocated to the Ministry of Mines and Metals, while the petroleum and petrochemicals industry fell under the remit of the Ministry of Petroleum. Although the responsibilities of the various ministries were defined reasonably clearly in principle, the separation of their areas of authority has tended to be more difficult in practice, as a result of which their activities often overlap. In order to rationalize this structure, the government has proposed the gradual merger of these ministries, with the first step in this direction having been taken in September 1994, when the Ministries of Industry and Heavy Industries were combined.

According to a report presented to parliament by the Ministry of Industry in 1992, the enterprises under its supervision accounted for 79 per cent of manufacturing output, 80 per cent of value added, 79 per cent of employees and 93 per cent of firms in the manufacturing sector. These enterprises were managed by the National Iranian Industries Organization (NIIO), an umbrella organization affiliated to the ministry. The ministry also promoted manufacturing activities through its Industrial Estate Company, which designated land for the building of industrial estates and assisted in the setting up of industrial units. In addition, the Ministry maintained the Iran Standards Institute and was responsible for ensuring that the manufactured goods produced in Iran

complied with specifications set in the national standard. None of these functions and procedures has changed as a result of the ministry's merger with the Ministry of Heavy Industry.

The Ministry of Industry has historically also been responsible for a wide range of research and development (R&D) activities as well as the provision of industrial training. A number of the ministry's departments and provincial centres operate their own R&D units, and the ministry also administers the Industrial Management Organization, which attempts to improve managerial and technical skills by providing training courses for staff members of manufacturing establishments affiliated to the ministry. In line with its training objectives, the ministry established the Technical College for Iranian Industries in 1989.

While the Ministry of Industry has been responsible for the supervision of a large number of industries dispersed throughout Iran, the Ministry of Heavy Industries has had to deal with a smaller number of establishments concentrated mainly in Tehran (the automotive industry), Tabriz (the machine tool and agricultural equipment industries) and Arak (the machine tool industry). This ministry also operates a number of R&D units and conducts strategic management courses as well as sending trainees abroad. Through the Industrial Development and Renovation Organization (IDRO) affiliated to the ministry, it also assists in upgrading Iran's heavy industries and helping them to enhance the quality of their output through training and the acquisition of technology.

The Ministry of Mines and Metals is concerned mainly with the exploration, extraction and processing of minerals (except fossil fuels), and the production of basic metals. As such it supervises Iran's steel mills and aluminium and copper plants, as well as a number of plants manufacturing intermediate industrial products. The Ministry of Petroleum manages Iran's oil refineries, petrochemical complexes and gas treatment units. It operates its oil-related manufacturing activities through the National Iranian Oil Company (NIOC), the National Petrochemical Company (NPC) and the National Gas Company (NGC). In addition, it also assists the development of the sector by operating an Oil College, an Oil Research Centre and some other research units affiliated to its commercial companies.

Apart from the government ministries discussed above, the banking system is also involved in the manufacturing sector through its supervision or direct management of a number of industrial establishments. The banks' direct involvement in the industrial sector was initiated by the establishment of a number of specialized banks in the 1950s, such as the Bank of Industry and Mines. The role of the banks in industrial management was greatly enhanced after 1979 as a result of the introduction of Islamic banking practices, and the provision that banks could take over manufacturing units owned by their debtors. This has resulted in the emergence of banking-industrial complexes resembling the Japanese model, in which the banks provide the financial resources for their affiliated manufacturing enterprises.

E. OWNERSHIP AND INVESTMENT PATTERNS

Ownership

The pattern of industrial ownership in Iran has its roots in the historical development of manufacturing industry in the country. As noted in Chapter I (Industrial development policies), Iran's industrialization programme was initiated and largely funded by the state for most of its first two decades. It was only in the Fourth Development Plan (1968-72) that the government seriously began to seek the involvement of the private sector in manufacturing activities, albeit mainly in

small and medium sized industries. This resulted in the establishment of a large number of plants and factories by the private sector in the early 1970s, which concentrated principally on the production of consumer goods.

The expansion of the private sector into large-scale industries was subsequently prevented by the nationalization of many of the large, medium and even small sized privately owned enterprises in the 1980s. Some of these were placed under the control of the newly-established National Iranian Industries Organization (NIIO) affiliated to the Ministry of Industry, or the Industrial Development and Renovation Organization (IDRO), an umbrella organization established in 1967 for the management of state-owned heavy industries and affiliated to the Ministry of Heavy Industries since 1982, while others were taken over by a number of revolutionary foundations, such as the Bonyad-i-Mostazafan (Foundation of the Oppressed), Bonyad-i-Shahid (Foundation of the Martyrs), Bonyad-i-Panzdehe Khordad (Foundation of the 15th Khordad, commemorating the date when Ayatollah Khomeini was sent into exile). In the course of this process, most of the heavy industries were transferred to the IDRO, the medium and small industries to the NIIO, and the industries confiscated from associates of the previous regime to the revolutionary foundations.

According to an industrial census conducted by the Statistical Centre of Iran (SCI) in 1983, 986 of the 7,128 large industrial establishments with more than ten employees in the country were managed by the public sector. Of these, 202 were in the non-metallic mineral industries (ISIC 36), 177 in the machinery industry (ISIC 38), 174 in the textile and leather industries (ISIC 32), and the remainder in other branches of the manufacturing sector. The distribution of these establishments by number of employees revealed further that 7.9 per cent of them employed fewer than 19 people, 14.6 per cent between 20 and 49 people, 15.6 per cent between 50 and 99 people, 40.1 per cent between 100 and 499 people, and 21.8 per cent more than 500 people. Thus, more than 50 per cent of the publicly-owned industrial enterprises employed a work force of more than 50 people.

In addition, these firms accounted for 68.8 per cent of the total value added of all large industrial enterprises in the country. The most important of these were in the engineering industries (ISIC 38), which accounted for 19.7 per cent of total MVA, the textile and leather industries (ISIC 32), accounting for 14.7 per cent of total MVA, and the food, beverage and tobacco industries (ISIC 31), accounting for 10.5 per cent of total MVA. The census also showed that with a total payroll of more than 385,000, large-scale public enterprises accounted for 67.2 per cent of total employment in Iran's large industrial establishments. Again, the biggest contribution was made by ISIC categories 38, 32 and 31, which accounted for 17.3 per cent, 16.4 per cent and 10.2 per cent, respectively, of the total labour force employed in all large industrial establishments in Iran.[3/]

In summary, the 1983 census showed that public enterprises accounted for a majority of the workers employed. In the absence of more up-to-date information it seems safe to assume that the role of the public sector in manufacturing activities increased between 1983 and 1989. This growth is likely to have been arrested in the following years as a result of the introduction of the privatization programme, which resulted in more than one hundred firms being transferred to private ownership. This may not have caused a significant reversal in the distribution of ownership between the public and private sectors, however, because it coincided with the creation of a large number of new state-owned industrial enterprises in the field of petrochemicals, basic metals and engineering.

A significant change in the ownership structure is likely to take place in the coming years under the Second Socio-Economic and Cultural Development Plan of the Islamic Republic, which

provides for a major transfer of ownership in the industrial sector. According to the first draft of the plan, all the industrial establishments under the control of the NIIO are to be transferred to the private sector and the organization itself abolished. The ownership of establishments affiliated to the IDRO is also intended to be transferred to the private sector to the extent permitted by the constitution of Iran.[4/] Although the pace of this transition may not be as rapid under the revised version of the Plan adopted in March 1995, the trend is expected to remain unchanged.

Investment

In Iran the state has traditionally made a major contribution to investment in the manufacturing sector. The government has generally directed its investment expenditure into areas requiring high levels of capital expenditure and more advanced technology, such as the manufacturing, mining, transport and communications, health and education, and public utilities sectors, although also to a more limited extent, the agricultural sector. The private sector, on the other hand, has concentrated its investments in the agricultural sector and the provision of household services and trade, with some investments also being made in small and medium-sized manufacturing industries. As a result of the shift in economic policies initiated in the early 1990s, however, it is expected that most future investments will originate in the private sector, except in areas deemed to have a strategic importance, such as the oil/gas sector and heavy industries.

The investment expenditure undertaken by the public and private sectors in all sectors of the economy in 1985-91 is indicated in II.14. This suggests that construction accounts for the bulk of capital formation, although it needs to be borne in mind that the expenditure on machinery and other capital goods is likely to have been significantly underestimated since these items were for the most part imported at overvalued or concessional rates of exchange. Another important feature of Table II.14 is the concentration of the private sector on construction and the public sector on the procurement of capital goods, although this pattern appeared to be shifting in 1991, possibly as a result of the introduction of the new economic policies.

Table II.14. Investment in machinery and building by public and private sector, 1985-91
(Billion rials, current prices)

	1985	1986	1987	1988	1989	1990	1991
Investment in machinery							
Total	744	500	463	644	1,042	1,761	3,028
Private sector	325	202	131	311	585	884	1,789
Public sector	419	298	332	333	456	878	1,239
Share of public sector in total machinery investment (Percentage)	56	60	72	52	44	50	41
Investment in building							
Total	2,097	2,106	2,199	2,313	2,668	3,901	5,027
Private sector	1,429	1,347	1,431	1,445	1,700	2,163	2,571
Public sector	667	759	768	868	968	1,739	2,456
Share of public sector in total building investment (Percentage)	32	36	35	38	36	45	49
Total domestic capital formation	2,841	2,606	2,662	2,957	3,709	5,663	8,054
Share of machinery in total (Percentage)	26	19	17	22	28	31	38
Share of building in total (Percentage)	74	81	83	78	72	69	62

Source: Central Bank of Iran, *Annual Reports*, various years.

A summary of the subsectoral distribution of investment in the manufacturing sector is presented in Table II.15. This table reveals that the bulk of manufacturing investment during the past decade has been channelled into the engineering industries (ISIC 38) even though the actual share declined considerably from more than 40 per cent in 1981 to approximately 23 per cent in 1990. The difference was made up by an increase in the shares of several other industries, principally non-metallic minerals (ISIC 36) and, to a lesser extent, basic metals (ISIC 37). The increased share of the latter reflects the expectation of the government that the iron and steel, aluminium and copper industries can be developed into a major source of foreign exchange earnings.

Table II.15. Distribution of new manufacturing investment by ISIC in industries with 10 or more employees, 1981-90, selected years

ISIC	1981	1984	1987	1988	1989	1990
31	15.3	15.3	20.9	15.0	14.0	17.9
32	17.8	15.1	14.5	16.6	14.6	17.5
33	1.5	1.4	4.5	3.5	3.4	3.6
34	4.3	3.5	3.7	2.5	3.9	2.8
35	10.5	12.9	8.7	11.7	15.9	13.1
36	7.5	20.2	13.4	16.6	18.3	15.2
37	2.5	4.1	3.4	9.5	2.9	5.9
38	40.3	27.1	30.4	24.1	26.3	22.6
39	0.1	0.3	0.5	0.8	0.8	1.5
Total[a/]	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Statistical Centre of Iran, *Statistical Yearbooks*, various years.

a/ Totals may not add exactly due to rounding.

F. INDUSTRIAL EXPORTS AND IMPORTS

Exports

An essential feature of Iran's foreign trade during the past 50 years has been the dominance of the petroleum sector in the country's exports. While the share of non-oil/gas products in total exports has fluctuated between 2 per cent and 16 per cent between 1971 and 1991, the share of manufactured goods never exceeded 28 per cent of total non-oil/gas exports. This is indicated in Table II.16, which presents a historical summary of the distribution of Iran's non-oil/gas exports by major commodity group.

Within the category of manufactured goods, the most significant exports during the past 20-30 years have been detergents and soap, chemicals, shoes, garments, transport equipment, cement and building materials (see Table II.17). The export of cement has ceased in recent years, however, but copper ingots and products have become an important manufactured export since the mid-1980s.

Table II.16. Distribution of non-oil/gas exports by main commodity groups, 1971-92, selected years
(Percentage)

	1971	1975	1980	1985	1988	1989	1990	1991	1992
Agricultural and traditional goods	76.6	69.9	93.3	79.8	74.4	85.7	79.1	75.0	69.6
Metal ores	4.9	5.5	3.0	6.5	3.2	2.6	2.5	1.5	1.2
Industrial goods	18.4	24.6	3.7	13.8	22.5	11.7	18.4	18.2	21.3
Other	-	-	-	-	-	-	-	5.3	7.8
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Central Bank of Iran, *Annual Reports*, various years.

Note: Totals may not add exactly due to rounding.

Table II.17. Composition of main manufactured exports, 1972-92, selected years
(Percentage of total non-oil exports)

	1972	1977	1980	1982	1985	1986	1987	1988	1989	1990	1991	1992
Detergents and soap	3.6	3.1	-	0.2	-	0.1	0.2	-	0.4	0.1	0.1	0.2
Chemicals	3.4	2.3	-	-	1.0	1.2	1.5	3.1	3.3	1.2	1.8	2.1
Shoes	3.0	1.5	0.4	0.6	0.7	0.2	0.4	-	-	-	0.5	1.0
Copper ingots and products	-	-	0.4	-	6.2	6.6	3.6	13.8	1.6	5.9	2.4	4.9
Ready-made clothes, knit wear and textiles	8.2	4.6	1.6	3.4	1.9	1.7	0.9	0.7	0.5	0.9	2.2	2.7
Cement, building, materials and mosaic	1.3	0.2	-	1.2	0.2	0.4	0.9	0.4	0.6	0.3	0.2	0.6
Transport vehicles	0.5	1.9	0.1	0.5	0.1	0.3	0.2	0.2	0.2	0.4	0.8	2.4
Others	2.1	11.7	1.1	1.6	3.8	1.6	3.7	4.2	5.2	9.6	10.0	7.5
Total[a/]	22.1	25.3	3.7	7.5	13.8	12.0	11.4	22.5	11.7	18.4	18.2	21.3
Total value of non-oil/gas exports ($ billion)	0.44	0.52	0.65	0.28	0.47	0.92	1.16	1.04	1.04	1.31	2.61	2.94

Source: Central Bank of Iran, *Annual Reports*, various years.

a/ Totals may not add exactly due to rounding.

One of the main reasons for the poor performance of Iran's manufactured exports is the lack of international competitiveness, in terms of both price and quality, of the goods produced by Iran's import-substituting industries. Both the government and private industry are aware of the need to improve this competitiveness, *inter alia* through the promotion of foreign investment in joint ventures, preferably with buy-back agreements. In the meantime, they are also hoping to find markets for the existing products in low-income and less-developed countries.

In view of the uncertain prospects for international oil prices, the government has begun to place increased emphasis on the promotion of non-oil exports, and manufactured exports in particular. The original draft of the Second Development Plan of the Islamic Republic called for an increase in the value of manufactured exports to $15.8 billion (see Table II.18). The development and promotion of non-oil/gas exports, and the provision of appropriate policy advice, is also one of the main foci of the technical assistance programme currently being formulated for Iran by the United Nations Development Programme.

Table II.18. Projected value of manufactured exports by major product group, Second Development Plan of the Islamic Republic of Iran, 1995-2000

Product	Value ($ billion)
Textiles and clothing	0.52
Chemical and cellulose products	1.16
Food and pharmaceuticals	0.32
Non-metallic minerals	0.22
Petrochemicals	2.23
Metals	2.24
Carpets and handicrafts	7.00
Trucks	0.14
Buses	0.06
Others	1.91
Total	**15.80**

Source: Plan and Budget Organization, *Draft Second Socio-Economic and Cultural Development Plan of the Islamic Republic of Iran*, 1993.

Imports

As a developing country with a limited manufacturing capacity of its own, Iran has devoted a substantial proportion of its foreign income to imports in general and the import of manufactured goods in particular. A substantial proportion of these imports has consisted of capital goods needed for the establishment and expansion of the country's industrial and infrastructural capacity, with the data in Table II.19 indicating that transport equipment and machinery have usually accounted for about a third of total merchandise imports. Despite its long-standing efforts at import-substituting industrialization, however, Iran also remains heavily dependent on imports of manufactured intermediate goods, including chemicals, and a wide range of manufactured consumer goods.

Table II.19. Share of manufactures in total merchandise imports, 1980-89
(Percentage)

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Engineering products[a/]	28.2	26.1	28.1	34.9	37.6	34.2	35.4	32.7	34.3	30.0
Chemical products	14.0	16.1	14.2	11.5	12.2	10.2	14.6	15.2	16.0	16.0
Others	36.8	35.3	33.8	35.0	30.3	37.2	31.6	29.3	25.7	26.8
Total manufactures	79.0	77.5	76.1	81.4	80.1	81.6	81.6	77.2	76.0	72.8
Total imports	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total imports ($ billion)	10.8	13.5	11.8	18.1	14.5	11.4	9.4	9.4	8.2	12.8

Source: Calculations based on data provided in *Annual Report* and *Balance Sheet* of the Central Bank of Iran, various years.

a/ Machinery, tools and transport equipment.

G. INDUSTRIAL LOCATION AND REGIONAL DEVELOPMENT

Apart from such economic factors as the vicinity to sources of raw materials and markets, the location of Iranian industry has also been influenced by a variety of social, administrative and historical factors. The first extensive attempts to industrialize the country in the 1920s and 1930s involved the establishment of textile mills and other plants producing basic consumer goods in Tehran, Esfahan and the provinces bordering the Caspian Sea, which became the initial nuclei of the industrialization process. As this process accelerated and became closely enmeshed with the development planning system, it increasingly became oriented towards import-substitution and the achievement of industrial self-sufficiency. This concept of self-sufficiency was gradually extended to the provincial level, resulting in a considerable dispersal of industry, which was also stimulated by the specific local availabilities of a variety of natural resources. Despite this geographical spread of manufacturing activities, however, the capital Tehran and the areas surrounding it became the principal hub of the industrial sector, and now account for about 40 per cent of the country's medium and large industrial enterprises.

The change in government in 1979 reinforced the drive for self-sufficiency. This policy stance, coupled with the need to create jobs for the growing population and the availability of abundant foreign exchange at the time prompted a renewed dispersal of manufacturing industries throughout the country. A number of new industrial estates, of which the most successful are near the cities of Ghazvin, Rasht, Semnan, Arak, Tabriz and Saveh, were also established at that time to accommodate a variety of small and medium sized industries.

As indicated in Table II.20, however, which presents the latest available data on the distribution of industrial enterprises by province, Tehran has remained the most important industrial centre in Iran. It continues to account for the vast bulk of the total number of industrial enterprises in Iran, and also had the widest range of industrial activities. The most important of these include food processing, textile production, woodworking, paper production and publishing, oil refining and motor vehicle assembly. Other important industrial provinces are Esfahan, Khorassan and East Azerbaijan,[5/] which have a number of heavy industries, including chemicals and petrochemicals, iron and steel, metalworking, machine tools and motor vehicle assembly.

Table II.20. Distribution of industrial establishments with 10 or more employees by province, 1990

ISIC		Total country	Tehran	Markazi (Central)	Gilan	Mazan-daran	East Azerbaijan	West Azerbaijan	Bakhtaran (Kermanshah)	Khuz-estan	Fars	Kerman	Kho-rassan	Esfahan
311	Food products	1,241	321	17	48	93	156	45	19	37	58	64	119	65
312	Food products	279	65	2	105	14	4	3	5	18	13	4	8	5
313	Beverages	35	11	1	2	4	3	2	1	1	2	1	3	3
314	Tobacco	5	-	-	1	1	-	1	-	-	-	-	-	1
321	Textiles	1,459	471	26	26	79	213	15	10	4	22	13	113	178
322	Garments	533	341	4	19	17	14	8	1	4	17	7	46	23
323	Leather products	147	79	-	1	-	27	-	-	-	1	-	33	2
324	Footwear	178	128	2	2	-	9	-	-	-	-	-	15	16
331	Wood products	188	57	3	28	37	5	2	4	4	10	1	6	7
332	Furniture	131	94	1	6	2	3	-	1	2	5	1	3	3
341	Paper products	152	90	5	2	6	3	1	1	2	5	2	6	7
342	Printing/publishing	202	162	-	4	1	-	3	1	1	3	4	11	1
351	Basic chemicals	88	28	5	2	6	3	-	3	3	8	-	-	9
353	Oil and gas processing	320	177	9	8	5	27	5	2	6	15	-	10	14
354	Oil and gas processing	71	13	3	2	1	5	1	3	11	2	2	5	1
355	Rubber products	76	42	1	7	-	3	-	1	-	3	-	4	3
356	Plastics	343	162	13	12	12	14	4	7	7	13	2	13	15
361	Pottery and china	35	5	3	2	-	1	-	-	-	1	2	2	1
362	Glass products	77	47	2	1	1	3	-	-	-	4	-	4	4
369	Other non-metallic minerals	3,914	701	99	35	157	234	159	98	168	270	89	384	526
371	Basic metals	45	11	1	-	1	1	-	1	7	2	-	1	11
372	Non-ferrous metals	71	27	10	3	-	2	1	-	1	2	1	7	5
381	Metal products	1,214	711	38	16	20	46	16	17	20	26	11	67	64
382	Non-electrical machinery	512	302	9	3	11	23	5	2	22	15	8	28	22
383	Electrical equipment	327	201	7	7	4	11	-	3	3	19	2	15	16
384	Transport equipment	223	126	8	1	10	7	3	-	2	3	1	11	9
385	Professional equipment	49	31	-	-	1	3	-	-	1	1	-	6	2
390	Miscellaneous	80	58	2	-	-	-	-	-	-	1	-	8	5
Total		**11,995**	**4,461**	**271**	**343**	**483**	**820**	**274**	**180**	**324**	**521**	**215**	**928**	**1,018**

(continued)

Table II.20. (continued)

ISIC		Sistan ve Baluchestan	Kordestan	Hamedan	Chahar Mahal ve Bakhtiyar	Lores-tan	Elam	Kohgiluyeh ve Boyer Ahmad	Bushehr	Zanjan	Semnan	Yazd	Hor-mozgan
311	Food products	11	21	41	4	16	5	3	5	41	15	31	6
312	Food products	2	1	3	-	4	-	2	1	7	5	5	3
313	Beverages	-	-	1	-	-	-	-	-	-	-	-	-
314	Tobacco	-	1	-	-	-	-	-	-	-	-	-	-
321	Textiles	6	7	6	13	2	-	1	1	90	16	147	-
322	Garments	2	2	3	4	1	2	-	2	4	6	4	2
323	Leather products	-	-	1	-	2	-	-	-	-	-	1	-
324	Footwear	-	-	-	-	-	-	-	-	5	1	-	-
331	Wood products	1	1	4	2	2	-	-	-	12	1	-	1
332	Furniture	-	1	2	-	-	-	-	-	5	-	2	-
341	Paper products	-	-	-	1	1	-	-	-	16	-	4	-
342	Printing/publishing	-	2	-	-	-	-	-	1	4	1	1	2
351	Basic chemicals	-	-	-	-	1	-	-	1	14	1	4	-
353	Oil and gas processing	-	-	1	-	3	-	-	2	27	1	7	1
354	Oil and gas processing	1	3	2	-	2	3	1	1	2	3	1	3
355	Rubber products	-	-	-	-	-	-	-	-	9	-	3	-
356	Plastics	2	1	8	2	-	-	-	1	36	6	13	-
361	Pottery and china	-	-	2	-	-	-	-	-	6	2	8	-
362	Glass products	-	-	1	-	-	-	-	-	7	2	1	-
369	Other non-metallic minerals	78	30	194	116	83	14	12	12	108	90	225	32
371	Basic metals	-	-	1	-	-	-	-	-	4	1	3	-
372	Non-ferrous metals	-	-	-	-	-	-	-	-	11	-	1	-
381	Metal products	6	10	16	5	8	2	2	3	48	11	49	2
382	Non-electrical machinery	1	5	5	3	1	1	3	1	20	7	13	2
383	Electrical equipment	-	1	4	2	-	-	-	2	16	2	11	1
384	Transport equipment	-	-	3	2	-	-	-	3	12	2	3	17
385	Professional equipment	-	2	-	-	-	-	-	-	2	-	-	-
390	Miscellaneous	-	1	-	-	-	-	-	-	1	1	3	-
Total		**110**	**89**	**298**	**154**	**126**	**27**	**24**	**36**	**507**	**174**	**540**	**72**

Source: Statistical Centre of Iran, unpublished data, February 1992.

All the other provinces have less than 5 per cent each of the total number of manufacturing enterprises in Iran. Among these, Kerman is an important centre for copper production; Zanjan for metalworking; Mazandaran for food processing, woodworking, paper and textiles; Gilan for food processing and woodworking; and Khuzestan for paper. Apart from Tehran and Esfahan, which are provincial centres in their own right, Iran's major industrial towns include Ahvaz (in Khuzestan), which has an iron and steel industry; Tabriz (in East Azerbaijan), which has a heavy engineering industry; Arak (in Markazi province), which has a petroleum refining industry and also produces heavy engineering goods and petrochemicals; and Shiraz (in Fars), Bakhtaran (in the eponymous province), and Bandar-i-Imam and Abadan (both in Khuzestan), which have petroleum refining and petrochemical industries. Mashhad, in the comparatively highly industrialized province of Khorassan, is also an important industrial centre.

The concentration of manufacturing industry in central Iran, and especially in Tehran and its surrounding towns, has given rise to a number of problems. The most important of these are high levels of industrial pollution in these areas, an excessively high growth of Tehran's population, and the high cost of setting up new industries in the already industrialized areas. In order to promote a greater dispersal of industry, the government is encouraging the relocation or establishment of manufacturing enterprises at least 120 kilometres outside Tehran, and has provided tax and other incentives for industries to be established in deprived regions. These measures are likely to have only a limited effect, however, since industries choose to locate in Tehran and adjacent areas because of the availability of a large market, a skilled labour force, access to back-up services, and a budgetary policy allocating a high share of public spending to the capital city.

H. ENVIRONMENTAL ISSUES

Public authorities in Iran have been keenly aware of the need to protect the environment for more than two decades, and have established a comprehensive legal and institutional framework for this purpose. A Department of the Environment was established in 1971 to control activities posing a threat to the environment, and its powers were reinforced by the promulgation of an Environmental Protection and Enhancement Act in 1975, which incorporated many of the recommendations of the United Nations Conference on the Human Environment held in June 1972 in Stockholm. This was followed by the enactment of the Air Pollution Control Regulation of 1975, which provided for measures to identify sources and determine maximum acceptable levels of air pollution, inspect and monitor emissions from industrial enterprises, and develop programmes to reduce industrial air pollution.

Environmental considerations have also featured prominently in the legislative measures introduced since 1979. The constitution of the Islamic Republic of Iran, which was approved in December 1979, contains a formal commitment to the protection of the environment and the ecologically sustainable utilization of the country's natural resources.[6/] This commitment has since been emphasized further through a number of important environmental laws, including the Water Distribution Act of 1982, the Water Pollution Control Regulation of 1984, the Radiation Control Law of 1989, the Water and Sewage Companies Law of 1990, and the Environmental Health Regulation of 1992. In addition, the government has established an Environmental High Council headed by the President of the Republic, which includes two vice-presidents, ten ministers and the attorney general. Supported by four coordinating councils for environmental programmes, research, education and sustainable development, the High Council formulates environmental policies and strategies and approves environmental standards.

Despite its strong commitment to environmental protection, the government has often lacked the means to implement its policies and regulations with the required rigour, and has often had to give priority to the objective of economic growth and income creation where this has been in conflict with its environmental goals. This has resulted in a considerable neglect of the environment, involving a substantial loss of forestry resources, significant environmental damage during the 1980-88 war, the widespread dumping of unprocessed industrial and household refuse, and high levels of air and water pollution. The situation is especially serious in Tehran, where average concentrations of air pollutants exceed internationally accepted standards by a considerable margin (see Table II.21) and no adequate facilities have been established for the treatment of waste water. Most of the other major cities, including Tabriz, Ahvaz, Arak, Shiraz and Esfahan, also suffer from high levels of pollution. The level of hydrocarbon pollution is extremely high in Iran, due both to the very low price of petroleum products and the age and poor maintenance of the country's vehicle fleet.

Estimates of the sources of the major air pollutants suggest that industry is responsible for the bulk of Iran's emissions of sulphur dioxide and total suspended particles (TSP), and a substantial proportion of its total emissions of nitrogenous oxides (see Table II.22). The sulphur dioxide emissions originate mainly from the petroleum refining and metallurgical industries, which account for 40 per cent and 25 per cent of total industrial sulphur dioxide emissions respectively. The TSP emissions derive primarily from the steel and cement industries, which together produce about 70 per cent of the industrial sector's emissions of these particles. In addition, the industrial sector is also responsible for substantial emissions of mercury, copper, fluorine, aluminium and hydrocarbons.

Table II.21. Concentration of air pollutants in Tehran, 1989-91
(Annual averages)

	Average concentration		Guidelines WB	Guidelines WHO	Percentage above guidelines WB	Percentage above guidelines WHO
Sulphur dioxide	$\mu g/m^3$	140	100	40-60	40	130-250
Nitrogen dioxide	$\mu g/m^3$	250	100		150	100-200
Total suspended particles	$\mu g/m^3$	180	100	60-90	80	120-340
Lead	$\mu g/m^3$	2.2		0.5-1.0		
Carbon monoxide	ppm	11				
Hydrocarbons	ppm	10				

Source: United Nations Development Programme Tehran, unpublished data.

Note: WB is World Bank's guideline; WHO is World Health Organization's guideline.

Industrial effluents also represent a major source of water pollution in Iran. Although the industrial sector is estimated to account for only 1 billion cubic metres of the 7 billion cubic metres of waste water produced in Iran each year, it tends to be the most heavily polluted, carrying a diversity of toxins, heavy metals and other pollutants. This reflects the fact that only comparatively few industries, comprising mainly such large enterprises as oil refineries and petrochemical plants, have the financial and technical facilities to treat their effluents efficiently.

A few other particularly polluting industries, such as leather tanneries and textile mills, are also required by law to be equipped with waste-water treatment facilities. Even where such equipment does exist, however, it does not always work effectively because its operators often lack the necessary knowledge and expertise to run it properly.

Table II.22. Air emissions from sectoral sources, 1991

	Residential/ commercial	Industry	Agriculture	Transportation	Power	Total
A. Thousand tonnes						
Sulphur dioxide	45	452	37	31	293	859
Nitrogen dioxide	36	98	36	185	191	546
Total suspended particles	30	105	12	24	46	217
Lead	-	1	-	1-4	-	2-5
B. Percentage of total						
Sulphur dioxide	5	53	4	4	34	100
Nitrogen dioxide	7	18	7	34	34	100
Total suspended particles	14	48	6	11	21	100

Source: United Nations Development Programme Tehran, unpublished data.

Quantitative data on the extent of the water pollution caused by individual industries in Iran are limited, although the estimates presented in Tables II.23 and II.24 provide an indication of the effluents released by some of the country's main manufacturing industries. Table II.23, which shows the concentration of pollutants in the waste water released by four major industries, suggests that these concentrations are comparatively high, with a considerable biological and chemical oxygen demand being imposed on the waste water, and substantial quantities of solid residues being suspended in it. Table II.24, which shows estimated output levels and the total volume of pollutants discharged by various industries in 1990, presents a similarly discouraging picture.

Table II.23. Comparison of the quality of industrial effluents

Pollution indicator		Dairy industry	Meat industry	Textile industry	Chemical industry
Biological oxygen demand	(mg/l)	1,000	1,500	600	1,000
Commercial oxygen demand	(mg/l)	1,900	2,500	1,500	3,400
Suspended solids	(mg/l)	300	350	200	150

Source: United Nations Development Programme Tehran, unpublished data.

Table II.24. Production[a/] of large industries and pollution load, 1984-90
(Thousand tonnes)

Industry	1984	1985	1986	1987	1988	1989	1990	Biological oxygen demand 1990
Edible oil	438,348	480,913	401,612	473,366	356,743	486,027	540,323	2.2
Sugar (beet)	406,795	486,346	579,659	538,373	503,474	508,408	500,211	7.4
Sugar (cane)	225,792	210,953	62,762	132,643	140,000	100,000	71,115	
Dairy products	260,555	297,343	264,060	266,449	226,916	282,741	398,400	2.4
Canned fruits and vegetables	112,122	122,074	71,473	110,400	131,545	147,272	149,999	2.4
Soft drinks	816,319	900,108	741,097	815,110	907,070	911,122	911,280	1.6
Slaughter houses	505,000	584,509	327,277	450,111	517,238	497,325	580,125	4.1
Tanning and leather	78,318	78,251	64,372	79,320	81,450	88,122	94,850	5.2
Detergent	225,020	236,565	195,040	217,022	150,565	168,657	211,125	0.4
Soap	38,658	36,055	31,118	26,742	32,719	32,052	40,304	0.2
Wool textile	-	11,352	9,230	7,458	7,691	6,394	7,200	
Cotton mills	-	81,729	79,551	79,934	57,660	53,091	62,859	
Nylon fibres	19,160	22,978	17,966	15,713	11,696	11,762	17,194	8.9
Acrylic fibres	34,166	34,930	21,912	17,521	16,615	23,799	29,764	
Polyester fibres	-	151,784	147,738	148,450	107,082	98,597	100,406	

Source: United Nations Development Programme Tehran, unpublished data.

a/ The production data in this table may not be entirely consistent with those presented in Chapter III because of different sources.

Recognizing the growing environmental pressures faced by the country, and in particular the threat to the environment posed by the high levels of industrial discharges, the Government of Iran has initiated a number of measures to minimize the environmental damage arising from economic development, and is coordinating these policies with recommendations and technical assistance from the international community. These measures include the formulation of relevant standards; the establishment of an appropriate legal framework; the introduction of a compulsory environmental impact assessment for all major development projects; the adoption of measures to optimize the use of energy through changes in consumption patterns; the promotion of clean production technologies; the application of research on the environment; and the public dissemination of environmental knowledge and awareness. A major programme to establish a national strategy for the environment and sustainable development was launched in 1992 with the support of the United Nations Development Programme (UNDP) and the World Bank, which is expected to result in recommendations for a wide range of policy measures covering all aspects of environmental conservation, including waste minimization, pollution control, the prevention of soil erosion and desertification, and the conservation of Iran's biodiversity. In another very important development, steps are also being taken to phase out the use of ozone-depleting substances in a project being undertaken with the technical assistance of UNIDO.

The full implementation of these programmes will clearly be constrained in the short run by their high financial cost and the scarcity of the needed financial resources. Social considerations, such as the need to restrain increases in the price of basic consumer goods in an already inflationary economic environment, will also restrain the implementation of appropriate policies, one of the most urgent of which is the need to price natural resources at their full economic cost. There is a clear evidence of will and commitment on the part of the government to tackle the country's environmental problems, however, and a significant improvement in the existing environmental conditions is expected in the medium term.

I. INTERNATIONAL COOPERATION FOR INDUSTRIAL DEVELOPMENT

Since the end of the 1980-88 war, the Government of Iran has focused on the task of promoting economic development and increasing the well-being of the Iranian people. While seeking, as far as possible, to achieve this goal through the mobilization of the country's own resources, it has also recognized the benefits to be gained from increased international cooperation with bilateral and multilateral development assistance agencies, non-governmental organizations and private entrepreneurs. Considerable efforts have therefore been made to establish and develop these ties in the post-war period, as a result of which a tight network of such links has been created.

An important partnership has emerged between Iran and the United Nations development assistance system. The UNDP and many specialized agencies maintain a strong local presence in the country, and are actively supporting Iran's development efforts. After a hiatus of more than 15 years the World Bank has also resumed its assistance to Iran, and since 1990 has conducted several sectoral and macroeconomic studies as well as disbursing a modest amount of new loans.

As the specialized agency for industrial development of the United Nations system, UNIDO has cooperated with Iran since the early 1960s. By mid-1994 the number of completed technical cooperation projects undertaken by UNIDO in Iran had reached 105. They covered all fields of industrial activity including the development of an industrial infrastructure and institutional support base, and the establishment, expansion or rehabilitation of industrial facilities for the manufacture

of a wide range of agro-industrial, chemical, metallurgical and engineering products. In addition, a further 14 projects were in progress at this time, including a project to formulate a master plan for the development of national industrial research institutions, and two projects to convert Iran's refrigerator and foam producing industries from the use of chlorofluorocarbons (CFCs) to alternative non-ozone depleting substances.

NOTES TO CHAPTER II

1/ See Annex Table A-4.

2/ This section draws heavily on the Country Information Sheet on Women in Industry prepared for Iran by the Unit for the Integration of Women in Industrial Development at UNIDO in July 1992, and from an unpublished report entitled *A Survey of Living Conditions of Rural Women in the Islamic Republic of Iran* prepared by the Ministry of Jihad-e-Sazandegi of the Islamic Republic of Iran in March 1993.

3/ Statistical Centre of Iran, *Statistical Yearbook*, Tehran, 1985.

4/ Government of Iran, Plan and Budget Organization, *Draft Second Social, Economic and Cultural Development Plan of the Islamic Republic of Iran,* 1993.

5/ East Azerbaijan has probably lost some of its importance since late 1993, when Iran's 25th province, Ardebil, was separated from it.

6/ For details see Articles 45 and 50 of the Constitution of the Islamic Republic of Iran.

III. INDUSTRIAL BRANCH PROFILES

A. AGRO INDUSTRIES

STARCHY STAPLE FOODS

The resource base

Iran is a relatively arid country, of which less than 25 per cent or about 450,000 square kilometres enjoys a moderate climate. An even smaller proportion of Iran's total land area, about 10 per cent or some 165,000 square kilometres, is arable according to the most recent agricultural census undertaken in 1988. The proportion of fallow land has averaged 35 per cent of total arable land, with irrigated and dry farming accounting for 45 per cent and 55 per cent of the cultivated land respectively during the past decade.

With the exception of few moderately large state-owned estates, the agricultural sector is dominated by smallholders, whose production constitutes more than 90 per cent of Iran's total agricultural output. Large privately-owned estates are almost non-existent, and the average plot of land owned by smallholders is less than 6 hectares in size.

The principal food crops produced and consumed in Iran are wheat and rice. Substantial quantities of both have had to be imported during the past two decades to meet domestic demand. Another staple food produced and consumed in substantial quantities across the country is the potato. Barley is the second most widely cultivated crop, but is used almost entirely as an animal feed, with human consumption constituting less than 1 per cent of production.

Table III.1. Production of starchy staple foods and animal feed, 1975-93, selected years
(Thousand tonnes)

	1975	1980	1985	1987	1988	1989	1990	1991	1992	1993[a/]
Wheat	5,570	5,850	6,660	7,003	7,265	6,010	8,011	8,793	10,179	10,711
Rice	1,500	1,181	1,772	1,803	1,419	1,854	1,981	2,357	2,364	2,281
Barley	1,400	1,265	2,296	2,731	3,394	2,847	3,548	3,102	3,065	3,058
Potatoes	550	1,270	1,725	2,348	1,443	2,033	2,516	2,612	2,708	3,213

Source: Ministry of Agriculture.

a/ Preliminary estimates.

Table III.2. Imports of starchy staple foods, 1975-92, selected years
(Thousand tonnes)

	1975	1980	1985	1987	1988	1989	1990	1991	1992
Wheat	1,285	1,786	2,150	3,873	3,423	5,312	4,000	3,900	2,453
Wheat flour	24	8	200	300	85	-	-	11	-
Rice	283	402	420	788	209	881	794	559	944

Source: *Foreign Trade Statistical Yearbook*, various issues.

Wheat

Recent trends

Wheat-based bread has traditionally constituted an important part of the Iranian diet in general, and the principal staple food of low income groups in particular. The large-scale production and consumption of wheat flour rendered flour milling a major component of the agro-industrial sector. Traditionally wheat was stone-ground in the home, and this form of processing is still believed to account for a significant proportion of total output. This method has been largely replaced by mechanized flour milling since the 1950s, however.

Three types of processing are undertaken by Iran's mechanized flour milling industry: mechanized stone-grinding, hammer-beating and rolling. The first two of these processes yield a comparatively low-quality flour, which often contains a high degree of foreign matter and can at best be used by bakeries. The third process, involving the separation of foreign matter, washing, drying and grinding, yields higher quality flour, appropriate for further processing into noodles and confectionery.

Iran's high rate of population growth over the past few decades has stimulated a sharp increase in demand for wheat, which in turn has boosted the milling industry. Although exact data on Iran's total milling capacity or output are unavailable due to the widespread incidence of home milling and the large number of small-scale mechanized enterprises, official statistics released by the Ministry of Industry indicate that 288 medium and large mechanized units with a combined production of 6.9 million tonnes were in operation in 1994, while a further 66 flour mills with a projected capacity of about 2.5 million tonnes were under construction.

More than 80 per cent of the total supply of wheat flour is used to produce bread by local bakeries. Although attempts were made in the early and mid-1970s to replace local bakeries by large-scale bread producing factories, they were not entirely successful since most Iranians traditionally prefer to consume freshly-baked bread. Changing life styles, especially in urban areas, are putting these traditions under pressure, however, and there have been some indications in the more recent past that these attitudes may be changing.

Because bread represents a primary food staple of the Iranian population, its price has always been carefully controlled and heavily subsidized by the government. The flour market is regulated by an official body known as Sazman Ghaleh Keshvar (SGK), which is responsible for the

marketing and distribution of all cereals including wheat. Flour mills are obliged to operate as contractors to SGK, at predetermined rates per tonnage of milling.

Other downstream processing activities which have gained in importance in recent years include the production of pastry, biscuits and pasta. While the production of pastry is dominated by local confectioners, and that of instant noodles by a number of small enterprises, the ownership of the biscuit industry is more concentrated in the hands of a small number of industrial business groups. These include the Minoo, Vitana, Pars and Gorgi industrial groups, all of which came under state ownership in the 1980s.

The biscuit industry experienced a rapid growth from the late 1960s to the late 1970s. The total production of biscuits and wafers reached 75,000 tonnes in 1977, after registering an average annual increase of 25.5 per cent in the preceding five years, while Iran's total known annual production capacity for biscuits and wafers rose to 200,000 tonnes. During the same period, large quantities of wafers were also exported to the neighbouring states of the Persian Gulf.

Output declined sharply during the 1980s. The main raw materials required by the industry, including flour, sugar and edible oil, were rationed during the 1980-88 war, and were provided by the state at highly subsidized prices to manufacturers, who in turn were obligated to sell their products at low prices. These arrangements resulted in a deterioration of product quality and packaging.

The gradual reduction of price controls and the end of rationing after the war resulted in a significant increase in both prices and output, and through the promotion of increased domestic competition in the early 1990s also induced a notable improvement in quality. In 1994 it was estimated that some 180 firms with a combined capacity of 380,000 tonnes were involved in production of biscuits and wafers, 103 firms with a total capacity 870,000 tonnes in the automated baking of bread, and 154 firms with a joint capacity 220,000 tonnes in the production of pasta.

Constraints and prospects

The growth prospects of the flour-milling industry are relatively favourable. Continuing high rates of population growth and the taste preferences of the Iranian population for wheat-based products will boost the demand for flour. This growth in demand is likely to be restrained to some extent by the reduction of bread subsidies, however, which will help bring about a more efficient pattern of bread consumption. In addition, investment opportunities in the wheat milling industry may also be constrained by shortages of foreign exchange required to import machinery and equipment.

The biscuit industry, having lost much of the export market it had developed in the 1970s as a result of its declining quality and the change in regional trade patterns in the 1980s, is facing excess capacity. Despite the high rate of population growth, it is unlikely that domestic demand for biscuits will increase sufficiently to stimulate a significant volume of new investment because of the comparatively low levels of disposable income enjoyed by the majority of the population. Only the relatively small proportion of middle-class Iranians may increase their consumption as quality improvements increase the attractiveness of domestically produced biscuits.

By contrast, the prospects for the pasta industry appear bright. Increased urbanization and stagnant *per capita* incomes have significantly boosted demand for pasta-based foods in general, and macaroni in particular. The widespread sale of imported pasta varieties from Turkey clearly indicates bright investment opportunities in this field. With no dramatic improvement in *per capita* incomes expected in the foreseeable future, the prevailing trend of a shift from meat-based meals

to pasta-based foods will be enhanced in the years to come. In 1994 it was reported that 32 pasta plants with a combined capacity of 28,500 tonnes per year were under construction.

Rice

Recent trends

After bread, rice is the second most widely consumed staple food in Iran. Though originally cultivated in northern regions, it is now also grown in the southern and the south-eastern parts of the country, following a strong growth in demand during the second half of the current century. This demand growth, supported by sharp increases in *per capita* incomes, also triggered a substantial increase in imports in the 1970s. From being a net exporter of rice in the 1960s, Iran became an importer in the 1970s, and has continued to import substantial quantities since that time.

Rice was traditionally husked by hand-pounding, but this method has been replaced by mechanized milling, which was introduced in the 1920s and 1930s, and spread particularly rapidly between the 1950s and 1970s. The milling industry is divided into two distinct sectors, one consisting of relatively small scale enterprises scattered throughout the rural rice producing areas, and the other of more centralized larger firms. The former tend to concentrate on the milling of the more popular traditional long-grained rice varieties, and mill them to a high quality with a lesser percentage of broken rice. The latter, which can offer higher standards of polishing than their smaller counterparts, are mainly responsible for milling the short-grain high-yielding rice varieties.

Table III.3. Output of milled rice, 1975-93, selected years
(Thousand tonnes)

1975	1980	1985	1987	1988	1989	1990	1991	1992	1993[a/]
975	768	1,152	1,172	922	1,251	1,288	1,532	1,537	1,483

Source: Ministry of Agriculture.

a/ Preliminary estimate.

The processing of rice into other products is limited since it is mainly consumed in the form of cooked grains. Only in the northern areas of Iran are small quantities of rice processed further into rice flour, mainly in the home. This flour is used for the manufacture of sweets and bread - a speciality of the region. Rice bran, a by-product of the milling process, is used as an animal feed.

Constraints and prospects

Promotional measures adopted by the government since the early 1980s, which included the provision of imported rice hullers and other equipment at highly subsidized prices, have resulted in a substantial growth in the number of small enterprises and cooperatives engaged in rice milling during the past 15 years. This growth in the number of small mills in the producing regions has

resulted in the emergence of considerable excess capacity in the milling industry. Despite a growing demand for rice, it appears unlikely that this spare capacity will be fully utilized in the foreseeable future, since the expansion of domestic rice production is expected to remain limited, leaving much of the growth in demand to be met by imports.

With an average yield of 1.5 tonnes per acre, which falls well below the global average, Iranian rice producers clearly have considerable scope for expanding their output. Efforts to stimulate a shift in the pattern of rice production towards higher-yielding varieties have had only a modest success, since these varieties have only gained a very limited acceptance by Iranian consumers, who tend not to like their taste. Although a recent increase in imports of cheap rice from Thailand seems to suggest that this consumer resistance may be weakening, the widespread adoption of high-yielding varieties will also require the development of a number of agricultural support services and activities, including improved irrigation, propagation techniques, and an increase in mechanized cultivation. Until these facilities and processes have been developed, Iran will remain dependent on rice imports.

Barley

Recent trends

Barley is the second most widely produced starchy crop in Iran. According to the last agricultural census, less than 40 per cent of the approximately 4 million hectares planted to barley was irrigated, but the crop's contribution to total agricultural output exceeded 60 per cent in 1988. The growth of barley production, which recorded an average annual growth rate of 6.3 per cent during the 1970s owing to the extension of cultivated land as well as yield improvements, reflected a corresponding rise in demand for this crop. By 1990 the country had become self-sufficient.

Table III.4. Imports of barley, 1982-92
(Thousand tonnes)

1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
403	471	688	533	149	160	89	743	587	182	110

Source: *Foreign Trade Statistical Yearbook*, various issues.

Barley is used almost entirely for the production of animal feeds, or for further processing into starch and glucose required by the textile and food industries. Large quantities are also used in an almost unprocessed state by traditional livestock breeders as animal feeds. The use of barley in other food processing industries is negligible.

Iran's animal feed industry originated with the establishment of the firm Khorak Dame Pars in Tehran in 1954 with an annual capacity of 36,000 tonnes. The industry has expanded considerably since then, and 19 enterprises with a combined production capacity of more than 900,000 tonnes were operating in this field by 1977, when their total output was 884,000 tonnes. Within less than a decade, the number of manufacturing units increased to 250, thus raising total capacity by almost

twelve times to 11.4 million tonnes per annum. While output figures for the post-1979 era are not published, data on the industry's production capacity suggest a total of 2.4 million tonnes, of which about 200,000 tonnes were for the production of poultry feed.

Constraints and prospects

Iran is well endowed with carbohydrate and oil seed crops, as well as many of the other inputs required for a thriving animal feed industry. In spite of this generally favourable situation, there is a lack of other important substances required to produce high quality animal feeds. The proportion of carbohydrates is typically quite high in domestically produced animal feeds, thus lowering the desired quality. Stricter quality control mechanisms, which will significantly reduce the demand for barley, will concurrently raise the demand for imports of other inputs to maintain existing animal feed production levels.

A further expansion of the animal feed industry is likely to be inhibited by the fact that the production capacity of the existing units is already very high relative to domestic demand, even though regional distribution does not always match availability of supplies or the demand for animal feeds in the region in question. It is also unlikely that the government will continue to provide the substantial subsidy offered in the past through an undervalued foreign exchange rate for machinery imports, which provided the principal impetus for the industry's past increase in production capacity.

Maize and potatoes

Recent trends

Potatoes are an important ingredient of many popular Iranian meals. The high population growth of the last three decades was therefore accompanied by a rapid increase in the production and consumption of potatoes, which are mostly purchased fresh and cooked in the home. Processing activities are consequently limited, except for the production of potato crisps and unfried, frozen potato chips, which are manufactured by a number of small-scale enterprises. Official data suggest that 50 firms with a combined capacity of 40,000 tonnes were in operation in 1994, and another 7 plants with a total capacity of 17,000 tonnes for the production of potato crisps were under construction.

The consumption of maize or corn-based foods, other than corn on the cob, is negligible. The cultivation of maize has historically been limited, with the output being used mainly as animal fodder or for the production of starch by traditional methods. Although maize production has increased in recent years, the total volume of output remains modest.

According to the latest available data provided by the Ministry of Industry, eight companies produced maize starch and glucose with a capacity of 20,000 and 30,000 tonnes respectively in 1994. Iran's total capacity for the production of starch and glucose is much higher than these figures suggest, however, if production from other starchy crops like wheat is included. By this wider definition, the country's total starch production capacity amounted to 44,000 tonnes in 1994, while that of glucose and gluten amounted to 42,000 and 3,000 tonnes respectively. Another important downstream activity associated with the wheat and corn involves the production of baby food by one firm with a capacity of 300 tonnes per year.

A major breakthrough was achieved by the Pars-Minoo Industrial Group with the introduction of corn-based snack "puffs" during the early 1970s. This product was well received by domestic

consumers and also successfully penetrated a number of regional export markets, especially in other Persian Gulf states. A total capacity of 11,100 tonnes had been established by 1977, with output increasing spectacularly from 1,000 tonnes in 1976 to 7,700 tonnes in the following year. After 1979 these corn puffs were perceived as being "non-essential", however, and their production ceased during much of the 1980s. When production resumed in the late 1980s, the recovery of the old export markets proved extremely difficult. Even so, 21 firms with a combined capacity of 28,400 tonnes were reported to be involved in the production of snacks based on puffed corn in 1994.

Constraints and prospects

Since processed foods derived from potatoes and maize tend to be luxury foods, the longer term prospects of the potato and maize processing industries will depend to a considerable degree on the pace of Iran's economic recovery and the future patterns of income growth within the country. Over the short term these industries appear set to experience a significant expansion, with data provided by the Ministry of Industry indicating that eight plants for the production of starch and related products, seven for the production of baby food, and four for the production of corn-based snacks were under construction in 1994. Progress on most of these projects was reported to be slow, however, owing principally to shortages of foreign exchange

HORTICULTURE

The resource base

A wide variety of temperate fruits and vegetables are produced and consumed in Iran. The country also has a considerable potential for expanding its output of a large number of fruits, including pears, grapes, melons, quinces, plums, apricots, peaches and even bananas. An extensive range of flowers is also grown throughout the country.

Recent trends

The greater proportion of fruits and vegetables is consumed fresh or cooked in traditional Iranian dishes, with some vegetables also being consumed raw. The abundance of fruits and vegetables has given rise to a thriving tradition of preserving as jams, compotes, pickles and sun-dried products. These techniques are practised widely in both rural and urban areas, although the sun-drying and desiccation of fruits such as grapes, figs, apricots, plums and cherries continues to be concentrated mainly in the countryside, where this activity forms one of the primary functions of farming families.

Attracted by the availability of these vast raw material resources, private entrepreneurs began to take an interest in the canning industry at a comparatively early stage in Iran's industrialization process, with the first attempt at canning being made in 1930. A commercially viable canning industry did not emerge until 1956, however, when suitable cans became available. By 1961 the industry had expanded to encompass 18 firms, which catered mainly to restaurants and the armed forces.

The growing urbanization and rising *per capita* income resulting from the industrialization policies of the 1960s and the oil revenue boom of the 1970s generated a rapid growth in consumer demand for canned foods, which led to a further expansion of the industry over the following two decades. In addition, the emergence of other rapidly growing consumer markets in the neighbouring countries provided the industry with a substantial export potential. This reinforced its growth momentum and prompted the cultivation and packaging of new products, such as asparagus, which

had not traditionally been produced or consumed in Iran but for which there was a relatively high demand in export markets.

Table III.5. Production of fruits and vegetables, 1986-92, selected years
(Thousand tonnes)

Commodity	1986	1987	1989	1990	1991	1992
Figs	74	58	53	78	82	204
Pears	103	107	127	147	153	159
Apples	1,154	1,238	1,246	1,524	1,364	1,463
Grapes	1,542	1,519	1,320	1,424	1,627	1,508
Pomegranates	423	461	496	540	565	523
Other stoned fruits	458	446	534	536	532	604
Citrus fruits	1,552	1,653	2,147	2,308	2,438	3,068
Melons	-	-	-	-	776	864
Water melons	-	-	-	-	1,235	1,765
Cucumbers	-	-	-	-	799	1,057
Tomatoes	-	-	-	-	1,642	2,371

Source: Ministry of Agriculture.

The industry's expansion during the 1960s and 1970s was accompanied by increased vertical integration, as it sought to overcome the supply constraints arising from continued dependence on small-scale peasant farmers. The first of these vertically integrated canning firms, Dashte Morghab, began marketing its products under the brand name of 1&1 in 1968. This was followed by the establishment of several other similar large-scale firms, including Chin-Chin, Jirofot and Shahryar Agro Industrial Complex. Over the following years the scope of commercial food processing extended beyond canning to freezing and bottling, and by 1978 the industry comprised 42 firms with a combined production capacity of nearly 200,000 tonnes of canned fruits and vegetables, 55,000 tonnes of tomato sauce and paste, 6,500 tonnes of jam and 29,000 tonnes of other products.

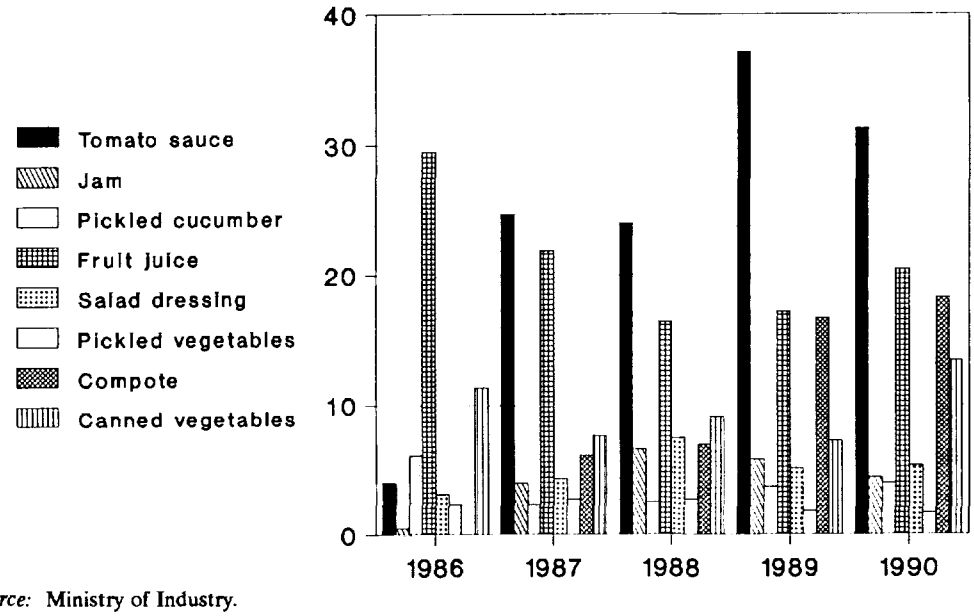
Table III.6. Production of canned fruits and vegetables, 1986-90
(Thousand tonnes)

Product	1986	1987	1988	1989	1990
Tomato sauce and paste	44.0	24.7	24.0	37.1	31.3
Jam	0.5	4.0	6.6	5.8	4.4
Pickled cucumber	6.1	2.3	2.5	3.7	4.0
Fruit juice	29.5	21.9	16.4	17.2	20.5
Salad dressing	3.1	4.3	7.4	5.1	5.3
Pickled vegetables	2.3	2.7	2.7	1.8	1.7
Compote	-	6.1	6.9	16.7	18.3
Canned vegetables	11.4	7.6	9.1	7.2	13.5

Source: Ministry of Industry.

The growth of the industry accelerated sharply during the early 1980s. This was stimulated in part by huge subsidies granted by the government for the import of can-making machinery and galvanized steel sheet for the manufacture of cans. A large proportion of the subsidy provided to the can-making industry was then passed on to the canning sector and ultimately to the consumers through the imposition of tight price controls. The low administered prices served to reinforce the increase in demand triggered by the rapid population growth and the needs of the armed forces during the war. Output continued to rise in the immediate post-war era, largely as a result of the increased availability of cans following the liberalization of import and foreign exchange controls. The process suffered a setback after March 1993, however, when the elimination of foreign exchange subsidies following the unification of the exchange rate pushed up domestic prices and adversely affected domestic demand. This decline in domestic demand was only partially offset by a modest increase in export sales stimulated by the implicit devaluation of the rial.

Fig. III.A. Output of processed fruit and vegetable products, 1986-90
(Thousand tonnes)



Source: Ministry of Industry.

The currency depreciation of the post-war period gave rise to considerable hopes for an expansion of Iran's export potential for fruit juice concentrates, however, and prompted significant investment in this field, which was boosted further by the availability of subsidized foreign exchange for the import of appropriate machinery. As indicated in Table III.7, the industry comprised 46 firms at the end of the Iranian year 1993/94 on 20 March 1994. Twenty firms had a combined annual capacity of 60,400 tonnes for the production of apple juice concentrate, 15 firms had a joint annual production capacity of 25,000 tonnes of orange juice concentrate, nine firms had a production capacity of 20,000 tonnes per year of grape juice concentrate, and 2 firms had a joint capacity of 6,000 tonnes of pomegranate juice concentrate. In early 1994, 53 new plants with a combined annual production capacity of 63,500 tonnes were reported to be under construction.

Table III.7. Fruit and vegetable canning industry, 1993 (end-year)

Product	Number of companies	Capacity (tonnes)
Canned vegetables	100	200,000
Tomato paste and sauce	112	150,000
Canned fruits		
Apple	100	40,000
Other fruits (cherries, pears, plums, apricots, peaches)	100	60,000
Juice		
Pomegranate	2	6,000
Apple	20	60,400
Orange	15	25,000
Grapes	9	20,000

Source: Ministry of Industry.

Constraints and prospects

The majority of canning enterprises do not have their own plantations or fields but have to procure their raw materials from small peasant farmers. Supply contracts are usually concluded before the start of the harvest, but are seldom followed in their entirety. Certainty of supply is only available to the small number of large-scale nationalized enterprises, although even these firms frequently face the problem of inconsistent product quality.

The anticipated slowdown in the growth of *per capita* incomes in the short to medium term, combined with a general Iranian preference for fresh fruits and vegetables, will hinder the growth of the canning and preserving industries for the foreseeable future. While the potential for export to countries in the European Union (EU), the Persian Gulf region, the Commonwealth of Independent States and eastern Asia is immense, the industry's past export performance has not been impressive. Any improvement will depend on the establishment of a more appropriate infrastructure for quality packaging, an efficient transport and customs service, the formulation of effective marketing strategies and consistent export regulations.

ANNUAL AND PERENNIAL CASH CROPS

The resource base

Iran produces a large number of cash crops in substantial quantities. These include cotton, pistachios, almonds, walnuts, hazelnuts, dates, oilseeds, pulses, olives, sugar beet and cane, lentils, tea, saffron, cumin seeds, and tobacco. The production of most of these items has fluctuated considerably in recent years due to changing weather conditions and abrupt policy changes, which affected the pattern and level of production.

With only a few exceptions, however, most cash crops registered low or negative growth rates during most of the 1970s. Although the import-substituting industrialization policies pursued during this period unfavourably affected the agricultural terms of trade, the promotion of large-scale cultivation practices significantly increased the output of cotton, sugar beet and sugar cane

in particular. However, the over-valued currency also hampered the export of cash crops, most of which have traditionally been produced for export. This development was reinforced by the unprecedented growth of *per capita* incomes and the rapidly expanding industrial base during the 1970s, which increased domestic demand for these products and led to a reduction in exports.

The situation changed in the 1980s with the introduction of new government policies to promote the production of certain agricultural goods deemed strategic to achieve self-sufficiency. This greatly altered the prevailing production patterns, including the production of cash crops during much of the 1980s. While the changes in relative prices discouraged the production of some cash corps, the general improvement in the agricultural terms of trade boosted the output of most other cash crops during this period and into the early 1990s.

Table III.8. Production of cash crops, 1985-92, selected years
(Thousand tonnes)

Product	1985	1987	1989	1990	1991	1992
Cotton	360	327	395	437	412	330
Pulses	343	341	264	325	576	674
Dates	397	524	538	516	634	578
Pistachios	105	114	130	162	172	201
Walnuts	31	33	64	44	73	68
Hazelnuts	2	4	4	5	5	6
Olives	4	4	8	10	8	11
Sugar beet	3,924	4,456	3,535	3,601	5,000	5,999
Sugar cane	2,286	1,575	1,448	1,659	1,731	1,611
Tobacco	28	25	15	19	20	22
Tea leaves	148	192	124	166	188	245

Sources: Ministry of Agriculture, Iran Tobacco Company, Cotton and Oil Seeds Cultivation Organization, Iran Sugar and Sugar Cube Organization.

Cotton

Recent trends

The cultivation of cotton has a long history in Iran, especially in the provinces of Mazandaran and Khorassan, which account for more than 75 per cent of the land planted to cotton in the country. In 1903 a high yielding variety of cotton was introduced into Iran from America, and has largely replaced indigenous varieties. A significant rise in production did not take place until the late 1960s, however, when large-scale modern farming practices were introduced. By 1970 more than 300,000 hectares were planted to cotton, with an average land holding of 80 hectares and an output of 444,000 tonnes of unginned and 149,000 tonnes of ginned cotton. Output grew markedly in the following years, owing both to the extension of land under cultivation and increased yields. In 1975, production reached its peak of 716,000 tonnes and then decreased in the subsequent years due to reduced cultivated acreage and the yield per acre.

Iran's production of cotton has dropped abruptly since 1979 for various reasons. These include the fact that many privately-owned large estates were brought under state ownership in the early

1980s, and were later divided into smallholdings and transferred to peasant cultivators. A new law to reform arable land, which permitted a more speedy acquisition of land by peasant farmers if they planted other crops, and especially wheat, resulted in a decline in cotton production, as did a shift in the relative price of cotton vis-à-vis other agricultural products. A ban on cotton exports imposed in 1980 further exacerbated this unfavourable trend.

The growth in cotton production prior to 1979 was accompanied by a significant expansion of the cotton milling industry. By 1983 there were 104 operational cotton mills in Iran with a combined milling capacity of 700,000 tonnes, while the rate of capacity utilization in the same year was less than 35 per cent.

Table III.9. Production and export of milled cotton, 1971-92, selected years
(Thousand tonnes)

	1971	1974	1976	1977	1979	1980	1984	1988	1989	1990	1991	1992
Production	149	239	158	180	103	63	111	107	126	125	118	94
Export	75	117	77	73	42	-	-	-	-	-	-	-

Source: Cotton and Oilseed Cultivation Organization.

Cotton emerged as one of the most important non-oil export items during the 1970s, heading the agricultural export list for much of this period. The volume of exports reached its peak at 154,000 tonnes in 1975, before dropping to an unprecedented low of 4,000 tonnes by 1980, when exports were totally banned. Local demand for milled cotton by the domestic textile industry remained in the range of 70,000-95,000 tonnes during 1970-1985.

Constraints and prospects

Although Iran has vast areas suitable for cotton farming, especially in the provinces of Mazandaran and Khorassan, the adoption of modern mechanized systems is required to reduce production costs. However, the policy established in the early 1980s, which resulted in the dismantling of large estates into smallholdings, was a move in the opposite direction. The cultivation of other crops, which was expected to follow from this land reform policy, generally proved to be very unsuccessful. The distorted relative price of cotton in the 1980s was equally damaging. The challenge now facing the policy-makers is to reverse the recent trend towards the fragmentation of holdings and to encourage efficient farming practices on large estates in order to enable Iran to fulfil its considerable potential as a producer and exporter of cotton.

Dried nuts

Recent trends

A wide range of dried nuts, including pistachios, almonds, hazelnuts and walnuts, are produced and consumed in substantial quantities in Iran, which is the world's largest producer and exporter of pistachios in particular. The area of cultivation is estimated to range from 90,000-120,000 hectares, which is about four times the acreage planted to this crop in the United States of America, the world's second largest producer and exporter of pistachios. Because of the pistachio

tree's characteristic of producing high and low yields in alternate years, Iran's output of pistachios has fluctuated considerably.

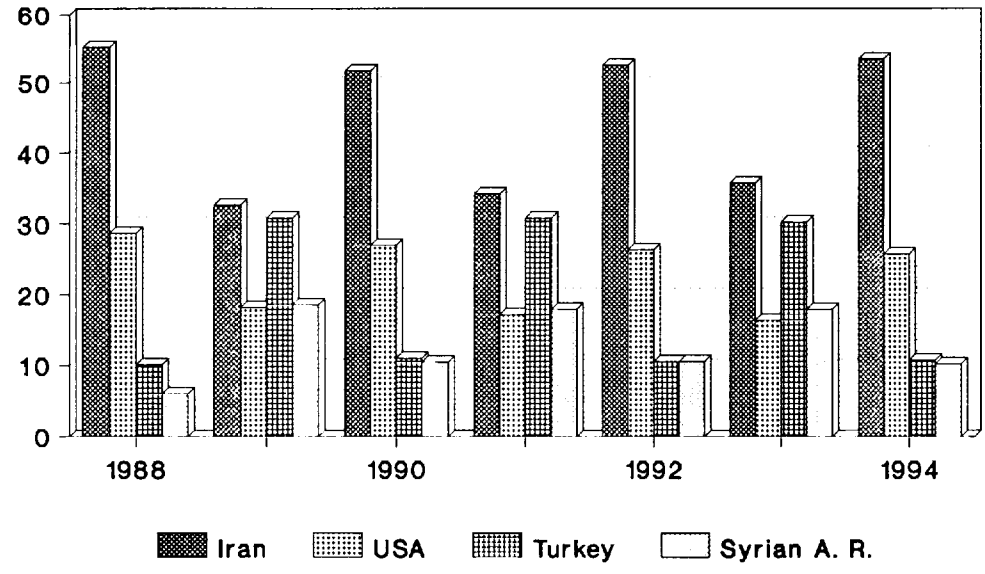
Table III.10. Global production of pistachio nuts by major producers, 1976-94, selected years
(Thousand tonnes)

Year	Islamic Republic of Iran	United States	Turkey	Syrian Arab Republic
1976	47.3	0.8	2.2	4.1
1979	11.0	8.6	17.6	8.5
1982	25.3	22.0	12.1	8.8
1985	70.0	13.5	36.3	11.0
1988	90.0	46.7	16.5	9.7
1989	35.0	19.4	33.0	19.8
1990[a/]	100.0	52.0	21.2	20.1
1991[a/]	40.0	20.0	36.0	21.0
1992[a/]	110.0	55.0	22.0	22.0
1993[a/]	45.0	20.5	38.0	22.5
1994[a/]	120.0	57.5	24.0	23.0

Sources: US Department of Agriculture, Foreign Agricultural Service; California Pistachio Commission.

a/ Estimate.

Fig. III.B. Share of global production of pistachio nuts by major producers, 1988-94
(Percentage)



Sources: US Department of Agriculture, Foreign Agricultural Service; California Pistachio Commission.

As pistachios are mainly consumed in the form of dried nuts, the extent of processing is limited to roasting and packaging. The bulk of this product is exported raw to more than 45 countries. Germany, Italy, Japan, the United Arab Emirates and the United Kingdom are the five main importers of Iranian pistachios, with Germany and the United Arab Emirates reexporting a substantial proportion of their imports after processing.

While pistachios are cultivated in the south-eastern province of Kerman, substantial quantities of almonds are grown in the province of Azerbaijan in north-western Iran. The country consequently plays a significant role in the international trade in these products, and has emerged as one of the major producers and exporters of both bitter and sweet almonds. In addition, walnuts and hazelnuts are also produced and exported in substantial quantities.

Almonds, though widely consumed within Iran, also constitute an important agricultural export item. They are used by the pharmaceutical industry and producers of confectionery. Their high nutritional value and low sugar and starch content make almonds an ideal snack for diabetics. Like pistachios, the bulk of Iran's output of almonds is exported to the EU without any further processing, although a limited quantity is also shipped to the other littoral states of the Persian Gulf.

As indicated in Table III.11, exports of all major dried nuts produced in Iran have fluctuated sharply over the past two decades. While climatic conditions and the alternating low-high yield patterns of most of these crops affect production levels and export performance, frequent and wide-ranging changes in export regulations, including a number of changes in regulations pertaining to foreign exchange earning indemnities, have also had a disruptive impact. More recently, however, exports have been boosted by the sharp devaluation of the rial in the early 1990s.

Table III.11. Export of dried nuts, 1970-92, selected years
(Tonnes)

	1970	1976	1977	1980	1985	1986	1987	1989	1990	1991	1992
Pistachios	9,560	8,680	15,280	4,864	1,707	42,114	53,825	68,849	68,462	97,386	104,205
Almonds											
unshelled	3,834	1,095	999	79	215	2,046	298	397	648	571	1,008
shelled	635	488	995	88	477	992	1,075	827	1,514	2,750	1,725
Walnuts											
unshelled	144	-	54	-	-	-	161	88	303	65	39
shelled	70	29	294	-	-	11	94	7	-	1,371	1,622
Hazelnuts											
unshelled	9	5	1	-	129	9	13	6	-	59	152
shelled	18	64	61	16	355	684	-	79	-	2,750	1,725

Source: *Foreign Trade Statistical Yearbook*, various issues.

Constraints and prospects

Iran has a vast potential for increasing its production and exports of dried nuts in general, and pistachios and almonds in particular. Overseas demand for pistachios expanded during the 1980s

as a result of the decline in international prices caused by the increase in world production which began at that time. This rapid growth in global demand has been further reinforced by the potent American marketing campaign for Californian pistachios, that has made the crop into a popular snack worldwide.

The growth in export demand is threatened by the emergence of poisons known as aflatoxins in dried nuts, and particularly pistachios. This problem can be overcome through a stricter enforcement of health standards by the Iranian authorities, and by an effective international campaign to increase consumer awareness of the good taste and high quality of Iranian pistachios, and of the strict observance of health and quality standards by Iranian exporters.

High value-added downstream processing activities, involving the roasting and packaging of dried nuts, also need to be promoted. Similarly, the production of pastes and essences from pistachios, almonds and other nuts may also be considered as a means of adding value to Iran's output of these crops. This will require increased investment in the industry by the private sector, which has so far been discouraged from entering the industry because of the existing oligopolistic market structures governing the local procurement and export of pistachios. These will clearly have to be dismantled if other investors are to be attracted into the industry.

Edible oils

Recent trends

In addition to cotton seeds, which are produced as a by-product of cotton cultivation, a number of other oilseeds is also grown in Iran. These include soybeans and sunflower seeds, which are now grown in several provinces, but were only produced in negligible quantities until the late 1960s. As late as 1967 the total land planted to these two major oilseeds amounted to less than 6,000 hectares and total output did not exceed 3,500 tonnes.

From 1968 onwards Iran witnessed a rapid extension of land under oilseed cultivation, and by 1976 it covered an area of more than 130,000 hectares. This trend could not be sustained indefinitely, however, and the size of the planted acreage has fluctuated considerably during the 1980s.

Table III.12. Production of oilseeds, 1970-91, selected years
(Thousand tonnes)

	1970	1974	1980	1985	1987	1988	1989	1990	1991
Cotton seeds	275	427	103	149	134	139	135	149	140
Sunflower seeds	51	43	2	3	11	21	25	22	23
Soybeans	6	35	51	50	43	110	102	72	63
Total	**332**	**505**	**156**	**202**	**188**	**270**	**262**	**243**	**226**

Source: Cotton and Oilseed Cultivation Organization.

More than 90 per cent of Iran's oilseeds, including cotton seeds, are cultivated in the two adjacent provinces of Mazandaran and Gilan. The remaining 10 per cent is grown in the widely dispersed areas of Fars, Tehran, Khorassan and Esfahan.

While locally produced oilseeds are used almost entirely by local refineries, domestic production continues to account for only a small proportion of Iran's total vegetable oil requirements. Small quantities of sunflower seeds are also consumed directly by Iranians.

One of the factors that contributed significantly to the expansion of oilseed production during the 1970s was the establishment of the Iranian Oilseed Cultivation Promotion Company in 1968. A privately-owned company, its principal shareholders were the owners of Iran's edible oil extraction and refining industry. The prime objective of the company was to promote the production of oilseeds, and this goal was achieved even though output varied as a result of climatic variations.

The company was nationalized in 1979, after which farm-gate and mill-door prices were set administratively, with the company being assigned as the sole buyer of oilseeds from farmers and the sole supplier of the crop to the refining industry. Unattractive relative prices prompted farmers to shift to the cultivation of other crops, which culminated in a considerable drop in the output of oilseeds. This discouraging trend was not reversed until the late 1980s, when the price control regulations were revised and relative prices improved.

The expansion of associated processing has surpassed the growth of domestic oilseed production. Iran has a relatively long history in both the oil extraction and refining industries. The first extraction-cum-refining factory for edible oil was set up as early as 1938 in Varamin near Tehran. The industry expanded quite rapidly during the 1960s and 1970s in response to the sharp increase in demand resulting from increased urbanization, rising *per capita* incomes, and the substitution of vegetable oil for animal fats. By 1972 Iran's oil industry comprised 16 refining plants with a combined capacity of 500,000 tonnes. Refining capacity rose further to about 700,000 tonnes by the end of the 1970s as a result of heavy investment in the industry, even though the volume of output remained well below 300,000 tonnes.

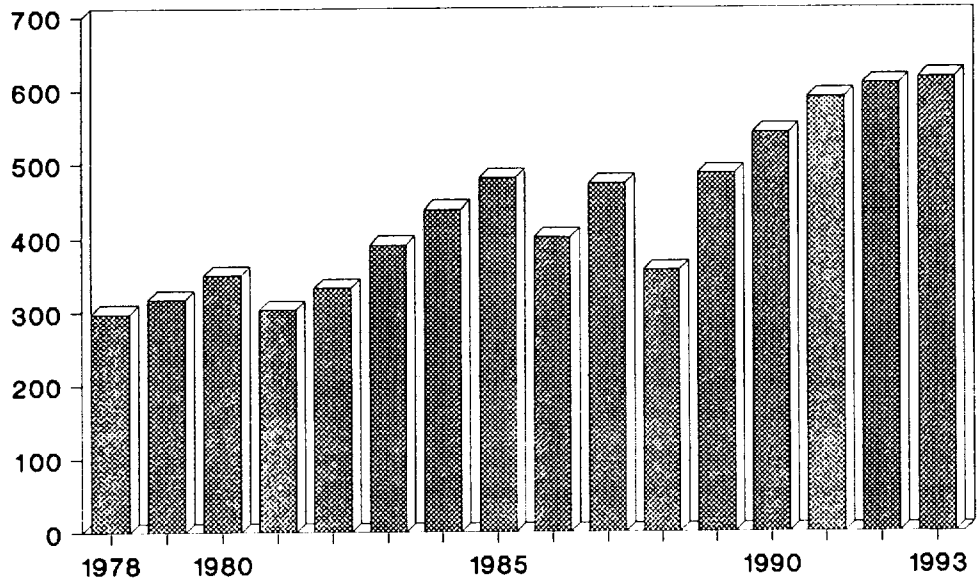
Table III.13. Refined edible oil production, 1978-93
(Thousand tonnes)

	1978	1979	1980	1981	1982	1983	1984	1985
Output	298.0	317.7	350.6	303.9	333.4	391.5	438.5	480.9
	1986	1987	1988	1989	1990	1991	1992	1993
Output	401.3	473.2	356.7	486.2	541.4	589.5	608.3	616.7

Source: Ministry of Industry.

Since the 1970s, total production capacity is reported to have declined modestly, with the latest available data indicating that the edible oil refining industry consisted of 14 firms with a combined annual production capacity of 650,000 tonnes in 1993. The rate of capacity utilization has increased significantly, however, as output has risen steadily during the past 15 years to more than 615,000 tonnes by 1993. While all of these firms came under state control after 1979, a few were privatized in the early 1990s.

Fig. III.C. Refined edible oil production, 1978-93
(Thousand tonnes)



Source: Ministry of Industry.

Constraints and prospects

The edible oil refining industry is currently plagued by uncertain raw material supplies. This is due partly to foreign exchange constraints, since the bulk of these raw materials are imported, and partly to administrative interventions in the pricing and distribution mechanisms. The deregulation of the industry would be difficult for social reasons, however, because of the importance of edible oils in the Iranian national diet. This fact was underlined by an attempt in the early 1990s to reduce government subsidies, which triggered a sharp increase in prices and eventually prompted the reintroduction of price controls.

The prospects for an increase in the production of oilseeds appear favourable, provided market forces are permitted to play their role in determining relative prices and steps are taken to increase the amount of irrigated acreage and encourage the development of large-scale modern farming, particularly for cotton. At the same time however, it appears unrealistic to expect that the domestic production of oilseeds will expand sufficiently in the foreseeable future to meet the requirements of the refineries. The edible oil refining industry is therefore likely to continue to import a substantial proportion of its raw material requirements for the foreseeable future.

The industry's longer-term prospects appear broadly favourable. Although it is currently burdened with obsolete machinery, its has developed considerable expertise. With renewed investment in plant and machinery, which would enable it to make optimal use of its experienced and highly efficient work force of engineers and technicians, the edible oil refining industry could soon regain a strong a comparative advantage in international markets.

Tea

Recent trends

Tea production in Iran began during the present century. The crop, originally imported from India, was initially grown in the northern region of Lahijan. Its cultivation was gradually extended to the adjacent provinces of Gilan and Mazandaran on the southern shores of the Caspian Sea. The total area planted has remained unchanged at about 32,000 hectares during the past three decades, mainly due to the limited availability of suitable land.

The cultivation of tea is dominated by smallholders, who account for approximately 90 per cent of total output. Almost 84 per cent of the tea gardens are less than one hectare in size, while estates of more than 10 hectares account for less than 2 per cent of the total. These include a number of state-owned plantations.

Tea is produced predominantly on rain-fed land, with only a few scattered plots being irrigated. The limited size of the fields is an important inhibiting factor for the extension of irrigation. The problem is exacerbated, moreover, by the fact that most of Iran's tea is planted on steeply sloping land, which is not usually terraced.

Table III.14. Production of tea, 1976-91, selected years

	1976	1981	1986	1987	1988	1989	1990	1991
Land under cultivation (thousand hectares)	32	32	32	32	32	32	32	32
Green tea leaves (tonnes)	84	163	212	199	247	170	191	196
Black tea (tonnes)	20	38	48	45	56	38	43	44

Source: Iran Tea Organization.

The associated processing and packaging activities have been gradually expanded since the 1950s. In 1994 Iran had 105 operational tea factories, of which seven were state-owned and the remaining 98 under private ownership. The combined daily production capacity of these plants was estimated at 2,100 tonnes of green tea leaves, with the seven state-owned plants having a capacity of 138 tonnes per day, or 6.5 per cent of the total. The individual production capacity of the existing plants, most of which were established during the 1960s and early 1970s, ranges from three to 76 tonnes of green leaves per day. This corresponds to approximately 0.7-17.2 tonnes of black tea per day.

The tea market is regulated by the Iran Tea Organization (ITO), also known by its Persian name as Sazman Chai-e Keshvar. While the ITO's original role was to promote tea production, it was transformed into the sole tea production and distribution authority after 1979. Under the system introduced at that time and still in force, farmers are obliged to sell tea leaves to the ITO at predetermined prices, with the tea factories buying the fresh leaves as sub-contractors of the ITO.

These arrangements have constrained new investments in the processing sector and also led to a substantial drop in the quality of processed tea, as a result of minimal replacement investment in this industry. In addition, they also resulted in an increasingly large proportion of lower graded tea leaves, mixed with stems and other foreign matter, being delivered to the ITO's subcontracted plants. This accounts for the substantial increase in the production of tea leaves recorded during the 1980s from the unchanged planted area.

Iranian consumers prefer to brew conventional black tea, and domestic demand for CTC (cut, tear, curl) types is very limited. Approximately 80 per cent of domestically produced black tea is sold in packaged form. The tea packaging industry is dominated by a large number of small enterprises and employs manual processes for the most part. The mechanized production of tea bags accounts for only a small proportion of total output.

All of the tea produced in Iran is consumed locally. Although the country was almost self-sufficient during the 1960s and the early 1970s, it now depends on imports for almost half of its annual consumption, of some 100,000 tonnes. Since domestic production has increased considerably during the intervening years, this increased import-dependence has been due to a sharp rise in demand caused mainly by the rapid rate of population growth in this period.

Constraints and prospects

The potential for boosting the quantity and improving the quality of tea production in Iran remains immense, although the industry's prospects are clouded by the neglect suffered by the country's plantations and related downstream activities during the past decade or so. This has resulted in the build-up of substantial investment needs, which will have to be undertaken soon if the industry is to realize its full potential. An indication of the urgency of such investment is the age of many of the existing tea bushes which is in excess of 50 years and significantly reduces the quantity and quality of their output.

In addition, there is also the possibility of bringing a considerable acreage of state-owned land in the Astara region in north-eastern Gilan province under tea cultivation. The cultivation of this land, which is currently lying idle, would substantially increase the industry's raw material base and stimulate a corresponding increase in processing capacity. To a large extent, however, the realization of this potential will depend on the adoption of appropriate policies to encourage an efficient utilization of these resources, which would inevitably have to include measures to encourage the establishment of large tea estates, promote the role of market forces, facilitate and expedite the replacement of the existing old tea bushes and extend irrigated farming.

Sugar

Recent trends

Although the cultivation of sugar cane in Iran dates back to ancient times, the contemporary industry only dates back to the early 1960s. A comprehensive plan to revitalize sugar cane production in the province of Khuzestan in southwestern Iran was formulated by the government in collaboration with the Food and Agriculture Organization of the United Nations (FAO) in the 1950s. The plan provided for the establishment of a vertically integrated complex comprising a sugar cane plantation, a sugar mill and a paper production plant, which came on stream in 1961.

The production of sugar beet has a longer contemporary historical background. Although small quantities of sugar beet were produced and consumed locally, production expanded rapidly only

after the establishment of the first sugar mills during the early 1930s. In contrast to sugar cane, which is cultivated on large government estates, sugar beet is produced mainly by smallholders.

Table III.15. Production of sugar cane and sugar beet, 1970-92, selected years

Year	1970	1975	1980	1985	1988	1989	1990	1991	1992
Sugar beet									
Production (thousand tonnes)	3,872	4,597	3,537	3,924	3,755	3,535	3,609	5,000	5,999
Area (thousand hectares)	184	160	144	154	141	150	174	..	..
Yield (thousand tonnes/hectare)	21	29	25	25	27	24	21	..	..
Sugar cane									
Production (thousand tonnes)	532	911	1,335	2,286	1,310	1,448	1,659	1,731	1,611
Area (thousand tonnes)	..	..	..	29	28	26	25	25	..
Yield (thousand tonnes/hectare)	..	..	..	79	47	56	66	69	..

Source: Iran Sugar and Sugar Cube Organization.

The first sugar mill in Iran was built in 1928 by the Belgians, but was soon closed down for political reasons. By 1956, the number of sugar refineries had risen to 11, with a combined output of 106,000 tonnes per annum. The first privately-owned mill was established in 1957, which set an important precedent for the further development of the industry. By 1978, only five of the 33 existing plants were state-owned, although this situation changed after 1979, when all sugar refineries were placed under public management and the private sector was left holding only a minority stake in some of them.

By 1994 the number of operational sugar mills had risen to 37, with a combined production capacity of about 1 million tonnes. Of these, 35 are designed to refine sugar beet, and account for about 65 per cent of Iran's total output of refined sugar. The remaining two mills refine cane.

Table III.16. Production and imports of refined sugar, 1970-92, selected years
(Thousand tonnes)

Year	1970	1975	1980	1985	1988	1989	1990	1991	1992
Production	570	670	595	692	583	554	575	535	871
Imports	61	511	584	573	265	464	764	450	380

Sources: Iran Sugar and Sugar Cube Organization; *Foreign Trade Statistical Yearbook*, various years.

Since sugar is regarded as an essential food item, it is distributed by means of a rationing system, with the market being regulated by the state-affiliated Iran Sugar and Sugar Cube Organization.

A reduction of subsidies combined with a phased relaxation of price controls since 1990 has prompted a significant increase in sugar output since 1992. The bulk of this output growth has been due to a marked increase in the cultivation of sugar beet by smallholders in response to improvements in relative prices vis-à-vis other competing crops following the easing of price controls.

These developments have also attracted private sector interest in the sugar refining industry, which is operating at high rates of capacity utilization while suffering from obsolete machinery and facilities. The realization of many of the private sector's investment plans in the industry has been hampered by the serious foreign exchange constraints that emerged in 1992-93, however, and restrained the import of the required machinery and equipment. The situation has been exacerbated by the subsequent reimposition of price controls as part of the government's new campaign to fight inflation.

A huge vertically integrated project with an estimated capital cost of about $1.5 billion was envisaged for the first Five-Year Economic Development Plan (1990-94). This project, which was intended to include a sugar cane plantation, a sugar refining plant and a paper plant utilizing bagasse, was to be implemented in Haft Tappeh in the province of Khuzestan, where a similar project had already been launched in the 1970s. The project has not so far been implemented, however, because of foreign exchange shortages and may be delayed indefinitely. It may also be hampered by the inadequate supply of water in the Karoun River, on which it depends heavily for irrigating the planned sugar cane plantations.

A major downstream activity related to the sugar industry is the production of confectionery. Apart from biscuits, substantial quantities of sweets, toffees, caramel and chocolates are produced in Iran. The total commercial production capacity for these products reached 120,000 tonnes per year by 1976, although actual production did not exceed 21,000 tonnes during the 1970s and 1980s. Some of the output of the confectionery industry is exported to neighbouring countries.

Paper production is another downstream activity associated with sugar cane mills. The Pars Paper Company, with an annual capacity of 100,000 tonnes, was established in Haft Tappeh in 1970 to make economic use of bagasse (see Pulp and paper). Sugar cane and sugar beet pulp is also used for the manufacture of animal feeds.

Constraints and prospects

The prospects for the sugar industry remain quite favourable. Domestic demand, a large portion of which is covered by imports, is expected to grow in line with the anticipated increase in Iran's population during the coming years. A corresponding increase in supply appears likely to be achieved if the deregulation of the industry continues and the removal of restrictive controls on pricing and distribution encourage increased investment in the industry.

Tobacco

Recent trends

Tobacco cultivation has a long history in Iran, which produces a wide range of tobacco varieties, including nicotine rustics appropriate for use in *hookahs* (water pipes). The cultivation of tobacco originated in the northern province of Gilan, but soon spread to the adjacent province of Mazandaran on the shores if the Caspian Sea. Other major tobacco-producing areas now include the provinces of Azerbaijan and Kurdestan.

Tobacco is produced entirely by peasant farmers who typically only own comparatively small plots of land, and modern large-scale farming practices are almost non-existent in both the publicly and the privately owned parts of the industry. The area planted to tobacco has also declined gradually over the past decades from approximately 30,000 hectares in 1935 to some 15-20 hectares in the 1970s to 1990s, largely as a result of induced distortions in the relative prices of tobacco, which encouraged a shift to the production of other agricultural crops.

Table III.17. Tobacco production, 1976-92, selected years

Year	1976	1981	1986	1987	1988	1989	1990	1991	1992
Land under cultivation (hectares)	16	21	20	20	18	15	15	18	19
Production (thousand tonnes)	18	21	24	23	19	16	15	20	20

Source: Iran Tobacco Company.

The private sector is not allowed to engage in downstream activities associated with the production of tobacco-based products. A monopoly over the manufacture, import and distribution of tobacco products, as well as a number of other related downstream activities, has been granted to the Iran Tobacco Company (ITC), known in Persian as Sherkat Dokhaniyat Iran, which was established in 1932. Although this monopoly was partially breached in 1992 when a ban on the import of cigarettes by the private sector was lifted, the domestic production of cigarettes and other tobacco-based products still lies within the monopoly of the ITC, which produces several local brands of modest quality.

Table III.18. Production of cigarettes, 1968-93, selected years
(Billion cigarettes)

Year	Filter tipped	Non-filter	Total
1968	2.5	9.1	11.6
1970	3.2	8.7	11.9
1975	7.1	8.2	15.3
1977	7.1	4.9	12.0
1982	..	..	13.5
1985	..	..	16.2
1986	..	..	15.3
1988	..	..	13.8
1989	..	..	10.0
1990	..	..	12.3
1991	..	..	11.6
1992	..	..	10.5
1993	..	..	7.9

Source: Iran Tobacco Company.

During the 1960s domestic demand for cigarettes was met entirely from local production, although small quantities of foreign cigarettes were imported exclusively by the ITC. With demand outstripping supply, the share of domestically-produced brands in the Iranian market had fallen to a meagre 20-25 per cent by 1994. The remaining demand, estimated at 55 billion cigarettes per year, was met largely by American and Japanese brands imported by the ITC.

Constraints and prospects

Iran enjoys a substantial *ex-ante* comparative cost advantage in the tobacco processing industries, taking into account the comparatively good quality of locally produced tobacco leaves as well as the relatively high yield per hectare. The further development of these industries is hampered by the ITC's monopoly, however, which forces local farmers to sell their produce at artificially low prices. A promotion of market forces will result in an extension of tobacco cultivation, as the conversion of land cultivated by other products is feasible. Increased mechanization of cultivation, however, which could play an important part in further improving crop yields, is hampered by the limited acreage of plots.

Iran's cigarette production capacity will almost double in the near future, when a highly automated large-scale unit owned by the ITC is completed. The plant, in the last stages of construction, is located in Rasht in the province of Gilan, and has a production capacity of 20 billion cigarettes per annum. This anticipated expansion notwithstanding, a sustained growth over the longer term appears inconceivable without privatization of downstream activities and deregulation of the industry to encourage market forces.

Another major factor that will restrain the expansion of this industry is the unexpected ratification of a bill by the Iranian parliament in 1992 stipulating a complete cessation of the production and import of cigarettes within the following seven years. The enforcement of this law, which is intended to lead the way towards a total ban on smoking throughout the country, may not be easy, and at the very least requires a clarification pertaining to the production of tobacco and tobacco-based products for export. A particularly strong opportunity for export growth is offered by the neighbouring CIS markets, to which Iran has ready access.

ANIMAL HUSBANDRY

The resource base

Iran is endowed with extensive grasslands scattered throughout the northern, northeastern and western regions of the country. These grasslands constitute the primary source of animal feed for the traditional nomadic livestock breeding and animal husbandry practised by smallholders. A wide range of forage and carbohydrate crops is also grown. The country's potential to produce animal feed from sugar beet and sugar cane pulp, as well as the residues of abattoirs, has been underexploited. Iran's extensive potential for a thriving fishing industry may prove to be yet another important source of supply for the production of animal feed.

Recent trends

The traditional nomadic livestock breeding and rearing of farm animals by small farmers was almost the only form of animal husbandry practised in Iran until the 1960s. The abrupt increase in demand for meat and dairy products during the late 1960s and the early 1970s stimulated the growth of the animal husbandry industry by attracting both smallholders and large private investors, with a number of modern commercial animal husbandry enterprises breeding imported

livestock being set up during the 1970s. The situation changed in the 1980s, however, when the further growth of a modern livestock breeding industry based on intensive methods and high yield was hampered by a neglect of existing large enterprises and regular government intervention. The food rationing system introduced by the government since the early 1980s, and the consequent strict pricing policies and control over basic products including fodder, meat and dairy products etc., have adversely affected this important sector of the economy. A partial deregulation in the late 1980s has also had only mixed results.

Table III.19. Livestock population, 1971-92, selected years
(Million animals)

Livestock population	1971	1988	1989	1992
Sheep	24.3	40.7	45.0	49.1
Goats	13.1	22.2	23.0	25.6
Cows	5.6	6.4	7.0	7.9
Buffaloes	0.2	0.3	0.4	0.4
Camels	0.1	..	0.1	0.1
Horses	..	..	0.2	0.2
Pigs	0.2	..	..	..
Donkeys	..	..	2.1	1.5
Chicken	12.8	..	28.0	39.5

Source: Statistics Department, Ministry of Agriculture.

Table III.20. Livestock products, 1981-1992, selected years
(Thousand tonnes)

	1981	1985	1988	1989	1990	1991	1992
Red meat	420	520	515	560	540	575	625
White meat	245	333	330	330	356	435	520
Eggs	230	230	260	280	295	342	390
Milk	3,000	3,500	3,400	3,827	2,400	3,750	4,145

Source: Statistics Department, Ministry of Agriculture.

The output of meat products increased rapidly during the 1970s following the unprecedented improvement in the standard of living and the relatively high rate of population growth. Publicly-owned abattoirs expanded rapidly and to a large extent replaced the unhygienic fresh meat supplied by unauthorized dealers. Figures presented in Table III.21 grossly underestimate the actual production of fresh meat as they do not include the widespread animal slaughtering by individual operators, particularly in the rural areas. This phenomenon also explains the sharp differences in performance of slaughterhouses during the 1980s. While the low output in certain years can largely be explained by the practice of price control, resulting in the development of a black market for fresh meat, the increase in production in other years is attributed to the impact of a more market-oriented pricing policy adopted by the government in the early 1990s.

Table III.21. Dairy and meat production, 1974-93, selected years
(Thousand tonnes, large industrial units only)

	1974	1977	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993[a/]
Dairy products														
Pasteurized milk	..	..	173.5	260.1	269.8	273.6	285.0	266.5	226.9	282.8	397.0	394.4	380.6	380.8
Pasteurized yoghurt	..	..	51.8	69.0	81.0	78.1	63.1	55.0	48.5	48.4	54.0	41.9	30.7	14.5
Ice cream	..	..	9.4	8.2	8.5	7.5	6.3	10.7	10.5	6.0	6.2	1.7	2.6	2.0
Butter milk	..	..	0.9	10.6	9.2	10.9	13.2	-	-	-	4.8	12.5	10.5	-
Meat products														
Sausages	3.6	9.8	22.4	25.8	25.9	26.3	16.5	27.4	27.7	28.6	25.4	38.2	30.3	-
Hamburger meat	..	..	3.1	3.3	4.4	4.4	2.0	..	..	..	..	..	..	..

Sources: Statistical Centre of Iran, *Statistical Yearbook of Iran, 1990;* Ministry of Industry.

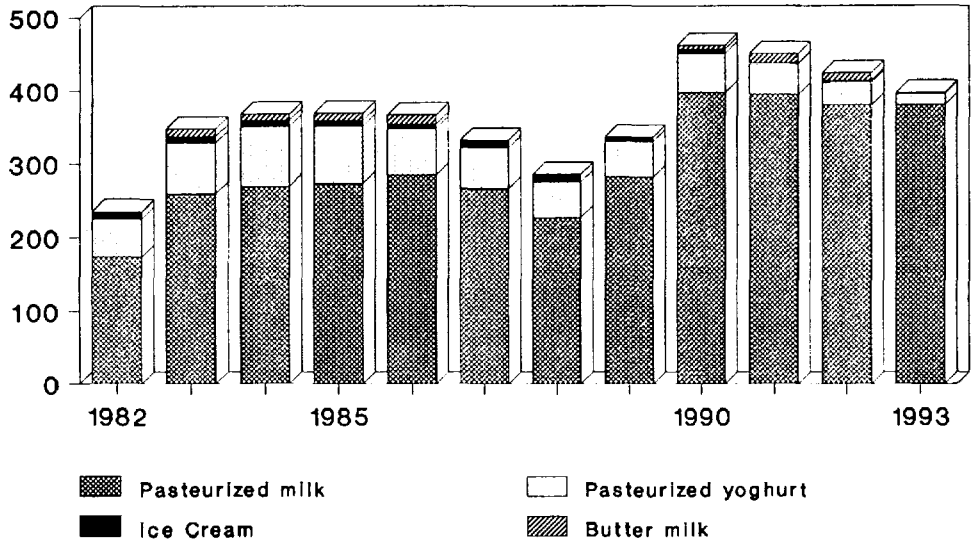
a/ Based on interviews in Keshavarz Magazine, 1994.

The output of processed meat products has grown particularly rapidly in recent years, initially in response to a growing demand resulting from western cultural influence, and subsequently in response to the high rates of urbanization in the last two decades. By 1994 there were 56 companies with a combined capacity of 160,000 tonnes involved in the production of sausages and cooked meat products, 25 firms with capacity of 350,000 tonnes in the production of canned meat and fish, and 76 with capacity of 60,000 tonnes in the production of hamburgers. Another 35 projects are under way, of which 29 with a capacity of 62,900 tonnes are for sausages and 6 with capacity of 6,100 tonnes for canned fish.

The other major downstream sector associated with animal husbandry is the dairy industry. The first modern pasteurization plant was established in Tehran in 1957 by the government in cooperation with FAO and the United Nations Children's Fund (UNICEF). In the following years several similar publicly-owned factories were established in Tehran and other major Iranian cities, but it was not until the 1970s that private investors ventured into this business. The sector's range of goods now includes pasteurized milk, cheese, butter, yoghurt, ice cream and butter milk.

In 1993 the industry comprised 21 firms with an annual capacity of 900,000 tonnes producing pasteurized milk, three with a capacity of 14,000 tonnes involved in the production of cheese, 25 with an annual capacity of 34,700 tonnes in the production of ice cream, and 3 with a capacity of 6,000 tonnes in the production of milk powder.

Fig. III.D. Output of selected dairy products, 1982-93
(Thousand tonnes, large industrial units only)



Sources: Statistical Centre of Iran, *Statistical Yearbook of Iran, 1990;* Ministry of Industry.

The industry is in the process of considerable expansion. More than 60 new plants were reported to be under construction in 1994, including 6 for the production of pasteurized milk with a combined annual capacity of 92,000 tonnes, 53 for the production of cheese with a total capacity of 10,500 tonnes per annum, and 2 with a joint capacity of 2,500 tonnes per year of ice cream. In

a particularly significant development, the Swiss company Nestlé signed a joint-venture agreement with a private Iranian business group in mid-1994 to set up the country's first infant milk powder processing facility.

Constraints and prospects

Iran is heavily dependant on imports of fodder and other raw materials to produce animal feed, although the situation could be greatly improved through a more efficient use of available resources. These include the residues of the sugar, flour and rice mills, as well as abattoirs and fish canneries. Despite a significant increase in Iran's production capacity for animal feed during the past two decades, the industry's capacity utilization rate has remained low. This is again due to extensive government involvement, which has at times seriously depressed the market price for animal feed. Iran does, however, enjoy good prospects for increasing the output of a number of fodder crops, including barley and maize.

APICULTURE

The resource base

With extensive orchards of fruit, vast flower resources and favourable climatic conditions in different parts of the country throughout the year, Iran is ideally suited for apiculture. This is widely practised in many parts of the country, in association with other agricultural activities.

Recent trends

Bee keeping has an ancient historical background in Iran, but its contemporary revival dates back about half a century when the first imported wooden hives were introduced. The traditional basket hives were replaced by new types on a large scale only during the last two decades, however, when suitable foreign varieties of queen bee were also imported and the infrastructure for local breeding was gradually laid out.

Table III.22. Number of bee hives, 1978-92, selected years
(Thousand units)

Year	1978	1983	1984	1985	1992
Wooden hives	..	917	959	1,050	1,600
Traditional hives	..	381	371	326	230
Total	**500**	**1,298**	**1,330**	**1,376**	**1,830**

Source: *Foreign Trade Statistical Yearbook*, various issues.

Constraints and prospects

The scope for developing apicultural activities remains limited due to the comparatively high cost of production. While the need to move to different parts of the country during various seasons

is a significant inconvenience, it does not appear to stimulate the high yields witnessed in many other apicultural areas of the world. In addition, bee keepers are presently also adjusting to new price structures following the removal of a number of government subsidies in the early 1990s.

While local packaging and marketing methods remain elementary and in need of comprehensive improvement, venturing into foreign markets will be necessary to sustain the industry. Iran also lacks an institutional and technical support base, which is essential for advancing related skills and the application of new techniques. Such support is particularly urgent to combat bee diseases, which nearly devastated the industry in 1985.

FISHING

The resource base

With a 630 kilometre coastline in the north stretching along the Caspian Sea, and 1,880 kilometres in the south along the Persian Gulf and the Sea of Oman, Iran is blessed with extensive marine resources. By contrast, the country's fresh water fish resources are limited. This lack of a natural resource base for inland fisheries is offset, however, by a well-developed fish farming industry based on a growing number of hatcheries, typically situated along river banks or canals originating from the country's various dams.

Recent trends

Iran's fishing industry has two distinct components, reflecting the different fishing activities practised in the north and south of the country, with almost 1,500 kilometres between them and very little relation between the two. The Caspian Sea, the world's largest enclosed sea, contains marine life completely different from that in the Persian Gulf and the Sea of Oman, which are connected to the Indian Ocean. Accordingly, the Iran Fishing Company (IFC) also has two executive arms, the North Fisheries Company and the South Fisheries Company. Known by its Persian name as Sherkate Shilat Iran, the IFC is a governmental body with exclusive fishing rights and policy-making authority for the country's fishing industry.

The wide differences between the northern and southern fishing regions notwithstanding, fishing activities in both regions have experienced rapid growth since 1979. The total output of the fishing industry almost quadrupled during the 1980s, rising from 85,000 tonnes in 1981 to 330,000 tonnes in 1990. Despite this growth, however, Iran remains a net importer of fish products, mainly fish meal for its animal husbandry industry.

Although fish has long been a highly popular diet among the coastal populations of northern and southern Iran, it was rarely consumed by most Iranians living in the inland regions of the country. The situation began to change about two decades ago, however, when demand grew in line with high population growth and rapid urbanization that familiarized a great number of people with the food. The domestic fish market nevertheless remains highly embryonic, and the bulk of the fish caught in Iran are sold fresh or frozen.

Sea fishing in Iran is carried out by three principal groups: the IFC, cooperatives and individuals, with the latter two supplying the majority of the total output. The IFC employs large vessels equipped for the high seas, while the other two groups are confined largely to coastal waters and rely on traditional methods. Large-scale commercial fishing by Iranians is prohibited, but recently some foreign vessels have been licensed to operate in the southern waters.

Table III.23. Fish catches, 1986-92
(Thousand tonnes)

Year	1986	1987	1988	1989	1990	1991	1992
Fish catches from:							
The Caspian Sea	11.1	14.2	16.3	21.6	24.8	35.0	41.0
The Persian Gulf and the Sea of Oman	121.0	165.5	223.5	241.9	260.2	277.0	271.0
Hinterland rivers and hatcheries	12.0	15.0	33.2	39.9	45.1	45.0	42.0
Total	**144.1**	**194.7**	**273.0**	**303.4**	**330.1**	**357.0**	**354.0**

Source: Iran Fishing Company.

Table III.24. Exports and imports of fish and fish products, 1975-92, selected years
(Thousand tonnes)

Year	1975	1980	1985	1986	1987	1988	1989	1990	1991	1992
Exports										
Fish	4.1	1.4	0.5	0.3	0.8	3.3	3.2	6.0	1.9	3.6
Fish products	0.2	0.2	0.3	0.3	1.2	0.4	0.4	0.3	0.3	2.9
Total	**4.3**	**1.6**	**0.8**	**0.6**	**2.0**	**3.7**	**3.6**	**6.3**	**2.1**	**6.5**
Imports										
Fish	0.6	2.6	-	0.1	0.2	-	-	-	-	-
Fish powder	22.2	68.2	105.0	52.5	62.1	41.7	44.0	54.0	42.5	72.7
Fish products	0.4	0.7	-	-	-	-	-	-	-	-
Total	**23.2**	**71.5**	**105.1**	**52.6**	**62.2**	**41.7**	**44.2**	**54.0**	**42.5**	**72.7**

Source: *Foreign Trade Statistical Yearbook*, various issues.

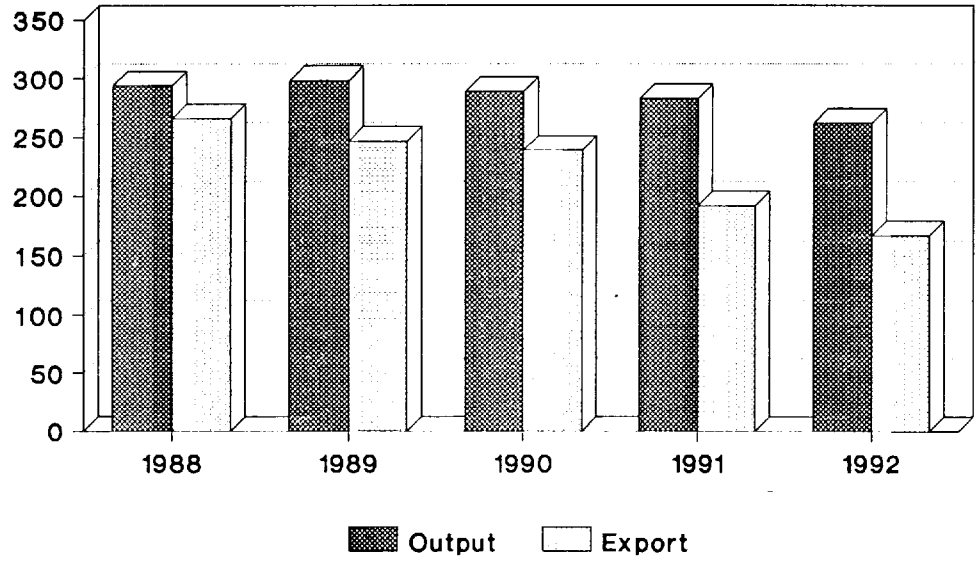
Table III.25. Output and export of caviar, 1975-92, selected years
(Tonnes)

Year	1975	1979	1985	1987	1988	1989	1990	1991	1992
Output	195	196	266	294	294	298	289	283	262
Export	166	184	153	223	266	247	239	192	167

Sources: Iran Fishing Company; *Foreign Trade Statistical Yearbook*, various issues.

The IFC has gradually transferred some of its exclusive fishing rights to small operators in the last decade but retains its monopoly of fishing sturgeon in the Caspian Sea. Sturgeon roes are processed into caviar by Shilate Shomal, almost exclusively for export.

Fig. III.E. Output and exports of caviar, 1988-92
(Tonnes)



Sources: Iran Fishing Company; *Foreign Trade Statistical Yearbook*, various issues.

Constraints and prospects

The marine resources of the Caspian Sea have diminished notably in recent years, reportedly due to pollution emanating from the newly independent countries of the former USSR surrounding the sea, and to over-fishing. Negotiations are under way to establish a common approach among all the Caspian states to protect the sea's marine life, and in particular its sturgeon. Against this background there is still significant potential for raising the industry's output. The extensive reserves of anchovy-type fish available in the Caspian Sea are virtually unexploited, with the annual anchovy catch averaging less than 5,000 tonnes per year during the last decade. This could well be raised to approximately 100,000 tonnes per year.

Similarly, excessive prawn fishing in the Persian Gulf has also caused an alarming decline of this valuable export resource. Otherwise, the prospect for increasing the output of marine resources in the south remains promising. Recent studies suggest an annual potential of approximately 500,000-600,000 tonnes, compared to the actual output of less than 250,000 tonnes currently being caught from the Persian Gulf and the Caspian Sea.

However, the development of Iran's fishing industry has been hindered by a number of seemingly insurmountable obstacles. The existing infrastructure, including ports, cold storage facilities, and processing plants, is grossly inadequate and needs substantial investment. This is particularly true of the south, which is even less developed than the north in terms of fisheries. One-sided policies

adopted by the IFC have disproportionately encouraged traditional fishing techniques and practically excluded large-scale commercial fishing by the private sector, thereby reducing the country's ability to develop a modern deep sea fishing industry.

BEVERAGES

The resource base

Iran's vast horticultural resources, and in particular its grapes and barley, have provided a strong base for the production of a variety of alcoholic and non-alcoholic drinks.

Recent trends

The production and distribution of alcoholic beverages was traditionally confined to the non-Muslim community because every activity related to alcohol (consumption, production and distribution) is religiously prohibited for Muslims, but the influence of western culture concomitant with rapid urbanization has resulted in a shift in social patterns since the middle of this century onwards. Several plants for the production of arak, wine and beer were set up in the years following the Second World War, and the industry expanded particularly rapidly during the 1970s in response to the growing demand for alcohol arising from the changing social habits of the younger generation and rising *per capita* incomes. The import of alcoholic products also rose substantially during the 1970s, to keep abreast with the rapid growth in demand.

The Islamic Revolution of 1979 put an end to the production of alcoholic beverages, and all of the country's distilleries and breweries were closed down within a short time. The prohibition notwithstanding, it is believed that alcoholic drinks continue to be made illegally in private homes for personal consumption and sale. The most popular such drink is believed to be arak, which is manufactured from raisins.

Iran's carbonated drinks industry is four decades old. The two international giants, Pepsi-Cola and Coca-Cola, established local bottling plants in Tehran and other major Iranian cities in the mid-1950s. By 1979, 24 plants were supplying non-alcoholic soft-drinks throughout the country. Four more were engaged in bottling mineral water. Subsequently, one plant in Khorramshahr was destroyed in the war with Iraq, and all other factories except a privately owned firm in Khorassan Province were expropriated. These factories are now either run by the state or by revolutionary foundations.

The events of the late 1970s and early 1980s resulted in a rupture of working relations between the local bottlers and their parent companies. The bottlers, through a centralized state-affiliated body, turned to a variety of sources for acquiring concentrates, and developed their own formulations. This inevitably resulted in a rapid deterioration in the quality of soft-drinks produced in Iran, not only due to the poor *ad hoc* formulations but also because of the visible lack of competition.

In the 1980s the industry was heavily subsidized through the provision of basic raw materials (concentrates and sugar), but also subject to strict price regulations. Following the end of the 1980-88 Iran-Iraq war, subsidies were gradually removed and import policies were liberalized. This resulted in the restoration of ties between Iran's sole remaining privately-owned bottler, located in Khorassan, and Coca-Cola in 1992. After renovating its machinery and equipment, this plant began to market authentic Coca-Cola.

This development helped to curb the inflow of expensive soft drinks imported from the United Arab Emirates through the Qeshm and Kish free trade zones, and other southern routes. It also obliged other manufacturers to improve their quality and bottling, or else suffer a sharp decline in their market shares. The results have been encouraging. Though not yet up to international standards, the quality and taste of most Iranian soft drinks has improved noticeably.

While there was virtually no investment for upgrading machinery and expanding soft drink production capacity during the 1980s, one brewery was converted to produce non-alcoholic beer in 1981.

Table III.26. Soft drink production, 1982-93, selected years
(Million bottles, 290 millilitres per bottle)

	1982	1985	1989	1990	1991	1992	1993
Output	2,151.2	2,700.3	1,399.7	2,588.1	2,401.3	2,209.6	2,509.8

Source: Ministry of Industry.

In addition to its modern commercial beverage industries, Iran also has a traditional distillation and extraction industry based on its extensive horticulture. The production of rose water constitutes the most important activity in this category. Although this has traditionally been produced by households, a significant proportion of it is now also being produced by a number of small distilleries.

In 1994 it was estimated that 17 such plants with a combined production capacity of 13,000 tonnes were operational. Apart from rose water and chicory water, these plants also produced aniseed water, fennel water, spearmint water and fumitory water, which are mainly used for making home-made soft drinks and as medicine. Eleven further projects with a combined production capacity of about 16,000 tonnes have also been approved for this sector by the Ministry of Industry and are now under way. Small quantities of distilled products, particularly rose water, have been exported in recent years. One company, Iran Golab, exported rose water valued at $1.6 million in 1993.

Constraints and prospects

The demand prospects for the soft-drinks industry are very good. Iran is a dry and hot country with a young and growing population. In summer substantial volumes of assorted beverages are still imported through illegal and costly channels from the neighbouring United Arab Emirates. This is an indication of the opportunity available to the industry provided the quality of the drinks reaches acceptable standards.

On the supply side, the industry is plagued by obsolete machines, negligence and lack of new investments. A foreign joint venture project for bottling Coca-Cola at a former brewery is in progress in Tehran, although its completion has been delayed beyond its originally scheduled date of 1993 owing to problems associated with machinery imports. The construction of this plant and the renovation of the Khorassan bottling unit in 1992 unleashed a major controversy, however, as

some political factions openly condemned the moves as being beneficial to western culture and consumerism. The production of Pepsi-Cola has also begun from a plant at Mashhad in Khorassan Province.

The prospects for the traditional distillation and extraction industry are favourable, especially since such distilled products are not only consumed widely in the domestic market but also have an export potential. This could be further enhanced through improved bottling and more efficient export policies.

B. TEXTILES, GARMENTS, CARPETS AND FOOTWEAR

TEXTILES AND GARMENTS

The resource base

A substantial proportion of the Iranian textile industry produces fabrics made entirely or partially of cotton, using locally produced raw materials. As noted above in the section on agricultural processing industries, Iran was an important exporter of cotton during the 1970s, with both production and exports of carded cotton peaking in 1974 at record levels of 240,000 tonnes and 115,000 tonnes respectively. Output fell sharply in the 1980s, however, following an abrupt decline in the cultivation of cotton as a consequence of the distribution of large mechanized private cotton estates to smallholders which effectively removed a sizeable acreage of cotton cultivation. This was reinforced by a shift in relative prices in favour of wheat, which was regarded as a strategic product.

A severe shortage of cotton in the domestic market prompted the government to impose a ban on cotton exports in 1980 to ensure adequate supplies for the local textile industry. Despite this ban, which has remained in force, the gap between domestic supply and demand remained large, and by the early 1990s had resulted in a sharp surge in the domestic price of cotton yarn. This prompted the signing of a barter agreement with the neighbouring republic of Turkmenistan, which resulted in a dramatic but short-lived surge in imports in 1991.

Table III.27. Imports of cotton yarn, 1976-92, selected years
(Tonnes)

	1976	1977	1980	1985	1989	1990	1991	1992
Cotton yarn	1,154	3,085	945	3,456	1,037	3,332	13,108	5,581

Source: Foreign Trade Statistical Yearbook, various issues.

Although Iran remains entirely dependent on imports of cellulose-based fibres such as viscose, it does have a capacity for the production of other synthetic fibres. However, Iran's petrochemical industry is not sufficiently well-developed to sustain the downstream synthetic fibre industry. This

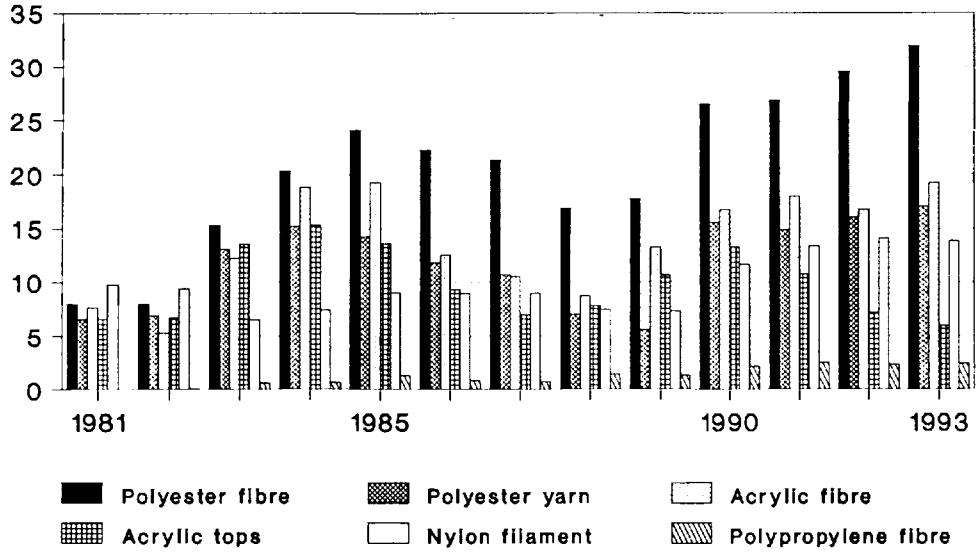
Table III.28. Domestic production of synthetic fibres, 1981-93
(Tonnes)

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Polyester fibre	7,990	7,993	15,277	20,299	24,145	22,303	21,335	16,903	17,802	26,469	26,826	29,523	31,925
Polyester yarn	6,602	6,915	13,105	15,242	14,242	11,813	10,717	7,000	5,619	15,580	14,852	16,031	17,047
Acrylic fibre	7,670	5,297	12,270	18,848	19,320	12,564	10,537	8,745	13,240	16,742	18,014	16,763	19,237
Acrylic tops	6,607	6,754	13,574	15,314	13,610	9,352	6,984	7,859	10,650	13,256	10,746	7,180	5,964
Nylon filament	9,742	9,393	6,529	7,466	9,053	8,968	8,968	7,519	7,355	11,654	13,388	14,120	13,870
Polypropylene fibre	-	111	606	692	1,315	876	745	1,452	1,333	2,189	2,500	2,370	2,417

Source: Ministry of Industry, *Textile, clothing, footwear, and leather industries - output statistics,* 1981-93.

has caused the fibre industry to remain dependent on imported petrochemicals, and has also restrained its growth, which in turn has resulted in the heavy dependence of the local textile industry on imported synthetic fibres. These problems have been exacerbated in recent years as a result of the growing foreign-exchange shortage, which has constrained the ability of both the fibre manufacturing plants and the textile companies to import the required raw materials.

Fig. III.F. Production of synthetic fibres, 1981-93
(Tonnes)



Source: Ministry of Industry, *Textile, clothing, footwear, and leather industries - output statistics*, 1981-93.

Table III.29. Imports of synthetic fibres and yarn, 1976-92, selected years
(Tonnes)

	1976	1977	1980	1985	1989	1990	1991	1992
Yarn								
Synthetic/blended	20,564	21,837	24,334	30,707	1,924	12,646	26,577	18,107
Fibres								
Total	**71,178**	**76,842**	**85,525**	**80,235**	**36,320**	**78,018**	**136,465**	**59,471**
Viscose rayon	27,735	39,237	38,794	3,226	3,898	9,128	18,585	2,420
Polyester	6,659	6,589	11,461	2,852	2,629	9,855	28,788	4,458
Acrylic	27,950	18,493	30,777	68,905	27,550	48,618	74,402	35,474
Nylon	689	833	524	225	-	34	76	220
Polypropylene	-	-	-	4,046	1,899	9,481	11,176	13,329
Others	8,145	11,690	3,969	981	344	902	3,438	3,570

Source: Foreign Trade Statistical Yearbook, various issues.

The situation is expected to change in the near future, however, when a number of recent investments in the petrochemical sector bear fruit. This will substantially reduce the import dependence of the synthetic fibre and textile industries, and allow both industries to operate at much higher capacity levels than has been possible in the recent past.

The domestic output of wool is substantial as a result of Iran's large sheep population, which according to the latest available estimates by the Ministry of Agriculture had reached more than 49 million by 1992. Domestically produced wool is consumed almost entirely by the huge hand-made carpet industry, however. Consequently, Iran still imports wool for the relatively small industry producing fabrics from worsted wool.

Table III.30. Imports of wool and woollen yarn, 1976-92, selected years
(Thousand tonnes)

	1976	1977	1980	1985	1989	1990	1991	1992
Wool	22.9	16.4	10.5	4.7	10.0	10.2	9.9	6.3
Woollen yarn	3.0	4.7	3.6	0.8	-	0.3	0.6	0.5

Source: Foreign Trade Statistical Yearbook, various issues.

With a substantial goat population, which is estimated to have reached 26 million by 1992, Iran is one of the world's leading producers of cashmere. Lacking a downstream processing capacity, however, the country exports its entire output of cashmere wool in unprocessed form.

Jute is also produced domestically. Until the early 1970s, when the production of jute averaged about 4,000 tonnes per year, Iran was self-sufficient in the product. In the meantime, however, the country's average annual production has fallen to between 500 tonnes and 1,500 tonnes, while demand has continued to rise. As a result, the country now imports significant quantities of jute.

Table III.31. Jute imports, 1976-92, selected years
(Thousand tonnes)

	1976	1977	1980	1985	1989	1990	1991	1992
Jute	12.6	7.4	-	13.1	13.2	8.3	15.9	7.9
Jute yarn	2.1	3.7	1.6	2.9	12.1	3.9	15.1	18.6
Jute fabric	23.5	25.4	12.4	51.4	29.4	46.5	23.0	44.9
Total	**38.2**	**36.5**	**14.0**	**67.4**	**54.7**	**58.7**	**54.0**	**71.4**

Source: Foreign Trade Statistical Yearbook, various issues.

Situated on the historic "Silk Road", Iran was not only a major re-exporter but also an important producer of silk in ancient times. Although production has gradually declined during the past two centuries, sericulture is still practised in a number of rural areas, especially in northern parts of Gilan province and in the provinces of Mazandaran, Khorassan and Azerbaijan. The average annual production of raw silk yarn is estimated at 700 tonnes, the bulk of which is utilized by the hand-made carpet industry.

Recent trends

Iran's modern textile industry came into being at about the same time as the revival of cotton production in the opening years of the present century, when imported American varieties began to be cultivated together with the various indigenous varieties. The industry took off with the establishment of a small cotton textile plant in Tehran in 1902, which was followed by another unit in Tabriz in 1909.

No new plants came on stream until 1920, but the following two decades witnessed the foundation of Iran's modern textile manufacturing industry. By 1940 it had expanded to 40 firms, of which 30 were based on cotton and supplied half the domestic market. Of the remaining ten, seven produced woollen textiles, the first of which was the Vatan factory established in Esfahan in 1930. Two others produced jute fabrics and the last one produced silk.

Over the following decade or so the expansion of the industry was interrupted by the unavailability of appropriate machinery because of the Second World War. The post-war period coincided with Iran's First Economic Development Plan (1949-55), however, which placed high priority on the development of textile manufacturing by encouraging both private and public sector investment in the industry. By the end of the plan period the number of textile firms had risen to 51, of which 41 were cotton-based. The total number of spindles amounted to 370,000 and the number of weaving and knitting machines to about 5,000, with the cotton-based plants accounting for about 90 per cent of the former and 85 per cent of the latter.

The industry grew rapidly during the second half of the 1950s in response to government investment incentives and a protected domestic market. By 1962, the total number of spindles had nearly doubled, while the number of textile machines had more than tripled, partly due to a surge of investment in the knitting industry. Due to its domestic orientation and the limited growth potential of the domestic market, however, this rapid expansion of the industry resulted in a seriously low rate of capacity utilization during the early 1960s, which prompted the government to prohibit investment in new capacity during the Third Economic Development Plan (1962-66). This ban was lifted in the late 1960s, when the industry's expansion resumed in response to the increased demand generated by population growth and rising *per capita* incomes. By 1972, the total number of spindles had reached 900,000, while the number of weaving and knitting machines was estimated at around 17,000.

The growing internal competition and declining capacity for import substitution in the early 1960s also caused the industry to divert its attention towards the neighbouring markets. Exports, mainly of cotton fabrics, increased gradually from the mid-1960s and peaked in 1972-73, when they accounted for almost 6 per cent of Iran's total output of cotton textiles. Exports dropped again to negligible levels in the following years, however, due to the impact of the oil boom, which caused a sudden upsurge in domestic demand and prompted the industry to turn its attention to the domestic market again.

Table III.32. Textile production, 1981-93
(Million square metres or tonnes, as stated)

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Production													
Cotton/synthetic fabrics (woven) (million square metres)	464	480	544	546	557	562	512	499	471	494	568	569	773
Wool/synthetic fabrics (million (square metres)	24.1	27.7	30.1	32.5	32.7	27.3	21.1	15.4	16.0	18.4	21.0	21.1	21.1
Knitted fabrics (tonnes)	23,128	27,095	30,445	32,498	31,157	24,943	17,537	10,712	14,342	21,000	24,550	24,792	25,782
Towels (tonnes)	401	363	257	1,127	1,281	1,516	1,641	1,426	1,414	1,208	1,390	1,398	1,453
Corduroy (million square metres)	7.4	3.6	7.8	8.7	7.9	7.6	6.1	6.1	8.3	9.1	10.4	10.5	10.9
Tarpaulin (million square metres)	2.9	8.1	5.1	4.8	7.5	7.6	6.9	5.4	5.4	6.2	7.0	7.1	7.3
Moquette (million square metres)	15.2	17.3	27.4	30.3	32.5	17.3	11.6	9.9	20.0	23.0	25.3	24.8	14.9
Machine-made carpets (million square metres)	5.9	6.6	8.5	9.4	10.8	7.5	5.6	4.6	4.9	7.6	8.8	8.9	27.2
Jute fabrics (tonnes)	7,424	8,463	8,435	8,821	8,905	7,868	7,660	6,906	6,838	6,595	7,580	7,594	7,369
Polypropylene fabrics (tonnes)	6,380	6,943	8,180	8,640	7,470	7,130	7,180	9,500	10,330	10,831	11,430	14,860	19,628
Acrylic fabrics (million square metres)	1.1	1.7	1.8	1.7	6.6	11.3	4.5	4.7	4.1	4.2	4.3	3.5	3.7
Blankets (tonnes)	19,769	22,549	27,115	28,169	28,531	21,981	12,540	12,493	19,355	22,258	25,484	25,619	27,054

Source: Ministry of Industry, *Textile, clothing, footwear, and leather industries - output statistics*, 1981-93.

Table III.33. Yarn production, 1981-93
(Thousand tonnes)

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Cotton/synthetic	102.5	103.7	111.5	114.4	112.4	112.0	116.7	102.5	109.5	110.0	112.0	112.8	113.3
Wool	2.3	2.6	2.9	3.2	3.3	2.7	2.4	2.6	2.6	3.4	3.9	3.9	4.2
Jute	7.8	9.9	13.5	12.5	11.6	12.2	12.4	9.9	10.2	9.6	11.0	11.0	11.7
Yarn for moquette, blankets and machine-made carpets	16.9	20.0	26.3	28.3	10.6	21.3	13.6	13.3	18.8	21.6	24.8	25.0	26.5
Yarn for hand-made carpets	16.5	15.6	16.9	17.7	16.8	10.9	7.0	5.9	13.4	15.0	17.0	17.2	18.2
High-bulk/non-bulk textured yarn	23.8	29.6	36.5	37.5	44.6	28.9	22.5	15.4	20.9	29.5	33.9	32.3	35.9

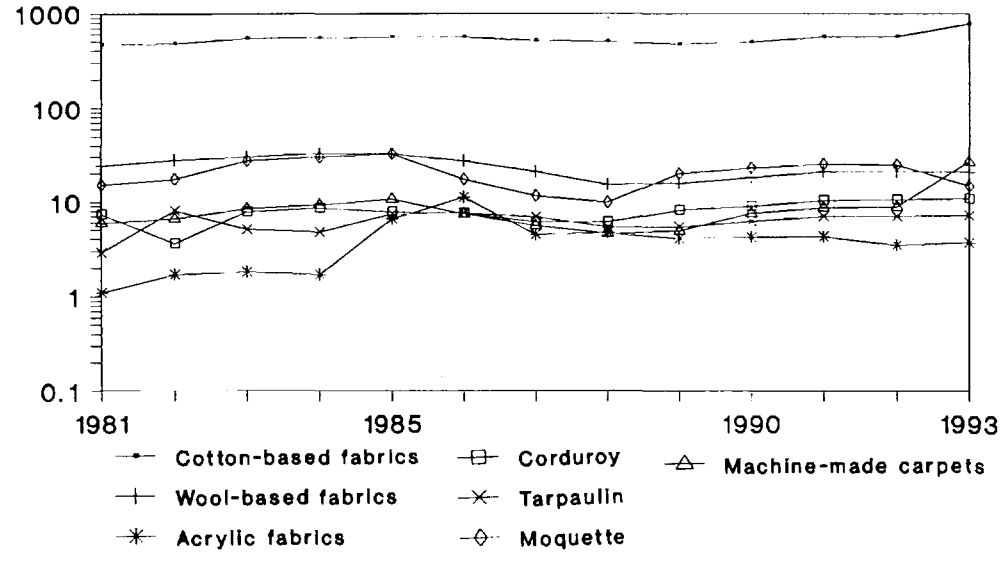
Source: Ministry of Industry, *Textile, clothing, footwear, and leather industries - output statistics,* 1981-93.

The overheating of the economy after 1973 had a severe impact on the competitiveness of the textile industry. As a labour-intensive industry, it was particularly affected by the rise in real wages experienced during this period, which resulted in a significant rise in production costs. The sharply rising domestic demand also greatly reduced the competitive pressures in the domestic market, which were only partially restored by a government decision to reduce tariffs in an attempt to restrain the rise in domestic prices. By the late 1970s, therefore, the textile industry was much less competitive than it had been in the opening years of the decade.

Despite these unfavourable developments, the Iranian textile industry continued to grow throughout the 1970s in response to unprecedented levels of domestic demand and the high degree of protection that it continued to enjoy. By 1980, the number of spindles had reached 1.4 million, while that of weaving and knitting machines had grown to 35,000. This capacity expansion was particularly noteworthy inasmuch as it took place at a time when human resource constraints were especially tight, and the availability of suitably experienced and qualified personnel was extremely limited.

Although it was largely privately-owned until 1979, the industry suffered from a variety of shortcomings, including weak management and comparatively limited expertise and technical know-how. The severe shortage of professionals in the technical and administrative sectors, which had characterized the industry since its inception, proved to be a particularly serious problem, and prevented the industry from achieving a sustainable growth momentum. Its effect was reinforced by the absence of appropriate training centres.

Fig. III.G. Production of major textiles, 1981-93
(Million square metres)



Source: Ministry of Industry, *Textile, clothing, footwear, and leather industries - output statistics,* 1981-93.

After 1979 the larger units came under state ownership, and during 1980-88 the industry operated within a state-controlled price regime. Its principal raw materials, both imported and locally produced, were provided at highly subsidized prices. The availability of these subsidized inputs and continuing high levels of domestic demand enabled the industry to maintain its output at a more or less stable level throughout the war years.

Price controls were relaxed after 1988, and the various subsidies received by the industry, including the provision of subsidized foreign exchange for its import requirements, were gradually reduced. This reduction of subsidies resulted in a marked increase in the price of textile products and a significant drop in output levels. The situation was exacerbated until 1990 by the inflow of textile imports from eastern Asia, which entered the country mainly through the newly created Kish Free Trade Zone and seriously challenged the domestic industry even though the prevailing trade and foreign exchange regulations rendered them considerably more expensive than locally produced textiles. The post-1990 production data indicate a recovery in output, however, which may be attributed to the gradual rise in *per capita* income and the increased protection granted to local producers in the domestic market.

Table III.34. Textile imports, 1976-92, selected years
(Thousand tonnes)

	1976	1977	1980	1985	1989	1990	1991	1992
Cotton/synthetic fabrics	13.2	31.6	3.7	6.5	2.8	2.0	3.4	3.9
Wool/synthetic fabrics	5.2	1.6	1.4	-	-	-	-	-
Synthetic fabrics	27.9	19.3	7.6	14.8	11.9	12.6	4.3	3.3

Source: Foreign Trade Statistical Yearbook, various issues.

At present, the Iranian textile industry comprises a number of spinning, weaving, knitting, dyeing, printing and finishing plants producing a variety of woven and knitted fabrics with yarn spun from assorted natural and synthetic fibres. According to the latest available data, the total number of operating spindles amounted to about 1.5 million in 1993 while the number of weaving and knitting machines amounted to approximately 40,000. Other related activities include the production of miscellaneous textiles such as corduroy, hydrophile cotton, ribbon, braid and felt, and related items such as zips.

The spinning industry, producing clothing and knitting yarn from natural and synthetic fibres, consisted of the following sectors in 1993:

- cotton/synthetic yarn: 76 companies with a total production capacity of 140,000 tonnes, the majority of which are integrated into larger weaving and knitting factories;
- high-bulk yarn: 23 companies with a capacity of 19,000 tonnes;
- non-bulk yarn: 5 companies with a capacity of 8,000 tonnes;
- wool/synthetic yarn: 17 companies with a capacity of 4,000 tonnes;
- yarn for machine-made carpets: 10 companies, with a capacity of 8,000 tonnes;

- moquette yarn: 9 companies with a capacity of 4,000 tonnes;
- blanket yarn: 80 companies with a capacity of 28,000 tonnes;
- jute yarn: 4 companies with a capacity of 15,000 tonnes;
- stretch yarn: 10 companies with a capacity of 5,000 tonnes;
- textured yarn: 10 companies with a capacity of 23,000 tonnes.

The weaving industry, meanwhile, consisted of about 170 firms of various sizes producing cotton-based textiles (including blends of cotton and synthetics) with about 25,000 weaving machines, 10 per cent of which were shuttleless, and an annual production capacity of approximately 700 million square metres. These firms were complemented by a large, but unknown, number of small workshops with some 5,000-7,000 weaving machines and an estimated capacity of about 80-100 million square metres. In addition, there were 25 factories producing wool-based fabrics (including wool/synthetic blends) with a total of 1,200 weaving machines, of which about 500 were shuttleless, and a combined annual production capacity of about 35 million square metres.

The knitting industry, having grown rapidly during the 1960s and early 1970s, produces a wide range of warp, circular and flat knitted fabrics. In 1993 it was estimated to comprise 5,000 enterprises with a total capacity of 200-300 million square metres, the majority of which were small workshops equipped with handlooms and producing flat knitted fabrics. The total number of knitting machines was thus estimated at 15,000, of which 4,000 were designed for warp and circular knitting, and the remainder, which including 1,300 power looms, for flat knitting.

In addition, the textile industry covered the following activities:

- moquette production: 50 companies with a capacity of 35 million square metres;
- machine-made carpets: 18 firms with a capacity of 11 million square metres;
- blankets: 100 companies with a capacity of 35,000 tonnes;
- tarpaulins: 35 companies with a capacity of 13 million square metres;
- towels: 9 companies with a capacity of 3,000 tonnes;
- polypropylene fabrics: 14 companies with a capacity of about 11 million square metres;
- jute fabrics: 12 companies with a capacity of 15 million square metres;
- acrylic fabrics: 28 companies with a capacity of 13 million square metres.

Iran's clothing industry consisted essentially of a large number of private tailoring shops until the early 1960s. The mass production of apparel began during the 1960s when growing demand, especially for tricot garments, stimulated the gradual emergence of a number of small workshops. The ready-made apparel industry did not make significant progress until 1975, however, when two clothing companies, Jamco and Iran Barak, were established as joint ventures with Italian firms to manufacture suits. The further growth of such firms was inhibited after 1979 by the prevalence of different dress codes, which in turn gave rise to the growth of a large but unquantifiable number of small and medium firms supplying such products as scarves and veils for women.

With the exception of a significant improvement in the quality and design of a few products, including children's wear, the progress of the ready-made garments industry has been patchy during the 1980s. One small company, Jamegan, has succeeded in penetrating the European, and especially the German market, to which it supplies shirts. Jamegan's success represents the exception rather than the rule, however, and may be attributed in large part to the efforts and entrepreneurship of a handful of businessmen.

At the same time, however, the textile and garment industry has gained a highly significant place in the Iranian economy in terms of its impact on employment. With a workforce of 100,000, the industry is the biggest employer in the manufacturing sector. It has consequently acquired a high degree of social importance, which has rendered its rationalization and its much needed exposure to international competition a highly sensitive issue.

Constraints and prospects

Despite the apparent increase in output during the early 1990s, the industry continues to suffer from a number of weaknesses. The most important of these stems from an inadequate level of investment since the late 1970s. This has been due in part to the official view prevailing for much of the period that the country had an adequate installed production capacity, as a result of which the authorities were reluctant to issue new licences. In addition, the expropriation and nationalization of many of the major private enterprises in the industry has resulted in a reluctance among private investors to venture into any major undertakings. Though several small units have been set up since 1980, the total investment has been barely sufficient to maintain overall production capacity, which was only slightly larger in 1993 than in 1980.

The industry was also weakened by the fact that it had to operate in a highly regulated market environment during the 1980s. This caused it to become unconcerned about the need for continuous quality improvements, and reinforced the trend towards inadequate investment. Having no motivation to improve product quality, the industry saw no reason to modernize or upgrade its plant and equipment, as a result of which it is now burdened with a high proportion of obsolete and inefficient machinery. Dependent on imports for most of its requirements of such machinery, the industry will face severe difficulties in acquiring new equipment even if investment interest revives because of the foreign exchange shortages currently confronting Iran.

In an attempt to overcome this problem, several small workshops producing spares and components for the industry have been established in recent years. These include a small facility for the assembly of spinning machines from parts imported from a German company, and another to assemble weaving machines with parts from the Swiss company Rueti. The success of this approach is also likely to be limited in the short-term, however, because these plants are also highly import-dependent and thus vulnerable to foreign exchange shortages.

The short-term prospects for the textile industry are consequently limited. Having failed to acquire a competitive edge after nearly a century, its comparative advantage stemming from its access to cheap locally produced cotton is also being eroded by the rapid decline in domestic cotton production. Although the industry continues to benefit from a large pool of cheap labour, much of the labour force is poorly trained, and hence does little to enhance the competitiveness of the industry in an era of increasing technological sophistication.

With its ability to penetrate export markets likely to be restrained in the foreseeable future by its lack of international competitiveness, the performance of the Iranian textile industry in the short to medium term will depend almost entirely on developments in the domestic market. Since the scope for further import substitution is also negligible under the prevailing regime of high import barriers, in which the industry already supplies the bulk of domestic demand, the further growth of the industry will only be possible under conditions of growing domestic demand. With population growth expected to slow down and the growth of *per capita* incomes expected to remain modest, this demand growth is almost certain to be limited in the coming years.

HAND-MADE CARPETS

The resource base

Iranian hand-woven carpets, better known as Persian carpets, are internationally renowned. Their unique designs, reflecting Iran's ancient cultural and artistic traditions, have been systematically perfected over centuries, and continue to set challenges for designers and weavers. In essence, the industry produces three types of carpets, woven from wool, silk, or a blend of wool and silk. All of these also use some degree of cotton for the base, onto which the pile is knotted. About 90 per cent of the hand-made carpets are woollen.

Wool, cotton and silk are thus the three principal raw materials utilized by Iran's large traditional hand-made carpet industry. Although all of these are produced locally in significant quantities, domestic production has generally been insufficient to meet the demands of the carpet industry. Consequently, substantial volumes of these inputs need to be imported.

As Iran's production of woollen fabrics is very limited, the bulk of its wool is utilized by the country's hand-made carpet industry. Iran's wool-spinning industry consists of 102 commercial mills with a total annual production capacity of about 24,000 tonnes, as well as a large but unknown number of family-based spinning enterprises operating both manual and power-operated spinning wheels, which are estimated to have a total production capacity broadly similar to that of the commercial mills. The total output of the commercial mills in 1981-93 is presented in Table III.35 below.

Table III.35. Production of woollen carpet yarn, 1981-93[a/]
(Thousand tonnes)

1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
16.6	15.6	16.9	17.7	16.8	10.9	7.1	5.9	13.4	15.0	17.0	17.2	18.2

Source: Ministry of Industry, *Textile, clothing, footwear, and leather industries - output statistics*, 1981-93.

a/ Commercial mills only.

The output fluctuations recorded during these years reflect the inconsistency in foreign exchange allocations to the milling sector for the import of wool. The comparatively high production levels of the early 1980s are attributable to adequate foreign exchange availability, but this was followed by a visible drop in output during 1986-88 due to heavy cuts in foreign exchange allocations. The improvement during 1989-93 was the outcome of the liberalized foreign exchange policies. In contrast, the traditional spinning industry has reportedly undergone fewer output fluctuations during this period, since it is largely dependent on domestic wool, the production of which remained more or less stable.

The quality of Iranian wool, though graded as average according to international standards, is highly suitable for the production of hand-woven carpets in terms of the thinness and length of its

fibre. The natural texture of this wool renders carpets produced from it pliable and highly resistant to wear and tear. These carpets are thus eminently suitable as floor coverings.

The production of the finer qualities of hand-made carpets, which have a higher number of knots per square centimetre and are less subject to wear and tear because they tend to be used mainly for decoration, requires wool with thinner fibres. The bulk of this wool needs to be imported, and as the output of fine carpets has surged in recent years, so have imports of yarn made from such fibres. This has resulted in the country having to meet a substantial proportion of its wool requirement from imports.

As discussed above (see Textiles and garments, and Agro industries - annual and perennial cash crops), Iran has also traditionally been a significant cotton producer. It is increasingly turning into an importer, however, because of substantial drop in domestic output since the late 1970s. Only a relatively small proportion of the country's demand for cotton emanates from manufacturers of hand-made carpets, with the bulk of it being generated by other branches of the textile industry.

Sericulture is also an ancient occupation in Iran. The centre for this activity is in the northern parts of Gilan province, which account for about 70 per cent of Iran's total output. Smaller centres are located in other northern provinces, including Khorassan, Mazandaran, and Azerbaijan, and in Esfahan in central Iran.

Sericulture is practised by an estimated 70,000 families, who receive silkworm eggs from the state-owned Iran Sericulture Company (ISC) at the beginning of each season. Nearly 200,000 boxes containing about 11.7 grams of silkworm eggs each were distributed by the ISC in recent years. This corresponds to an estimated average output of 5,000 tonnes of wet silk cocoon, which is equivalent to 2,000 tonnes of dried silk cocoon or 700 tonnes of silk yarn, most of which is used by the hand-made carpet industry.

Although silkworm eggs of hybrid and polyhybrid varieties are produced domestically, the bulk of domestic demand is met from imports. The import and distribution of silkworm eggs is monopolized by the ISC, which was formed after 1979 through the merger of three different companies - the Pilevar Company engaged in the study and production of silkworm eggs, and the Silk Production Industrial Complex and Gilan Silk Company, both of which were engaged in the rearing of young silkworms and the establishment of large mulberry groves with technical assistance from Japanese firms. After 1979 most of the large estates intended to be planted with mulberry bushes were distributed among local farmers, who switched the land to other agricultural uses.

Table III.36. Distribution and import of silkworm eggs by the Iran Sericulture Company, 1980-93, selected years
(Thousand boxes of 11.7 grammes with 20,000 eggs)

	1980	1985	1986	1987	1988	1989	1990	1991	1992	1993
Distribution	111.5	95.0	115.0	108.9	123.0	169.1	200.7	186.5	207.9	190.0
Imports	90.5	90.1	100.0	75.0	80.0	95.0	100.3	110.0	105.0	90.0

Source: Iran Sericulture Company.

Silk spinning is practised primarily as a cottage industry, mainly in Khorassan Province. Manually-operated spinning wheels account for about 80 per cent of Iran's total silk yarn output, with the remainder being spun by the country's few commercial spinning mills. Locally produced silk yarn meets the bulk of domestic demand, although a small proportion is imported illegally as imports are prohibited.

Another important input of the hand-made carpet industry are dyes. It traditionally used a variety of natural dyes produced from vegetables and herbs including luteous, madder, indigo, turmeric, saffron, walnut and pomegranate skin, as well as a variety of other plants and herbs. These traditional natural dyes are gradually being replaced by chemical dyes, however, many of which need to be imported.

Recent trends

Despite the patchy performance of the Iranian economy over the past two decades or so, the hand-made carpet industry has recorded considerable growth. This has been due to persistently buoyant levels of both external and domestic demand, since Iranians are themselves great admirers of hand-made carpets, which serve the functions of a status symbol and a hedge against inflation as well as forming an integral part of the traditional dowry package still widely demanded in Iran.

Various types of hand looms are used for carpet weaving. Commonly known as "Dar-e-Ghali", the looms have traditionally been made of wood, although looms made of steel have become increasingly popular in recent years. It is estimated that about 1-1.2 million carpet looms are operational in Iran, with the number of weavers being estimated at 2-2.5 million.

Carpet weaving is practised in both rural and urban areas. The most important weaving centres include the Central province and the provinces of Azerbaijan, Khorassan, Esfahan, Kerman, Fars, Yazd and Chahar Mahal ve Bakhtiyar. A large number of families weave at home on a part-time or full-time basis. There are about 1,000 small and medium workshops producing hand-made carpets.

The quality of carpets varies widely depending on the number of knots per square centimetre, the harmony of colours, the choice of design, the quality of the weaving itself, and the quality of the raw materials used. This problem of variable quality imposes a significant difficulty on the collection of industrial data, which are in any case only indicative due to the dispersed nature of the industry. Even the rough estimates calculated on the basis of the volume of raw materials used by this industry, which indicate an average annual production of about 9 million square metres of rugs of various qualities, can be highly misleading since they only reveal physical output levels and not the value generated by this high value-added industry.

The output of the carpet industry is closely linked to the business cycle. Output falters when the economy is in recession, and picks up in a boom. Fluctuations in global economic growth also affect the industry significantly as hand-made carpets constitute Iran's most important non-oil export item. Foreign exchange policies and fluctuations in exchange rates affect the volume of exports and thus widely influence the industry as a whole. Since hand-made carpets are considered assets, they are even subject to the country's monetary and fiscal policies, with expansionary monetary policies resulting in low interest rates tending to boost demand while more restrictive financial policies have the opposite effect.

The hand-made carpet industry is the second largest earner of foreign currency in Iran after oil, with the export performance of the latter having an inverse impact on that of the former. When

oil revenues decline, leading to a depreciation of the rial, exports of carpets increase and vice versa. This effect is reinforced by the slack domestic market for carpets that results from the decline in *per capita* incomes associated with lower oil prices, which in turn depresses domestic carpet prices.

The export performance of the hand-made carpet industry has shown considerable fluctuations during the past two decades. The comparatively low export figures of the 1970s are attributed to the unprecedented rise in real *per capita* income, highly overvalued exchange rates due to an enormous increase in foreign exchange revenues, as well as a comparatively low production capacity and significantly increased domestic demand for carpets. The low recorded volume of exports during the first half of the 1980s was caused by the so-called Payman-e-Arzi policy demanding the redemption of export revenues by the government and their conversion at unfavourable rates. It is widely believed that substantial volumes of carpets, especially the finer and more expensive ones eligible for higher foreign exchange redemption rates, were shipped illegally during this period. The increase in exports since 1988 has been due to the cancellation of the redemption regulation, which diverted illegal exports back to official channels, and to the rapid depreciation of the rial and stagnant domestic demand.

Table III.37. Exports of hand-made carpets, 1970-92, selected years

	1970	1976	1980	1985	1989	1990	1991	1992
Volume (thousand tonnes)	6.8	6.0	5.7	4.2	8.6	10.8	20.1	19.8
Value ($ million)	-	-	428	142	357	457	1,086	1,439

Source: *Foreign Trade Statistical Yearbook*, various issues.

It is believed that about 5 million people are directly involved in the production of carpets and in associated activities, such as the production of wool, silk and cotton, and the provision of spinning, dyeing and other services. The industry's indirect impact on employment is even greater, especially if the impact on the economy of the substantial foreign exchange revenues generated by it are taken into account.

The commanding position of the hand-made carpet industry in the national economy in terms of employment and foreign exchange potential has prompted a high degree of official intervention. This began with the establishment of the Iran Carpet Institute in 1930, which was replaced by the state-owned Iran Carpet Company (ICC) in 1935. This firm was set up to promote the industry, ensure quality improvements, protect the originality of Persian carpets, enhance exports, and develop the quality of the workforce.

Despite its limited capabilities, the ICC has played an important role in sustaining and developing the carpet industry. It established a number of carpet-making workshops supervised by skilled and experienced weavers, thereby supporting the diffusion of skills. It also promoted the use of natural vegetable dyes, and is now almost the only producer using such natural dyes. In addition, it identified and collected some 2,000 original designs, which are a great source of inspiration for Iran's present-day designers, and participated in international exhibitions to promote exports. With

20,000 affiliated weavers, the ICC is one of the largest single carpet producers, but the industry as a whole is so large that the ICC accounts for only a negligible share of the total output.

An important recent development has been the establishment of carpet-weaving cooperatives by the Ministry of Jihad-e-Sazandegi (Construction Crusade). These cooperatives are located in rural areas and play a significant role in promoting carpet weaving in these areas through the provision of financial assistance for the procurement of raw materials and equipment. The programme has been relatively successful, and by 1992 the number of such cooperatives had risen to 95, with about 270,000 weavers and 127,000 looms. This has resulted in the Ministry becoming the largest single producer of hand-woven carpets in Iran. A number of other state-related organizations and foundations are also involved in the carpet-weaving industry, but on a much smaller scale.

Constraints and prospects

The prospects for the hand-made carpet industry are quite favourable. The continuing depreciation of the rial will have a significant impact on export growth, although the impact of rising exports on output growth is likely to be offset to some extent by stagnant domestic demand owing to the anticipated slow growth in real *per capita* income. The industry's export performance will also depend on the economic health of Iran's main export markets, especially in the countries of the Organisation for Economic Co-operation and Development (OECD), and would be greatly improved by the lifting of US sanctions against Persian carpets.

The frequently cited threat of competition in international markets from other major carpet producing countries should not be discounted, but appears exaggerated at the present time. Although Iranian designs and names are copied and used by a number of major carpet producers to promote their products in export markets, the difference in quality between original Persian carpets and others produced elsewhere is sufficiently large to ensure that the industry will be able to retain its competitive edge.

Even so, mechanisms to upgrade the industry need to be institutionalized and reinforced. The institutions providing formal training in fields related to the industry need to be strengthened, and the research and support activities of these institutions need to be increased. With improved organization, planning and the adoption of the latest marketing techniques, the industry could significantly increase and diversify its international market share.

FOOTWEAR

The resource base

Iran's resource base to support a footwear industry is modest at best. Although the country is a major producer of goatskins and sheepskins, and exports significant volumes of the latter, substantial quantities of hides need to be imported to meet the needs of the leather-based industries, including footwear. According to the best available estimates, the country's production of goatskins and sheepskins amounted to some 25 million square feet and 150 million square feet, respectively, in the early 1990s, while the production capacity for hides amounted to 25 million square feet.

The bulk of the sheepskin produced in Iran is exported in the form of pickled skin. Pickled goatskin was also exported in substantial quantities until 1985, when these exports were prohibited in order to protect the rapidly depleting goat population and encourage the domestic shoe industry

to use this alternative material by suppressing its price in the domestic market. This prohibition was subsequently lifted in the early 1990s, however, as domestic demand for goatskin did not rise as expected and Iran's foreign exchange problems intensified.

Iran's modern leather tanning industry dates back to 1933 when a small processing facility was set up in the province of Hamedan in western Iran. The industry grew at a very slow pace until the early 1970s, but its expansion has accelerated since then. It has two distinct components: the light leather industry processing sheepskin and goatskin, and the heavy leather industry for hides.

The light leather industry expanded sharply in the 1970s as a result of the establishment of six large processing plants: the Roudbar Leather Company, the Lorestan Leather Company, the Charmineh Company, the Moghan Leather Company, the Khazar Khaz Company, and the Khorassan Leather Company with a combined annual capacity of about 45 million square feet. Some of these projects were undertaken by the private sector and some by the state-affiliated banks, including the Bank of Industry and Mines and the Agricultural Bank of Iran, in compliance with government plans to promote the industry. All of these plants are now state owned, however. In all, the industry consists of about 170 firms with a total production capacity of about 130 million square feet, the bulk of which are privately owned, and came into existence during the 1980s in response to the government's policy of promoting higher value-added processing activities.

The heavy leather industry, on the other hand, comprises about 80 firms with a combined production capacity estimated at approximately 90 million square feet. The industry has its origin in the establishment of the Zouk Company in 1946, although the largest processing facility with an annual capacity of 10.6 million square feet, the Azar Company, was set up in 1956. Both companies are state owned.

Table III.38. Exports and imports of pickled skin and hides, 1970-92, selected years
(Tonnes)

	1970	1976	1980	1985	1990	1991	1992
Exports							
Pickled sheepskin	-	15,311	11,921	19,280	12,761	17,439	19,780
Pickled goatskin	12,615	4,812	1,908	638	-	-	-
Imports							
Hides	4,062	9,019	4,830	15,046	6,941	3,390	1,908
Leather for sole production	-	1,548	3,843	455	83	38	233

Source: *Foreign Trade Statistical Yearbook*, various issues.

Both the footwear and leather industries largely depend on imported machinery as the local capability to produce such equipment is limited. Some types of related equipment, embodying comparatively simple technologies, are produced locally in limited quantities. However, the quality and performance of this equipment usually does not match that of its imported counterparts.

In addition, most non-leather inputs required by the shoe industry are largely imported. These include rubber, canvas and similar fabrics, certain types of soles and insoles, imitation leather, and petrochemical products such as polyurethane (PU) and polyvinyl chloride (PVC). Of these

products, only PVC is likely to be produced in the quantities required by the footwear industry in the foreseeable future following the recent establishment of an appropriate manufacturing capacity (see Petrochemicals below).

Recent trends

Iran's footwear industry is very heterogeneous. At one end of the spectrum it comprises about 20,000 to 25,000 private workshops and individuals producing hand-made shoes, which account for a significant proportion of the domestic market for leather footwear. At the other end it comprises a few large corporations manufacturing assorted machine-made sports and leather shoes, military boots and rubber and plastic (PVC) footwear. Some of these firms have a high level of integration, and were nationalized after 1979.

Despite the fact that a range of machines for sewing, cutting and pressing were gradually introduced in the industry in the early 1950s, it was not until the late 1950s that the machine-made shoe industry actually took off. During this period the industry witnessed a major leap forward with the establishment of three firms, the Melli Shoe Company, Wien Company and Bella Company. These firms gradually expanded their production capacity and diversified their range of products during the 1960s and the 1970s in a largely protected market and in response to rising population and real *per capita* income. They have remained the largest footwear manufacturers in the country.

The Melli Shoe Company outstripped the others in the early 1970s after undertaking heavy investments and entering into joint ventures with various renowned European and Japanese shoe manufacturers and foreign financial institutions. It became Iran's largest manufacturer of shoes, and by the late 1970s had an annual production capacity in excess of 20 million pairs, including leather and sports shoes, rubber and plastic shoes and boots, special safety footwear and military boots. Over time it was also expanded to include a variety of facilities to produce related goods, such as leather, soles, adhesives, canvas, laces and socks, as well as automotive and industrial rubber belts.

After 1979, the Wien and Bella companies came under state ownership, along with a number of other shoe companies, most of which had sprung up in the protected market of the 1970s to cater for the growing demand arising from the oil boom.

The production capacity of the machine-made footwear industry, consisting of 15 firms with legal permits, is estimated at about 125 million pairs per annum. The majority of these companies are of small to medium size, and specialize in the manufacture of plastic footwear. The combined production capacity of machine-made leather shoes is around 20 million pairs per year, while those of sports, rubber and plastic shoes is estimated at 25, 10, and 70 million pairs, respectively.

Taking the large number of individuals and small workshops producing hand-made shoes into account, Iran's total annual production capacity of leather shoes is believed to have reached 40 million pairs by 1994. The capacity to produce other types of footwear, particularly plastic shoes and slippers, is probably also understated in the official data cited above due to the existence of an unknown number of enterprises operating without production licences and for which statistics are not available.

Apart from the above-mentioned producers of modern footwear, the industry also comprises a large number of small workshops making a traditional type of footwear known as the *giveh,* which

consists essentially of a leather sole and a canvas top. The average annual production of *givehs* is officially estimated at about 2-3 million pairs.

The footwear industry releases no reliable output data, and those presented in Table III.39 should be treated with caution since they cover only the output of firms operating with official production licences. They do not include hand-made leather shoes and machine-made footwear marketed by unlicensed producers.

The output figures for the post-war period are even less reliable, mainly because such statistics were inflated by producers in order to enable them to qualify for subsidized raw materials. This system was suspended in the post-war years, however, as subsidies were removed and manufacturers saw no reason to release output figures.

Published figures for 1988-93 indicate an average annual output growth of 9.2 per cent for the entire footwear manufacturing industry. The reliability of these data is questionable, however, as they are based largely on projections of state-collected data for licensed manufacturing units prior to 1988, which ceased to be collected in later years. The indicated increase does not appear to be compatible with such developments as the removal of subsidies for the industry and the weak growth of *per capita* incomes after 1988.

The leather industry is also operating below capacity. In the heavy leather industry this was due to the considerable production capacity installed by private investors, who during the 1980s found it profitable to operate even at low levels of capacity utilization because of the heavy government subsidies they received. Their principal raw material, hides, was provided by the government at substantially subsidized prices, and their machinery was also imported with the help of highly subsidized foreign exchange. The high rates of population growth prevailing at that time also led investors to anticipate an increase in demand for shoes, and hence for heavy leather, in the future.

Table III.39. Production of machine-made footwear, 1981-93, selected years[a/]
(Millions of pairs)

	1981	1983	1985	1986	1988	1990	1993
Leather shoes	7.8	7.9	8.8	8.1	6.6	11.0	13.5
Sport shoes	11.0	16.3	16.3	17.1	17.5	18.0	22.2
Plastic (PVC) shoes	3.3	4.3	3.7	2.3	1.9	1.9	4.5
Slippers	1.6	1.7	1.7	1.8	1.2	1.9	2.3
Army boots	1.9	2.6	2.4	2.7	2.8	3.0	3.9
Safety boots	0.3	0.5	0.5	0.3	0.8	0.9	1.0

Source: Ministry of Industry, Computer unit, Textile and Clothing Department, August 1994.

a/ Does not include unlicensed production.

The light leather industry is in a much more dire situation and is believed to be operating at about 30-35 per cent of capacity. This has been caused by excessive state encouragement of the industry, and its prodigal issuing of permits to expand this sector in the expectation that it would help to add domestic value to Iran's exports of goatskins and sheepskins. This export growth has failed to materialize, however, and necessitated the closure of loss-making firms.

Exports of footwear, particularly of plastic shoes, increased steadily during the 1970s, with the former USSR constituting the principal market. This was due mainly to the initiative of the Melli Shoe Company, which succeeded in penetrating the regional markets of the Central Asian republics to ensure further growth. Footwear exports began to decline after 1979, however, and had fallen to almost negligible levels by the end of the 1980-88 war. This was followed by a sharp increase in exports of plastic footwear in 1991-92, mainly through barter trade with the states of the former USSR. While no firm statistics are available as yet, there are indications to suggest that this export surge has been reversed in subsequent years, partly because of the inability of the independent republics of the former USSR to increase their imports and partly because of the elimination of a variety of subsidies on exports, which included a significant implicit subsidy on imported raw materials through the substantially overvalued exchange rate of the rial.

Table III.40. Footwear exports, 1977-92, selected years
(Tonnes)

	1977	1980	1985	1989	1990	1991	1992
Plastic (PVC) footwear	855.9	463.0	454.7	2.5	30.9	348.3	2,067.6
Others	681.8	130.9	65.8	31.5	19.6	103.2	776.1
Total	**1,537.7**	**593.9**	**520.5**	**34.0**	**50.5**	**451.5**	**2,843.7**

Source: *Foreign Trade Statistical Yearbook*, various issues.

Constraints and prospects

The prospects for the footwear industry are not promising. The industry was nurtured in a protected environment during the 1960s and 1970s, but succeeded in gaining a degree of international competitiveness through the intense rivalry prevailing in the domestic market in those years. This resulted in a constant improvement not only of product quality and design, but also of the quality of the industry's workforce through internal training programmes.

Much of the industry's dynamism has subsided since the leading firms came under state control, however, with greater emphasis being placed on quantity rather than quality during the 1980s, when it enjoyed secure demand for its highly subsidized products in a market where footwear imports were prohibited. The industry is consequently facing severe problems due to the neglect of the 1980s. The quality of its output has deteriorated considerably, and the skills of the workforce and management have suffered due to lack of training during this period. Even though its growth will be decided by its export performance, the industry remains highly vulnerable to a surge in import competition.

The leather industry faces broadly similar problems to those of the footwear industry. Its difficulties are compounded by the absence of appropriate institutions to train the workforce and disseminate technical information and know-how.

C. WOOD, WOOD PRODUCTS, PULP AND PAPER

WOOD AND WOOD PRODUCTS

The resource base

Since most of Iran is arid, its forestry resources are severely limited. Only about 10 per cent of the country's total land area is covered by forest or woodland, and much of this is seriously dilapidated. These natural forests fall mainly under three categories:

- the northern forests bordering the Caspian Sea;
- the western woodlands stretching along the Zagros range;
- low-density woodlands scattered throughout the central, eastern and southern flanks of Iran.

In the past few decades Iran's natural forests have been subjected to wholesale neglect and mismanagement, resulting in both diminishing stocks and declining acreage. A survey conducted by the Food and Agriculture Organization of the United Nations (FAO) in 1965 recorded Iran's forest areas in the western and northern regions at about 5 million and 3.8 million hectares respectively. By the early 1990s the corresponding figures were estimated at 3.5 million hectares and 1.8 million hectares respectively, with 600,000 hectares of the latter being regarded as decaying forests. Similarly, the other woodlands, some of which are instrumental in preventing desertification, are also believed to have declined from their 1965 level of 3-4.5 million hectares.

The northern forests are virtually the only viable source of commercial timber. Of Iran's total 1.4 million hectares of forests deemed appropriate for commercial exploitation, nearly 1.2 million hectares are in the northern regions. The available stocks of timber consist of various types of indigenous hardwoods, including hornbeam (*Carpinus betulus),* comprising 40 per cent of the total; beech (*Fogus orientalis)* comprising 20 per cent puercus (*Costani folin),* comprising 10 per cent; maple (*Aceraceae),* comprising 8 per cent; and ironwood (*Parolia persica)* and alder (*Alnus),* comprising 5 per cent each.

Iran also has some forest plantations. The first official attempts at afforestation were made in 1962, when the government planted five hectares of assorted fast growing trees. This was followed by a significant expansion of afforestation and reafforestation activities under government auspices in subsequent years. At the same time, measures were introduced to attract private investments in this sector, which resulted in private entrepreneurs setting up several plantations of eucalyptus and spruce during the 1970s. However, a significant proportion of the land sold to the private sector to help increase forest resources was converted to lucrative tourist estates and seaside villas near the Caspian Sea.

The years between 1970 and 1977 witnessed a rapid growth in timber plantations owned both by the state and private businessmen, with an average of 25,000 hectares being added every year and the total area increasing to almost 300,000 hectares by 1978. Although some of the state-owned plantations were set up in desert areas to restrain the spread of desertification, these new plantations represented a significant increase in Iran's stocks of exploitable timber. The planting of forestry estates was interrupted in the early 1980s, however, due to the changed political and economic priorities of the new government, although a renewed attempt to plant timber estates was launched in the second half of the decade and intensified in the early 1990s. The area planted to timber increased from 800 hectares in 1981 to more than 90,000 hectares by 1992, with private entrepreneurs accounting for more than 60 per cent of the 1992 figure.

Table III.41. Area planted to timber, 1977-92, selected years
(Thousand hectares)

	1977	1980	1981	1985	1987	1988	1990	1991	1992
Area planted	5.9	-	0.8	10.9	35.0	18.9	49.4	87.3	91.0

Sources: Ministry of Agriculture; National Forest and Grasslands Organization.

A variety of herbs and roots are also obtained in modest quantities from Iran's natural forests and woodlands. The most important of these include liquorice, tragacanth, artichoke, rhubarb and barberry. Some of these products, particularly those with medical and industrial applications, are also exported.

The management and exploitation of Iran's forestry resources has been assigned to the Ministry of Jihad-e-Sazandegi (Construction Crusade) and the National Forest and Grasslands Organization. Although these two bodies are the main players in the forestry industry, exploitation rights of various kinds have also been granted to a variety of state-owned companies, cooperatives and private loggers in designated areas.

Recent trends

Iran's natural forests were unprotected until the promulgation of the law of forest nationalization in 1962, which revoked all private ownership of forest lands. Prior to the introduction of this law the forests were the primary source of firewood and timber production. Although the use of firewood and charcoal has been largely replaced by fossil fuels over the years, these activities continue to be practised by large numbers of people in and around the forest regions. In addition, about a million people living in the forest regions are estimated to be engaged in traditional small-scale animal husbandry. They own some 6 million animals, and are consequently directly responsible for the destruction of 3 million cubic metres of forest resources each year.

The introduction of an import-substituting industrialization policy and the growing demand for building materials resulted in the emergence of a variety of wood processing industries from the 1960s onwards. These included a number of sawmills and factories producing doors and windows, chipboard, laminated boards, plywood, veneer, fibreboard, parquet, pulp and paper. Some of these industries were entirely dependent on domestic sources of raw materials, while others had to import some of their needs.

Since the late 1980s officially approved logging has averaged 1.3 million cubic metres per year, but the illegal exploitation of the northern and western forests has been much higher, and is estimated to have ranged from 3.5-4 million cubic metres per year. The Second Socio-Economic and Cultural Development Plan of the Islamic Republic provides for the annual volume of officially licensed timber production to be increased to 3 million cubic metres. Illegal logging is also expected to rise in the coming years following price adjustments in the early 1990s that have substantially pushed up domestic wood prices.

Table III.42. Imports of wood and wood products, 1967-92, selected years
(Thousand tonnes)

	1967	1971	1981	1986	1987	1988	1989	1990	1991	1992
Total imports	65.2	88.2	438.1	223.0	192.3	167.8	73.2	185.6	308.9	120.6

Source: *Foreign Trade Statistical Yearbook*, various issues.

The wood removal data highlight the fact that firewood has typically been the main wood product, and on average accounted for 45 per cent of the total removals. This is understandable in the context of the prevailing poor infrastructure and in particular the lack of an efficient transport system in the wood producing areas, which has significantly hampered the movement of logs. These problems were also mainly responsible for the emergence of sawmilling activities and the processing of firewood into charcoal inside the forests. In addition, the difficulty of access has also prevented logging at higher altitudes, where forest stocks are more dense and forest growth more rapid.

Table III.43. Legal wood production, 1989-93
(Thousand cubic metres except as stated)

	1989	1990	1991	1992	1993[a/]
Roundwood	266.6	267.0	320.0	324.0	366.0
Timber	111.0	94.6	97.4	107.4	88.2
Others	293.6	298.7	312.5	309.5	230.5
Firewood	518.2	500.5	718.8	635.0	508.5
Charcoal (thousand tonnes)	43.9	37.6	36.6	35.2	30.6

Sources: Ministry of Agriculture; National Forest and Grasslands Organization.

a/ First three quarters.

Chipboard is manufactured by 13 companies in Iran, which have a combined annual capacity of 350,000 tonnes. The entire industry was created by the private sector prior to 1979. Some of the larger units came under state ownership in the following years, however, although they are now slated to be privatized. One of these plants, the Karoon Company, which has an annual production capacity of 20,000 tonnes, utilizes bagasse as raw material. Another plant, the Rafsanjan Company, which has an annual capacity of 22,000 tonnes, is located in the pistachio growing province of Kerman and uses pistachio branches for chipboard production.

Although the domestic chipboard industry had substantial excess production capacity in the early 1980s, significant quantities of chipboard were imported in those years. This was a direct

consequence of the availability of subsidized hard currency that made imports attractive. This option became increasingly limited in the late 1980s, however, as a result of which chipboard imports fell to negligible levels from which they have only gradually begun to recover in the early 1990s.

Ten firms, with a total production capacity of 40,000 cubic metres, produce plywood, while six firms with a production capacity of 17.5 million square metres produce veneer. Both industries operate below capacity due to an inadequate domestic supply of logs. Plywood is therefore imported in large quantities to overcome the resulting shortfall.

Iran's production capacity for parquet flooring is estimated at 5 million square metres. The growth of this industry has been restricted in recent years, however, because of low demand and the growing popularity of floor tiles and marbles. In addition, two manufacturing units with a joint capacity of 20,000 tonnes produce fibreboard, with the establishment of a third unit having been approved in the early 1990s.

The production of furniture and doors is another major activity. The industry is characterized by a large number of producers ranging in scale from small family workshops to medium-sized enterprises. The production of doors grew at a very fast pace in the 1980s as a result of government-controlled pricing regulations that effectively subsidized the price of wood and wood products, and Iran now has an estimated production capacity of 4 million doors per year.

Table III.44. Production and imports of chipboard, 1976-92, selected years

	1976	1978	1980	1981	1984	1986	1988	1989	1990	1991	1992
Production (thousand cubic metres)	48	82	117	133	196	176	159	180	210	..	..
Imports (tonnes)	22,106	16,250	14,944	89,121	3,744	6	119	84	274	721	3,332

Sources: Ministry of Industry; *Foreign Trade Statistical Yearbook*, various issues.

Constraints and prospects

Iran's forestry resources are grossly insufficient to sustain an extensive wood-based industry over the longer term. Furthermore, the excessive exploitation of these limited resources is causing a perpetual loss of forest cover at a rate believed to have averaged 50,000-70,000 hectares per year in recent years. While the prospects for the planting of fast-growing trees are good throughout the country, such plantation activities are only being undertaken at a comparatively slow pace.

One of the major problems confronting the government is that of forest-dwellers, whose despoliation alone is well above the level that Iran's natural forests can support. Moreover, the legal exploitation of Iran's forest resources is also often wasteful due to a shortage of appropriate managerial skills, experience and training.

Nevertheless, these weaknesses notwithstanding, there exists some scope for sustaining the chipboard industry. Demand for this product rose particularly strongly during the early 1980s, and is expected to remain steady at least in the near future as end users become more aware of its applications. The industry's ability to meet this demand may be limited, however, since the industry has suffered from a considerable degree of disinvestment. Investments for the replacement and modernization of production facilities, some of which came on stream as early as the mid-1960s, have been particularly modest.

Nine permits to establish new production units with a total capacity of 245,000 cubic metres were issued in the early 1990s, but the interest of most licence holders in obtaining a production authorization appears to be linked to the access they consequently gain to foreign exchange at highly under-valued rates to import capital goods. There is no evidence of any of the new projects being commissioned, due both to the persistent shortage of foreign exchange and a shift in official policy to discontinue hard currency allocations at subsidized prices for investment purposes.

The sharp and continuous devaluation of the rial in recent years and the reversal of government's policy towards a restrictive trade regime have substantially raised the price of imported wood and wood products including plywood. Although this will help to generate additional demand for the small domestic plywood industry, the overall impact will be less clear cut since the industry also depends on imported logs. In addition, while demand for fibre board is expected to remain firm, the parquet industry may face a depressed market as a result of increased competition from its floor tile and marble counterpart. The window and door industries face a similarly restrained outlook as a result of recent price adjustments, which have pushed up production costs at a time when the demand for these products was already diminishing due to a slowdown in the growth of the construction sector.

PULP AND PAPER

The resource base

As noted above, Iran's natural forest resources are limited and able to support associated downstream activities to only a limited extent. Some scope does exist, however, for the operation of certain downstream industries, including pulp and paper, due to the availability of alternative resources such as bagasse. Even though only modest supplies of bagasse can be procured at present, the potential for an expansion of sugar cane cultivation to support a thriving sugar refining industry in the province of Khuzestan is substantial. Moreover, like some other parts of the country, the Khuzestan region is very suitable for cultivating a variety of fast growing trees, such as spruce and eucalyptus, that are suitable for the production of pulp and paper. The substantial quantities of chaff produced by Iran's cereal milling industries have also often been cited as an important cellulosic resource. They are currently fully utilized as animal feed by the country's animal husbandry sector, however, which in turn is struggling with inadequate supplies.

Recent trends

The first integrated pulp and paper production facility, the Pars Paper Company, was established in 1970 in the province of Khuzestan by a consortium of Iranian businessmen and banks and the International Finance Corporation (IFC) as an integral part of the Haft Tappeh agro-industrial complex producing cane-based sugar. With an initial annual capacity of 35,000 tonnes of printing and writing paper, it used bagasse as the main input, along with a proportion (20 per cent) of imported long fibre pulp. The complex has been subsequently expanded significantly with the construction of two further plants, which have raised the total annual capacity to 105,000 tonnes.

This complex, which has remained Iran's sole producer of printing and writing paper, came under government control after 1979.

A second integrated pulp and paper production unit, the Chooka complex, was established in 1978 in the province of Gilan to process raw material mainly from the western parts of the Shafa Roud forest in northern Iran. This state-owned enterprise is equipped with sawmilling and plywood production facilities of 52,000 cubic metres and 6,600 cubic metres per year respectively, as well as a paper plant with an annual production capacity of about 150,000 tonnes producing a variety of products including kraft paper, wrapping paper, and corrugated medium. The level of capacity utilization has been relatively low from the outset, however, due to chronic operational difficulties and a high degree of dependence on imported long fibre pulp. In 1994 the actual operating capacity was estimated at 110,000 tonnes per year.

The establishment of a further wood and paper plant in the northern province of Mazandaran was proposed in the early 1970s. It was intended to have an annual capacity of 220,000 tonnes, and produce a range of paper products, including writing and printing paper and newsprint (91,000 tonnes), corrugated medium (85,000 tonnes), and paper board (44,000 tonnes). The project was cancelled in mid-stream after 1979 even though some of its equipment had already been commissioned and import orders had been placed for much of its remaining machinery. More recently, in the early 1990s, the government decided to proceed with the implementation of this project, albeit without the paper board unit.

Table III.45. Production and imports of paper products, 1975-93, selected years
(Thousand tonnes)

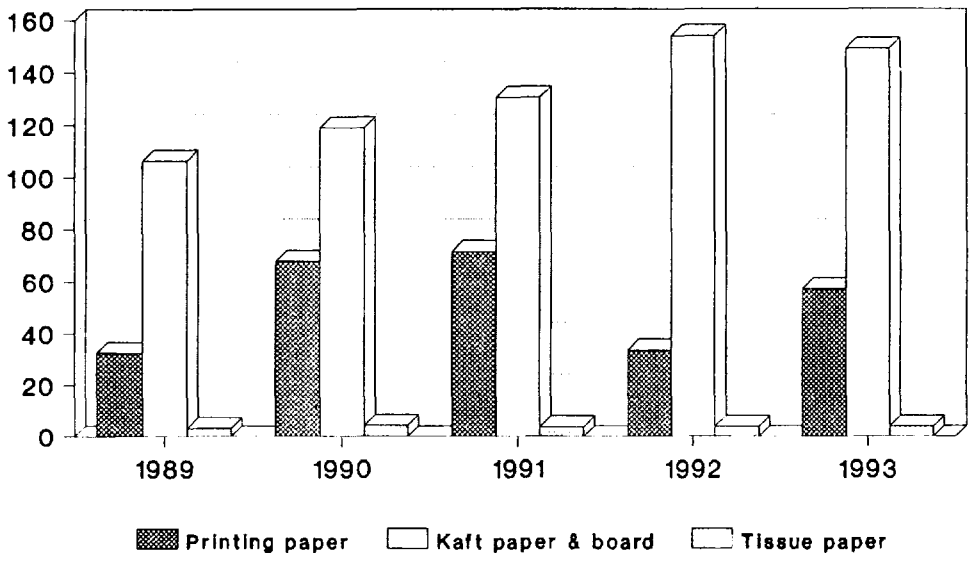
	1975	1977	1980	1989	1990	1991	1992	1993
Printing and writing paper								
Production	35.5	54.9	30.6	32.5	67.9	71.7	33.7	57.3
Imports	36.6	24.3	51.8	114.9	136.7	201.7	116.1	..
Kraft paper, corrugated medium boards								
Production	21.3	25.5	25.1	106.5	119.0	130.5	154.1	149.2
Imports	90.4	175.0	106.9	66.2	83.1	96.2	119.5	..
Tissue paper								
Production	6.8	9.3	2.8	3.1	4.5	3.8	4.0	4.0
Imports	0.5	0.8	4.5	2.0	2.7	3.9	3.9	..

Sources: Ministry of Industry; *Foreign Trade Statistical Yearbook*, various issues.

While the Pars Paper Company and the Chooka complex are the only integrated producers of both pulp and paper, several small factories with a total production capacity of about 50,000 tonnes per annum are engaged in the production of paper board from waste paper. The oldest and largest of these is the Kahrizak paper plant at Kahrizak in the province of Tehran, which was originally established in 1942 as the Mimosa paper board plant in the city of Tehran before being moved to its present location in 1950, and currently has an annual production capacity of 20,000 tonnes of paper. In addition, Iran also has three tissue paper producing units with a annual capacity of 35,000 tonnes, which utilize wastepaper, bagasse and imported pulp. Two of these, the Latif Paper

Company at the Hashtgerd industrial town in the province of Tehran and the Harir Paper Company at Haft Tappeh near the Pars Paper Company, were established in the early 1990s and have a production capacity of 15,000 tonnes per year each. A third paper producer established in the early 1990s is the Kaveh Paper Company in the Markazi province, which has an annual production capacity of 30,000 tonnes of writing paper, cardboard and kraft paper, and uses waste paper and imported pulp as raw materials.

Fig. III.H. Production of paper, 1989-93
(Thousand tonnes)



Source: Ministry of Industry.

Table III.46. Additional imports of major paper products, 1975-92, selected years
(Thousand tonnes)

	1975	1977	1980	1985	1989	1990	1991	1992
Newsprint	32.8	55.2	41.2	19.1	20.2	29.1	57.2	38.7
Cigarette paper	2.0	0.8	0.4	-	0.1	-	0.2	0.3
Cement bags	10.3	17.3	30.0	10.5	2.3	5.5	1.5	1.7
Pulp	24.9	43.6	12.2	23.9	17.2	51.2	46.6	47.6

Source: *Foreign Trade Statistical Yearbook*, various issues.

In view of the limited scale and scope of its own industry, Iran remains largely dependent on imports of pulp and paper to meet its domestic demand. The country's requirements of newsprint, industrial paper and cigarette paper in particular are met almost entirely from imports. These needs have increased significantly during the past two decades, owing to population growth, increased urbanization, higher rates of education, a broadening industrial base and enhanced bureaucratization.

Constraints and prospects

Iran's growing population suggests a continued increase in demand for assorted types of paper and paper products in the coming years. In addition, other important factors will also help to boost demand, especially in the manufacturing sector. Thus, the government's programme to stimulate non-oil exports, including fresh and dry fruits, will generate substantial demand for high-quality packaging and wrapping materials.

In view of Iran's continued high imports of almost all types of paper products, and in anticipation of the growth in demand projected for the coming years, 14 projects with a combined production capacity of more than 500,000 tonnes (equivalent to 150 per cent of the present total production capacity) have been approved. One of these projects, with a production capacity of 175,000 tonnes is dependent mainly on northern forest resources and another with a production capacity of 50,000 tonnes on forest plantations. Six projects with a total capacity of over 100,000 tonnes will rely on agricultural residues other than bagasse. Two projects with combined production slated at 100,000 tonnes, will be utilizing bagasse as well as imported pulp. The remaining four will be mainly using wastepaper and imported pulp. Three of these plants, the Latif, Harir and Kaveh mills described above, were brought on stream in 1993-94.

The implementation of the other projects may be constrained, however, by Iran's limited wood resources, wastepaper stocks, and agricultural residues, which have hitherto inhibited the growth of the industry. The restraining effect of these raw material shortages is highlighted by the performance of the Chooka complex, which was originally intended to be supplied entirely from the Shafa Roud forest. The continued exploitation of the forest over time has resulted in a considerable loss of growing stocks and it is no longer capable of meeting the Chooka plant's needs.

In the short term, therefore, the projected growth in demand will almost certainly lead to an increased dependence on imports of paper and pulp as domestic supply will remain restricted due to the shortage of raw materials. Efficient planning and management of the available resources will enable output increases over the longer term, however, especially in view of the fact that Iran has extensive acreage in southern Khuzestan suitable for sugar cane cultivation. The situation could also be improved further through the planting of fast-growing varieties of trees, such as spruce and eucalyptus, in various regions of the country.

D. PETROLEUM REFINING AND NATURAL GAS PROCESSING, PETROCHEMICALS, FERTILIZERS AND PESTICIDES

The resource base

Iran is an important producer of hydrocarbons, and a leading member of the Organization of Petroleum Exporting Countries (OPEC). Official estimates in 1988 put the country's total recoverable fossil fuel reserves at about 59 billion barrels, of which 53.5 billion barrels are located

onshore and 5.5 billion barrels offshore. Of the total figure, approximately 41 billion barrels are directly recoverable (36 billion barrels onshore and 4.5 billion barrels offshore), while the balance can only be exploited through the application of enhanced recovery techniques, e.g. through the injection of natural gas. More recent industry estimates place total reserves at more than 90 billion barrels in 1994. Iran's total potential reserves are believed to exceed the proven reserves by a huge margin, with official estimates in 1992 suggesting that these potential reserves moreover might amount to some 380 billion barrels, of which about 340 billion barrels are located onshore.

To date 62 oil basins have been discovered onshore. Of these, 59 are concentrated in the two provinces of Khuzestan and Kohgiluyeh ve Boyer Ahmad, two in Fars, and the remaining one in Kermanshah. The offshore oil basins number 20, of which 6 fields are currently not in operation.

The performance of Iran's oil industry has undergone substantial changes during the past two decades. After peaking at 6 million barrels per day (bpd) in 1976, Iran's crude oil production declined by almost half to 3.3 million bpd in 1979 as a result both of the new government's belief in preserving the country's God-given natural wealth and the flight of many Iranian and foreign experts working in the oil industry. In 1980, when the Iran-Iraq war broke out, production fell further to 1.45 million bpd, and averaged only about 2.4 million bpd in the following eight years as a result of the heavy damage inflicted by frequent and intensive Iraqi attacks on the oil industry. Following the end of the war the government launched an urgent programme to rehabilitate the industry, which resulted in an increase in the production capacity for crude oil from about 3 million bpd in 1988 to about 4.1 million bpd in 1992, with actual production rising to 3.7 million bpd by the latter year.

Apart from its extensive crude oil reserves, Iran also has the world's second largest natural gas resources. With recoverable reserves of almost 481 trillion standard cubic feet (tscf), Iran possesses 13.7 per cent of the world's total proven reserves. These natural gas resources include associated gas, i.e. gas found in association with crude oil and produced together with oil, as well as non-associated gas in independent natural gas fields. The total volume of recoverable non-associated natural gas is estimated at 227 tscf, while that of associated natural gas is estimated at 254 tscf, of which approximately 248.5 tscf is found in the onshore oil fields and 5.5 tscf in the offshore fields. Estimates of Iran's potential reserves are even higher, moreover, and believed to exceed 710 tscf, of which some 320 tscf are in the form of non-associated natural gas.

OIL REFINING

Recent trends

Iran has a long history of oil refining, dating back to the establishment of the Abadan oil refinery more than half a century ago. With a designed production capacity of 480,000 barrels per day, the Abadan refinery was for years one of the largest in the region. Its production capacity was later expanded, and amounted to 610,000 bpd in 1977.

Located in the province of Khuzestan bordering Iraq, this refinery became one of the first targets of the Iraqi military invasion, and was completely destroyed at the outset of the Iran-Iraq war when parts of Khuzestan, including Abadan, came under Iraqi occupation. It was rebuilt from scratch when the region was liberated in 1985, but did not come on stream until 1989. Although the new Abadan refinery has a smaller production capacity of about 260,000 bpd, it still remains the country's largest.

Table III.47. Petroleum refinery production capacity, output and feedstock utilization, 1977-92, selected years
(Thousand barrels per day)

	1977	1986	1991	1992
Tehran refinery				
Capacity	185.0	220.0	220.0	220.0
Feedstock	193.9	207.3	237.4	236.5
Refined output	181.4	188.5	225.3	225.8
Esfahan refinery				
Capacity	-	200.0	200.0	200.0
Feedstock	-	273.7	331.8	353.7
Refined output	-	258.7	315.8	342.3
Tabriz refinery				
Capacity	80.0	80.0	80.0	80.0
Feedstock	4.4	88.6	87.8	86.5
Refined output	2.9	83.8	81.2	80.8
Shiraz refinery				
Capacity	40.0	40.0	40.0	40.0
Feedstock	42.1	39.3	42.1	44.9
Refined output	36.4	36.5	39.3	41.9
Kermanshah refinery				
Capacity	15.0	15.0	15.0	15.0
Feedstock	17.4	13.1	28.6	23.0
Refined output	16.1	12.4	27.3	21.9
Lavan distillation complex				
Capacity	20.0	20.0	20.0	20.0
Feedstock	8.5	18.1	21.6	23.0
Refined output	8.0	17.4	21.0	22.2
Abadan refinery				
Capacity	610.0	-	260.0	260.0
Feedstock	485.6	-	240.7	228.6
Refined output	469.5	-	234.9	224.7
Mahshahr refinery				
Capacity	48.0	-	-	-
Feedstock	36.1	-	-	-
Refined output	32.1	-	-	-
Masjid Suleiman refinery				
Capacity	83.0	-	-	-
Feedstock	18.4	-	-	-
Refined output	17.1	-	-	-
All refineries				
Capacity	1,081.0	575.0	835.0	835.0
Feedstock	806.4	640.1	990.0	996.2
Refined output	763.5	597.3	944.8	959.6

Source: Ministry of Power Generation, Energy Planning Department, *Energy Balance Sheet*, 1994.

In the years between the construction of the original Abadan refinery and the early 1960s, three additional refineries with a combined production capacity of 146,000 bpd were also established at Kermanshah, Masjid Suleiman and Mahshahr. This was followed by the launch of a coordinated programme for the construction of several new oil refineries in the mid-1960s, which resulted in a refinery being brought on stream in Tehran in 1968 and the inauguration of a refinery in Shiraz and a second refinery in Tehran in 1973 and 1975 respectively. The Tabriz refinery and Lavan distillation complex became operational in 1977, while the Esfahan refinery, originally scheduled to be completed by 1979, was delayed until 1981, although its first phase had become operational by 1979.

From a total of 1,081,000 bpd of refined oil products in 1977, the capacity of Iran's oil refining industry fell to 575,000 bpd by 1986 as a result of extensive damage it suffered during the war. By 1986 three refineries with a combined production capacity of about 740,000 bpd were out of operation. Although the Abadan refinery came on stream after the war, albeit with a much lower production capacity, the Mahshahr and Masjid Suleiman refineries are still out of operation.

By the end of 1992, Iran's oil refining industry consisted of six refineries and one distillation unit with a total production capacity of 835,000 bpd. This represented 77 per cent of the industry's pre-war capacity, or 63 per cent if the capacity of Esfahan refinery, which was then almost completed, is also taken into account. In September 1993 Iran's refining capacity was expanded by 150,000 bpd following the completion of a new refinery at Arak in Markazi province.

The original Abadan refinery was initially intended to cater not only for the domestic market but also to export some of its output. The rising consumption of petroleum products during the late 1960s and 1970s caused by the unprecedented surge in economic growth during this period significantly reduced the exportable surplus generated by the refining industry. Even so, overall domestic production still exceeded total consumption throughout the 1970s, although a mismatch between the mix of domestic output and domestic demand necessitated imports of certain products in small volumes. This mismatch was inevitably exacerbated by the contraction of the industry's production capacity and output caused by the war in 1980-88.

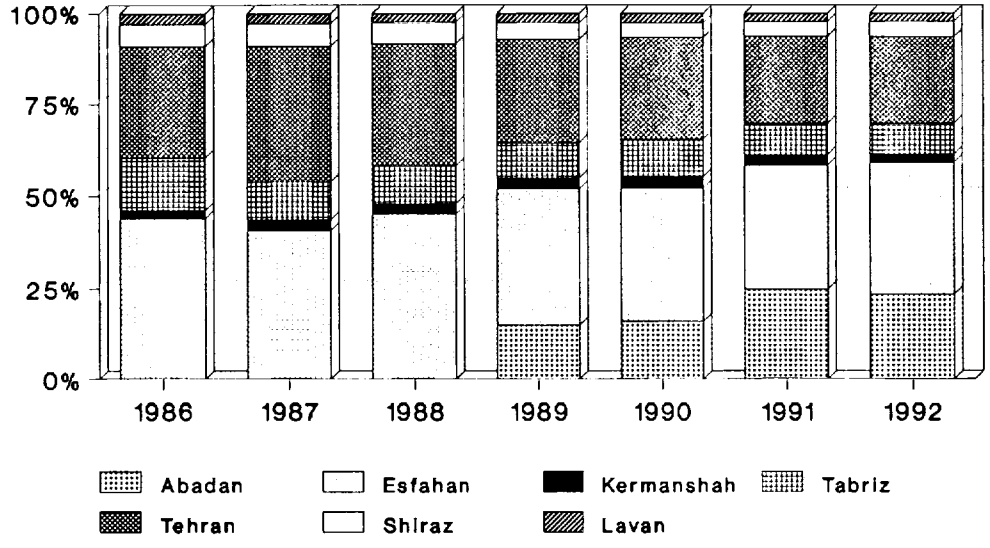
Table III.48. Refining of crude oil, 1981-92, selected years
(Million barrels)

Refinery	1981	1986	1987	1988	1989	1990	1991	1992
Abadan	-	-	-	-	46.0	50.7	85.7	82.0
Esfahan	76.7	100.0	93.8	110.3	112.8	114.7	115.3	124.9
Kermanshah	4.0	4.8	6.9	6.8	8.7	9.8	10.0	8.0
Tabriz	26.9	32.5	23.4	25.1	29.6	32.4	29.6	29.5
Tehran	71.9	69.0	85.4	81.6	86.0	87.8	82.2	82.4
Shiraz	13.2	14.2	14.6	14.6	14.4	13.4	14.3	15.3
Lavan (distillation complex)	4.5	6.6	6.6	6.1	8.1	8.4	7.7	8.1
Total	**197.2**	**227.1**	**230.7**	**244.5**	**305.6**	**317.2**	**344.8**	**350.2**

Source: Ministry of Petroleum.

As indicated in Table III.48, the Iranian oil refining industry has experienced steady growth, averaging 3.5 per cent per year, since 1989. This reflects a firm attempt by the government, clearly stated in the First Socio-Economic and Cultural Development Plan of the Islamic Republic, to reduce imports of refined products by expanding the production capacity of the country's existing units. In pursuit of this objective the government has also initiated a major refinery construction programme, involving the establishment of three further oil refineries in Bandar Abbas, Arak and Bandar Taheri, with production capacities of 225,000 bpd, 150,000 bpd and 200,000 bpd respectively. Although the construction of these three refineries was due to be completed by 1993/94, only the Arak refinery has so far come on stream. The completion of the other two refineries in the coming years will result in a significant reduction in Iran's dependence on imported petroleum products.

Fig. III.I. Output of refined petroleum products by refinery, 1986-92
(Percentage share)



Source: Ministry of Power Generation, Energy Planning Department, *Energy Balance Sheet*, 1994.

A disturbing feature of Iran's crude oil refining industry is the high output of residual fuel, which on average exceeded 30 per cent of the total during 1987-92. This was mainly due to the falling efficiency of the existing hydrocracker units. The resulting fuel oil surplus has prompted the government to take steps to improve the efficiency of these hydrocracker units and to consider the installation of new units to process residual fuel into kerosene and middle distillates, which are in short supply in the country. In the meantime, the government has also sought to encourage the industrial sector to increase its use of fuel oil. So far nine power generating plants are using fuel oil, which will be augmented by six more new plants. A motor oil producing unit, using fuel oil, is also planned to be installed at the Esfahan refinery site.

All refineries in Iran are state-owned, and the prices of petroleum products are heavily subsidized, averaging only slightly more than 5 per cent of those prevailing in other countries. Even though

these prices were raised after the 1980-88 war when the rationing system was relaxed, the rapid depreciation of the rial since then has reduced current prices to even lower levels in real terms than those prevailing in the war years. In 1994, one dollar, converted at the market rate of exchange, could buy 50 litres of petrol, 170 litres of kerosene, 260 litres of gas oil, or 500 litres of fuel oil.

Table III.49. Petroleum refinery production, 1976-92, selected years
(Million barrels)

	1976	1981	1986	1987	1988	1989	1990	1991	1992
Crude oil									
Production	2,185	540	796	891	933	1,076	1,192	1,228	1,348
Export[a/]	..	343	569	661	689	771	875	883	998
Import	-	-	-	-	-	-	-	-	-
Refinery output	..	197	227	230	244	305	317	345	350
Refined products									
Refinery output of which	..	197	227	230	244	305	317	345	350
Kerosene	..	28	21	24	29	43	38	42	..
Petrol	..	29	32	34	35	44	46	49	..
Gas oil	..	49	72	67	68	82	86	90	..
Fuel oil	..	59	70	69	74	96	99	108	..
Jet fuel	..	4	4	4	3	3	4	4	..
Motor oil	..	1	3	1	1	1	1	1	..
Waxy residue	..	8	12	11	13	13	14	15	..
Others	..	2	3	5	14	12	14	17	..
Losses and fuel for refineries	..	18	11	16	7	10	14	17	..

Source: Ministry of Petroleum.

a/ Adjusted for swap exports of crude oil in exchange for imports of petroleum products.

These low prices are invariably insufficient to cover even the distribution costs of the petroleum products concerned. They have also resulted in a rapidly growing and highly wasteful consumption of petroleum products, with *per capita* consumption increasing from approximately 850 litres per annum in 1978 to more than 1,000 litres per annum in 1993 despite a sharp declining in real *per capita* income between these years. The total consumption of petroleum products has more than doubled during the same period. In order to reverse this trend, official Iranian spokesmen suggested in January 1995 that the government is planning to double the retail price of petroleum products.

Constraints and prospects

Although Iran has abundant deposits of crude oil, the rapid depletion of this resource has become a cause for concern within the country. The government needs to initiate an extensive programme to redevelop the oil fields damaged during the war, and also to develop new fields in order to maintain the industry's capacity and sustain production levels. This is essential for the restoration of the high crude oil production levels required for both the local refineries and exports.

Measures also need to be taken to increase the yield of existing fields, many of which declined significantly during the 1980s due to war damage and improper exploitation. The injection of natural gas in substantial volumes is necessary in some cases to restore gas pressure and prevent a further loss of yield. The direct exploitation of the cap gas should be avoided, and it should instead be recycled to increase the field's yield.

With the bulk of Iran's oil now being exported in crude form, there is considerable scope for establishing export-oriented refineries. At present, however, Iran's refining capacity does not even suffice to meet local demand, but upon completion of the Bandar Abbas, Arak and Bandar Taheri refineries, its dependence on its imports of petroleum products will be reduced to a bare minimum. It could be reduced further, and even be transformed into an exportable surplus, if a more realistic price policy were adopted, which would reduce the excessive and wasteful domestic consumption of petroleum products and facilitate the introduction of more fuel-efficient technologies.

NATURAL GAS PROCESSING

Recent trends

The commercial exploitation of Iran's natural gas resources dates back to the early 1960s when the Shiraz Petrochemical Complex came on stream. This plant utilized associated natural gas, produced as an oil by-product, as feedstock for production of fertilizers. The establishment of the Kharg Petrochemical Complex in 1966 to produce liquefied petroleum gas (LPG) for export represented a further important attempt to harness the country's associated gas resources that were otherwise flared.

The main impetus for the development of Iran's gas resources was given by an agreement between the governments of Iran and the former USSR in 1966 providing for the export of Iranian natural gas in exchange for financial and technical assistance from the USSR for the construction of a steel mill, a machine factory, and several other projects. This agreement called for the laying of a 1,100-kilometre pipeline with a diameter of 40/42 inches from the oil fields in southwestern Iran to the border town of Astara in the north, as well as the construction of the Bid Boland refinery with a capacity of about 30 million cubic metres per day to process sour gas from the Aghajari oil field. A complementary source for feeding the trunkline included sweet gas from the Marun oil field. The natural gas from both these sources was associated gas produced at the oil fields that had been flared prior to this project.

Another important aspect of this project was the opportunity it offered for the internal distribution of natural gas, which had previously seemed economically unviable. This in turn necessitated the construction of pipeline networks to several cities and towns as well as a number of major industries. To cover the additional domestic demand, the trunkline capacity was designed at 16.5 billion cubic metres per annum, well above the maximum annual export volume of 10 billion cubic metres per annum initially agreed between the two countries.

The oil price rise of 1973 also prompted the government to review the utilization of the country's vast non-associated gas fields in addition to its associated gas resources. This resulted in the initiation of a series of gas utilization projects in several of the country's non-associated gas fields.

Construction work for the utilization of the Khangiran field in the north of Khorassan, discovered in 1968, commenced in early 1975. The Khangiran project, which included the construction of the

Hashemi Nejad gas refinery for treatment of sour gas with a designed capacity of about 35 million cubic metres per day, was completed in 1983. The proven reserves of this field (including the much smaller field of Gonbadli) are estimated at about 22,000 billion cubic feet, of which 13,700 billion cubic feet is directly recoverable. The project was intended to satisfy the energy needs of the Neka power plant, also under construction at the time, and to provide natural gas to residential and industrial users along the 640 kilometre long pipeline connecting the Khangiran gas refinery to the Neka power plant.

A similar project to promote natural gas use by industrial and residential consumers involved the development of the Gaverzin and Sarkhun gas fields in Hormozgan province in southern Iran. The Gaverzin field, with proven and recoverable reserves of 1,200 billion cubic feet and 1,000 billion cubic feet respectively, became operational in 1980, with the gas being used to meet the energy needs of the Bandar Abbas power plant after being processed in a small refining facility with a production capacity of 2 million cubic metres per day on Qeshm Island. The much larger Sarkhun field, with recoverable reserves of 6,400 billion cubic feet and proven reserves of 8,000 billion cubic feet, also became operational in 1980 and was intended to meet the needs of a much broader range of industrial users, the most important of which was the Sarcheshmeh copper mill (see Non-ferrous metals).

Other major gas fields in the Hormozgan region include Gashour and Asalouieh, discovered in 1974 and 1989 respectively. The former has proven reserves of 7,500 billion cubic feet and recoverable reserves of 5,000 billion cubic feet, of which about 1,700 billion cubic feet is sweet gas, while the latter contains sweet gas with proven and recoverable reserves of 8,000 billion cubic feet and 5,800 billion cubic feet respectively. Both of these fields are currently unexploited.

The province of Bushehr also has two major gas fields, the Nar and Kangan fields. The Nar field, currently operational, has proven and recoverable reserves of 13,200 billion cubic feet and 9,200 billion cubic feet respectively. The development of the Kangan field, with proven reserves of 29,000 billion cubic feet and recoverable reserves of 16,000 billion cubic feet, is in progress. The Vali Asr gas refinery, with a production capacity of 44 million cubic metres per day, was established in 1990 for the treatment of the raw gas obtained from these fields. Its output is intended for local consumption by domestic users.

Another comparatively small gas field, Sarajeh in central Iran, has been exploited since 1986. Its known reserves amount to 380 billion cubic feet of sweet gas, of which 220 billion cubic feet are recoverable.

Although the export of natural gas to the former USSR was suspended in 1979, domestic consumption has grown rapidly during the past 15 years. In early 1980 the number of industrial plants utilizing natural gas stood at about 280, whereas by 1985 the number had more than doubled to about 600, and by early 1993 had risen further to more than 1,100. Similarly, the number of city-gas connections to residential and commercial users increased from about 150,000 in 1980 to about 1.6 million by the end of 1993. The domestic consumption of natural gas consequently grew at an average rate of 15 per cent during 1981-92, from about 5,700 million cubic metres in 1981 to about 26,400 million cubic metres in 1992.

Apart from its importance in covering Iran's energy requirements, natural gas also has another significant role in the Iranian economy. It is used in enhanced oil recovery (EOR) techniques for the secondary recovery of oil. This is extremely important since the application of EOR techniques is expected to yield an additional secondary oil recovery in the order of 18 billion barrels - about 45 per cent of the country's officially estimated directly recoverable oil.

Table III.50. Consumption and export of natural gas by various sectors, 1981-92, selected years
(Million cubic metres)

Sector	1981	1986	1991	1992	Average percentage growth 1981-92
Residential, commercial, industrial	2,359	4,799	11,720	15,035	18.3
Power plants	2,652	3,913	9,523	9,858	12.7
Other	684	732	1,424	1,496	7.4
Total domestic consumption	5,695	9,444	22,667	26,389	15.0
Export	-	-	2,847	511	..
Total	**5,695**	**9,444**	**25,514**	**26,900**	**15.2**

Source: Ministry of Power Generation, Energy Planning Department, *Energy Balance Sheet*, 1994.

The volume of gas injected into oil fields reached 11.6 billion cubic metres in 1978, but had fallen to 6.2 billion cubic metres by 1987, when the First Socio-Economic and Cultural Development Plan of the Islamic Republic was prepared. Not only was the volume of gas injected insufficient to maintain the pressure in the oil fields, but in certain cases cap gas was also utilized for domestic consumption instead of being repressurized at a later stage for improving the oil yield.

In 1992 the Ministry of Petroleum released a list of 16 oil fields that required gas injections. A part of the required gas is planned to be injected from non-associated gas fields. The Aghar and Dalan gas fields in Fars province, which were discovered in 1973 and 1975 respectively and have combined recoverable reserves of about 15,000 billion cubic feet, are currently being developed for injection in the Gachsaran and Marun oil fields. Once developed, these fields are expected to produce up to 39 million cubic metres per day for injection purposes.

Not all of Iran's known non-associated gas resources, which are concentrated in eight regions of the country, are being exploited as yet. As indicated in Table III.51, Iran still has substantial known reserves of associated and non-associated gas awaiting development.

Domestic consumption of liquefied petroleum gas (LPG) has increased steadily since the mid-1960s in line with rising *per capita* incomes and the increased availability of domestically-produced gas burning consumer durables such as heaters and cooking ranges. By 1976 the domestic demand for LPG had reached 710,000 cubic metres. This growth in LPG consumption was also facilitated by the efficient distribution networks for LPG established by a number of private entrepreneurs, since the distribution of LPG is one of the few activities in the hydrocarbons sector not controlled entirely by the state.

Despite the growth of domestic demand for LPG, significant quantities were also exported until 1979. In the following years, however, Iran's output of LPG plummeted as a result of extensive damage to production capacity during the war. With domestic demand continuing to increase, however, Iran became a major importer of LPG in the 1980s. Although LPG output has increased to well above the pre-war level in the 1990s, it has not been able to catch up with the growth in demand, as a result of which the country has remained dependent on imports.

Table III.51. Natural gas reserves
(Thousand billion cubic feet)

Location	Field	Proven reserves	Recoverable reserves
Non-associated gas	-	**329.59**	**232.24**
Khorassan	Khangiran	20.20	12.74
	Gonbadli	1.64	1.00
Bushehr	Kangan	29.00	16.00
	Nar	13.20	9.24
Hormozgan	Qeshm (Salekh-Gaverzin)	2.91	2.17
	Sarkhun	7.99	6.40
	Asalouieh	8.00	5.80
	Gashour	7.50	5.00
Fars	Aghar	10.34	8.49
	Dalan	8.42	6.54
Qom	Sarajeh	0.38	0.22
Eylam	Tang Biejar	12.10	6.84
Kermanshah	Babaghier	49.00	24.96
Persian Gulf	North Pars	58.91	46.84
	South Pars	100.00	80.00
Associated gas	-	**379.69**	**253.84**
Onshore	All fields	367.56	248.20
Offshore	All fields	12.13	5.64
Total	-	**709.28**	**486.08**

Source: Ministry of Power Generation, Energy Planning Department, *Energy Balance Sheet*, 1994.

Table III.52. LPG production and consumption, 1976-92, selected years
(Thousand cubic metres)

	1976	1991	1992
Output	1,680	2,032	2,079
Consumption	710	2,813	3,062

Source: Ministry of Power Generation, Energy Planning Department, *Energy Balance Sheet*, 1994.

The promotion of the use of natural gas and LPG during the past two decades has been extremely successful. Natural gas now accounts for a significant proportion of the energy needs of the residential and commercial sectors, and is also used to fuel a large number of industrial plants, including several energy-intensive industries such as steel, copper, aluminum, cement and power plants. It is also utilized as feedstock in the country's expanding petrochemical industry.

To utilize the country's vast natural gas resources further and help alleviate the problem of pollution, especially in Tehran, the government is also trying to promote the use of compressed natural gas (CNG). About 22,000 public transport vehicles were targeted to run on CNG fuel by the end of the 1994-95 Iranian year that ended in March 1995.

Constraints and prospects

The contribution of natural gas to meeting Iran's energy needs has grown considerably since the late 1970s. Because transportation accounts for a significant portion of the international price of natural gas, the government encourages its domestic use, since Iran also has an extensive infrastructure of pipelines and distribution networks and has developed a considerable capacity for the production of pipes and the construction of pipelines.

As the country with the second largest reserves of natural gas in the world, Iran can easily sustain a further expansion of gas use. In planning the further development of the natural gas industry, however, several important considerations still need to be taken into account. In particular, the need to maintain sufficient gas resources for the application of EOR techniques in the oil industry needs to be borne in mind. The utilization of cap gas and the failure to implement the necessary gas injections for oil recovery purposes could cost the country dearly in terms of lost yields in its oil fields.

Another serious constraint to the further development of natural gas as a domestic fuel is the fact that Iran lies on an earthquake belt. The promotion of residential gas consumption, which typically necessitates the establishment of a dense network of pipelines, could jeopardize human life in heavily-populated areas. There is serious concern about the safety of distribution lines in Tehran, in particular, which is also prone to earthquakes.

In addition to increasing the domestic consumption of natural gas, steps could also be taken to develop Iran's natural gas resources for export, particularly in the form of liquefied natural gas (LNG). This would require huge investments for expanding the production capacity of natural gas and the processing capacity of natural gas into LNG.

PETROCHEMICALS

Recent trends

Iran's vast potential for developing a broad-based and sustainable petrochemical industry was recognized as early as the mid-1960s, when comprehensive plans were drawn up to create such an industry in order to add increased domestic value to the country's abundant resources of fossil fuel. These plans were given a further boost by the oil price rise of the early 1970s, which substantially increased Iran's foreign exchange reserves and facilitated the launch of several government projects during the 1970s.

The first major attempt to develop the petrochemical industry involved the establishment of a chemical fertilizer plant in Marvdasht in 1963. This was subsequently reconstituted as the Shiraz Petrochemical Complex, and expanded twice by the end of the 1970s. Meanwhile, Iran's second petrochemical plant was established on Kharg Island in 1966, producing sulphur and liquefied petroleum gas (LPG) for export.

This was followed by the opening of four further petrochemical plants during the 1970s: the Razi Chemical Complex (formerly known as the Shahpour Chemical Company), the Abadan Petrochemical Company, the Iran Carbon Company, and the Farabi Petrochemical Company (originally known as the Iran-Nippon Company). The Razi complex comprised a large chemical fertilizer unit, while the Abadan facility produced a range of products including polyvinyl chloride (PVC) and caustic soda, with a total production capacity of 94,000 tonnes per year. The Iran Carbon Company had an annual production capacity of 21,000 tonnes of carbon black, and the Farabi company produced dioctylphthalates and phthoclic anhydride with a total capacity of 45,500 tonnes per annum.

The largest project initiated during this period, known as the Iran-Japan Petrochemical Complex (IJPC), did not come to fruition, however, despite the investment of vast sums of money in 1973-79. This giant project, which was intended to be at the heart of Iran's petrochemical industry, was abandoned only months before its commissioning on the eve of the 1979 revolution. After the revolution the Japanese partners returned twice but eventually withdrew because of the Iran-Iraq war, during which the nearly completed complex was severely damaged.

Apart from an expansion of the fertilizer production capacity at the Shiraz Petrochemical Complex in 1985, no new petrochemical project came on stream during the 1980s. On the contrary, the existing capacity was significantly reduced as a result of damage suffered during the eight years of war (1980-88). When the guns fell silent in 1988, the Abadan, Kharg and Farabi complexes were almost entirely inoperative, the Razi complex was operating at 7 per cent capacity, and the IJPC had sustained extensive damage. The output of the entire petrochemical industry barely averaged 13 per cent of its scheduled production capacity during the first year following the end of the war in 1988, and Iran was forced to meet the bulk of its domestic requirements from imports.

The post-war years have witnessed a determined attempt by the government to revitalize the petrochemical industry, however. All existing plants have been recommissioned, although not all of the necessary repairs to the war-damaged units have been completed as yet. In addition, 12 further projects have been launched, at a projected hard-currency cost of more than $3.5 billion.

Table III.53. Petrochemical imports, 1976-92, selected years
(Thousand tonnes)

	1976	1980	1985	1989	1990	1991	1992
Polyethylene	66.5	117.1	60.0	165.9	149.2	124.3	167.3
Ethylene glycol	-	0.5	21.7	25.2	22.7	23.8	29.4
Polypropylene	13.7	17.7	17.1	15.7	36.2	30.5	45.6
Polyvinyl chloride	6.3	42.3	52.3	61.9	86.4	45.4	60.4
Sodium tripolyphosphate (STPP)	-	27.1	70.4	42.5	78.3	68.6	37.6
Dioctylphthalytes (DMT/DOP)	-	8.4	30.6	34.2	40.5	33.3	39.9

Source: *Foreign Trade Statistical Yearbook,* various issues.

The most important of these 12 projects involves the rehabilitation of the IJPC, which has now been reconstituted as the Bandar Khomeini Petrochemical Complex (BKPC). It comprises an olefins as well as an aromatics centre, and is also equipped with units for the production of

liquefied petroleum gas (LPG) and chlor alkali. Its scheduled annual capacity for various products includes:

- 1,900 tonnes of LPG,
- 250,000 tonnes of caustic soda,
- 100,000 tonnes of low density polyethylene,
- 60,000 tonnes of high density polyethylene,
- 50,000 tonnes of polypropylene,
- 40,000 tonnes of polystyrene butadiene,
- 250,000 tonnes of caustic soda,
- 150,000 tonnes of polyvinyl chloride,
- 170,000 tonnes of ethyl dichloride,
- 53,000 tonnes of propylene,
- 350,000 tonnes of benzene,
- 62,000 tonnes of benzene, and
- 144,000 tonnes of xylenes.

The feedstock for the BKPC will include 3.2 million tonnes of natural gas, obtained from the Ahvaz and Marun regions, and 1 million tonnes of naphtha produced at the Abadan refinery. The LPG unit was inaugurated in 1991 and since then a number of other plants have come on stream, some two decades after the project was begun. By the time it is completed, this huge undertaking will have cost $4.5 billion.

The other new ventures which began in 1989-93 include the Arak Petrochemical Complex, whose hard currency needs were put at $1.1 billion. Located in central Iran, the Arak complex comprises 15 units with a designed annual production capacity of 60,000 tonnes of high density polyethylene, 60,000 tonnes of low density polyethylene, 50,000 tonnes of polypropylene, 25,000 tonnes of polybutadiene, 30,000 tonnes of vinyl acetate, 105,000 tonnes of ethylene glycol, and a number of other basic petrochemicals. The feedstock requirements of this giant unit consist of 15,800 bpd of light naphtha and 1,200 bpd heavy naphtha, which are to be supplied from the Arak and Esfahan refineries, respectively.

Another new venture involved the construction of a petrochemical unit in Esfahan. This complex, which came on stream in 1992, has an aromatics plant with a planned capacity of 75,000 tonnes of benzene, 20,000 tonnes of toluene, 22,000 tonnes of orthoxylene, and 20,000 tonnes of paraxylenes. The feedstock for this plant is to be provided by the Esfahan refinery.

A third giant petrochemical plant currently under construction is the Tabriz Petrochemical Complex, with an estimated foreign exchange requirement of $860 million. Its designed capacity includes 100,000 tonnes of high density polyethylene, 90,000 tonnes of polystyrene, 18,000 tonnes of latex, 30,000 tonnes of phenol, 18,000 tonnes of acetone, 18,000 tonnes of acetrine butine, and other basic petrochemicals. A refinery with the same name, located in the vicinity of the complex, will provide the plant with the light naphtha feedstock it requires. The construction of this plant began in 1989 and was to be completed by early 1994, but its completion has been delayed.

Elsewhere, measures have also been taken to expand the capacity and output of existing plants. A methanol production unit with a capacity of 84,000 tonnes, which commenced operation in 1990, and a 200,000 tonne ammonium phosphates plant, which was inaugurated in 1992, have thus been established at the Shiraz Petrochemical Complex. The net effect of these developments has been a sharp increase in the output of the petrochemical industry from 870,000 tonnes in 1988 to almost 5.5 million tonnes in 1992.

Table III.54. Petrochemical output, 1988-92
(Thousand tonnes)

	1988	1989	1990	1991	1992
Total output	870	2,379	2,943	4,261	5,451

Sources: National Petrochemical Company; Ministry of Petroleum.

Despite the systematic expansion of its production capacity, the pattern and level of the petrochemical industry's exports have not been altered to any significant degree. The only major change has been the appearance of methanol and toluene on the petrochemical export list during the past few years.

While the upstream petrochemical base has mainly been built since 1988, and is continuing to be expanded at the present time, a comparatively broad and diverse downstream industrial base was created prior to 1979 to manufacture a wide range of end-use products from petrochemical raw materials. These industries were created partly in response to the protectionist policies adopted during the 1970s and 1980s, and were regarded as vital and immediate absorbers of upstream petrochemical products manufactured for the local market. In addition, they were also looked upon as potential sources of export earnings.

Table III.55. Output of selected basic petrochemicals, 1993

Products	Output (Thousand tonnes)
Benzene	64
Toluene	17
Orthoxylene (o-Xylene)	19
Paraxylene (p-Xylene)	37
Methanol	80
Low density polyethylene	78
High density polyethylene	99
Polypropylene	72
Benzene purified	76
Polybutadiene	21

Sources: National Petrochemical Company; Ministry of Petroleum.

For a long time, however, many of these downstream industries remained heavily dependent on imported inputs. The detergent, rubber, plastics, resins, paint formulation, PVC pipes and fittings, melamine ware, and textile industries in particular continued to import the bulk of their raw material needs until the early 1990s. The situation has changed dramatically since 1992, with the completion of the upstream projects discussed above permitting a sharp reduction in the import

of petrochemical raw materials for the downstream industry. This trend is expected to continue into the foreseeable future as the other plants under construction come on stream and the domestic production of intermediate petrochemicals increases.

Table III.56. Export of selected petrochemicals, 1970-92, selected years
(Thousand tonnes)

	1970	1976	1977	1980	1985	1989	1990	1991	1992
LPG	330.3	496.1	546.3	10.7	..	..	..	..	418.3
Sulphur	..	287.3	..	..	0.5	342.2	175.4	423.2	222.4
Methanol	..	..	..	..	1.0	..	..	52.2	53.9
Ammonia	12.5	9.2	100.0	..	..	79.2	..	31.1	40.5
Toluene	-	-	-	-	-	-	-	-	19.8

Source: *Foreign Trade Statistical Yearbook*, various years.

Iran's detergent and washing-up liquid industries have grown considerably since the mid-1960s and now have a total annual production capacity of about 200,000 tonnes each. Although initially conceived as import-substituting industries, they were able to export relatively large quantities of their output to a number of neighbouring countries until the late 1970s. These markets were largely lost in subsequent years, however, as a result of the political and economic disturbances of the 1980s.

Despite their growth, these industries have remained dependent on imports of a number of active agents, including linear alkyl benzene (LAB), and other raw materials. To complete the link between the upstream production of basic petrochemicals and the downstream detergent industry, a LAB production facility of 50,000 tonnes per year is now under construction.

The Esfahan polyacryl plant, with a yearly production capacity of 50,000 tonnes, has been dependent on imported raw materials since it became operational in 1974. This plant provides only 20 per cent of Iran's total domestic requirements of polyester fibre and thread, however. Moreover, its production capacity for polypropylene fibre amounts to only 8,000 tonnes per year, but nine new projects with a total capacity of 82,000 tonnes have already been approved, and if fully implemented will boost Iran's polypropylene fibre capacity beyond local needs. In addition, a plant is also under construction for the manufacture of dimethyl terephthalate (DMT), an intermediate petrochemical that completes the chain between paraxylene and polyester fibre.

One of the other major domestically produced intermediate petrochemicals is formaldehyde, which is utilized by various end use manufacturers, such as the paint industry with an annual capacity of 300,000 tonnes, the resins and glue industry with an annual capacity of 80,000 tonnes, and the melamine ware industry, which also has an annual capacity of 80,000 tonnes. In addition, a manufacturing plant for melamine crystals, with a planned annual capacity of 3,000 tonnes, is also under construction in Urumieh, but completion may be delayed by foreign exchange difficulties. In recent years the average volume of melamine crystal imports has been around 10,000 tonnes.

Meanwhile, the plastics industry has also developed considerably since the mid-1960s. Its present capacity is 800,000 tonnes. This industry was also heavily dependent on imports until the olefins plants came on stream in the early 1990s, which now supply a large portion of the industry's raw material requirements.

Iran's rubber industry, which was created principally in the 1970s, has an annual capacity of 200,000 tonnes. This figure is expected to rise to 270,000 tonnes per annum upon completion of projects currently under way to manufacture tyres and rubber parts. This sector, too, has depended on imports of butadiene rubbers, which are to be produced locally in the future when related plants come on stream. Another intermediate petrochemical related to the rubber industry is carbon black. The completion of a production plant with a planned capacity of 15,000 tonnes per annum, which is now under construction, will increase Iran's annual capacity to about 35,000 tonnes, about 50 per cent of the country's total requirements.

The PVC pipes and fittings industry, which was founded by the Polika Company in 1962, has gradually expanded to a yearly output of 130,000 tonnes. New facilities installed in the early 1990s will further raise Iran's PVC production capacity to more than 200,000 tonnes in the near future. This will significantly reduce the import-dependence of the PVC pipes and fittings industry.

Constraints and prospects

As one of the world's leading oil producers, Iran was one of the pioneers in establishing a strong petrochemical industry. Although this process was interrupted briefly between 1978 and 1988, it has now been resumed and the industry's upstream production capacity has been extensively enlarged in recent years, but only after a long halt. The continued glut, leading to the current excess-supply situation in world petrochemical markets, has considerably reduced the scope for the export of basic petrochemicals. However, these upstream plants will be able to supply the growing needs of an assorted range of domestic downstream manufacturers, and the import-competing role of this industry will be enhanced as and when new intermediate petrochemical projects are completed.

While prospects for exporting basic petrochemicals remain generally limited, there is good scope for the export of certain end-use products. This is mainly due to Iran's comparatively broad and diverse production base, and the availability of appropriate human resources, technical know-how and expertise in the downstream manufacture of these products, which has been acquired through the country's extended engagement in these fields.

As yet there has been no private participation in the upstream parts of the industry. All activities related to the production of basic petrochemicals by state-owned and/or affiliated organizations (excluding the Ministry of Defence) fall under the supervision of the National Petrochemical Company (NPC), founded in 1964. The NPC is an arm of the Ministry of Petroleum.

AGROCHEMICALS, FERTILIZERS AND PESTICIDES

The resource base

Although Iran has large deposits of dolomite, it lacks most of the other major raw materials needed for the production of organic fertilizers, including phosphates. The country's fertilizer industry is therefore limited to the production of inorganic fertilizers, for which the principal raw

material is provided by its natural gas industry. Natural gas also provides an important raw material base for the manufacture of pesticides, but the volume of production is relatively small.

Fertilizers

Recent trends

The production of chemical fertilizers dates back to the establishment of a comparatively small facility at Marvdasht in the province of Shiraz in 1963. The initial annual production capacity of this unit, which formed the nucleus of the Shiraz Petrochemical Complex, consisted of 40,000 tonnes of ammonia, 48,000 tonnes of urea, 45,000 tonnes of nitric acid, and 40,000 tonnes of ammonium nitrate. The establishment of this plant coincided with the government's efforts to introduce modern cultivation practices to boost agricultural output, with wide-ranging measures being taken from the early 1960s onwards to promote the use of chemical fertilizers, *inter alia* through the distribution of subsidized fertilizers by the Ministry of Agriculture.

Faced with a rapid growth in demand, the government initiated the country's second fertilizer project in 1966. This plant, the Razi Chemical Complex (formerly known as the Shahpour Chemical Company), represented a joint venture between the government and the Allied Chemical Company, with both parties holding an equal stake. The plant came on stream in 1970, and was expanded considerably in 1974, following which the government bought out its foreign partner in 1975.

The plant sustained serious damage after being bombed in the 1980-88 war, but has since been restored. By 1994 its annual production capacity had been increased to 610,000 tonnes of sulphur, 660,000 tonnes of ammonia, 700,000 tonnes of urea, 230,000 tonnes of diammonium phosphate (DAP), 1 million tonnes of sulphuric acid, 260,000 tonnes of phosphoric acid, and 180,000 tonnes of monoammonium phosphate (MAP).

In the meantime, the Shiraz Petrochemical Company was also expanded, with a small facility for the production of 30,000 tonnes of triple polyphosphate (TPP) and 20,000 tonnes of DAP per year being inaugurated in 1976. The second phase of its fertilizer capacity expansion started in 1976, but was not completed until 1985 due to work stoppages in the early 1980s. The completion of the second phase lifted the annual production capacity of the Shiraz Petrochemical Complex to about 440,000 tonnes of ammonia, 540,000 tonnes of urea, 380,000 tonnes of nitric acid and 255,000 tonnes of ammonium nitrate.

The designed production capacity of the two existing plants, the Shiraz Petrochemical Company and the Razi Petrochemical Company, together equals about 1.1 million tonnes of ammonia, 1.2 million tonnes of urea, 380,000 tonnes of nitric acid, 255,000 tonnes of ammonium nitrates, 500,000 tonnes of DAP, 180 tonnes of MAP, 20,000 tonnes of phosphoric acid, and 20,000 tonnes of triple superphosphate (TSP). This is insufficient to meet domestic demand, and since 1980 Iran has become a major importer of chemical fertilizers. As indicated in Table III.57, imports of urea rose from 13,400 tonnes in 1977 to a peak of 464,700 tonnes in 1985, and after some sharp fluctuations in subsequent years amounted to 323,200 tonnes in 1992.

The import and distribution of inorganic fertilizers is conducted solely by the Iran Fertilizer Company affiliated to the Ministry of Agriculture. This company distributes locally produced and imported fertilizers at heavily subsidized prices. The level of this subsidy has been reduced in recent years by the adjustment of the rial's exchange rate, however.

Table III.57. Imports of selected fertilizers, 1976-92, selected years
(Thousand tonnes)

	1976	1980	1985	1986	1990	1991	1992
Urea	13.4	131.3	464.7	402.1	31.9	189.7	323.2
Ammonium sulphate	2.0	33.5	30.7	26.2	4.9	-	6.9
Ammonium phosphates	101.2	230.3	599.5	693.8	648.8	..	667.2

Source: *Foreign Trade Statistical Yearbook*, various issues.

To attain self-sufficiency in the production of fertilizers, the government planned three projects for 1983-87. These included two DAP plants with annual production capacities of 200,000 tonnes each, and one 500,000 tonnes urea plant in the Nelka region of northern Iran. Of these, only one DAP project has been undertaken to date. It has been integrated into the Razi Petrochemical Complex and came on stream in 1992.

In lieu of the Nelka project, the establishment of another plant for the production of urea was proposed for the province of Khorassan. This project, estimated to involve a foreign exchange outlay of about $270 million, was undertaken in early 1990. As feedstock it will utilize the natural gas of the Khangiran field, and will have an annual production capacity of 420,000 tonnes of urea, 90,000 tonnes of sulphur-coated urea, and 60,000 tonnes of agricultural sulphur. The achievement of the project's proposed completion date of early 1995 has been prevented, however, by persistent foreign exchange difficulties.

Constraints and prospects

Despite the impressive expansion of the chemical fertilizer industry during recent decades, its output has not kept pace with the growth in domestic demand. The completion of the Khorassan Petrochemical Complex will bring the country closer to self-sufficiency in urea, the bulk of which is used in the traditional agricultural sector. As noted above, however, this project is now confronted with foreign exchange problems, which have restricted the government's ability to import the necessary machinery and equipment, and resulted in a delayed completion of the project.

Domestic demand for fertilizer is expected to remain relatively strong, although its growth may be weakened if the existing price subsidies are reduced. Such a reduction in subsidies is highly likely over time, however, in view of the budgetary constraints facing the government. The development of export markets could provide an alternative source of growth for the industry, but this would require a significant reorientation of its current marketing structure.

Pesticides

Recent trends

Following the introduction of land reforms of the early 1960s, the government initiated wide-ranging measures to boost agricultural output. Parallel to the introduction of modern production technologies in the traditional small-scale agricultural sector, the use of pesticides was

also promoted. The resulting increase in the use of pesticides led to the establishment of Iran's first pesticide formulation firm, the Karaj Chemical Factory, in 1965, with a production capacity of 4,400 tonnes per annum.

A rapid growth in demand in subsequent years attracted a number of private investors into the industry. During the 1970s several comparatively small-scale firms with production capacities of 500-1,000 tonnes per year were established. This was followed by the establishment of Sherkat Melli Shemiai Keshavarz, a large firm with a production capacity of 15,000 tonnes per year belonging to the state-owned commercial bank, Bank Melli Iran, which came on stream during the late 1980s.

The opening of the Sherkat Melli Shemiai Keshavarz plant took the total number of firms engaged in the formulation of pesticides to 19, with a joint production capacity of about 50,000 tonnes per annum. Of these, only six plants are currently operating, with the remainder having been shut down for environmental reasons or having become unviable as a result of the imposition of price controls and new arrangements for the importation of active ingredients after 1979. These resulted in exclusive rights to import active ingredients being granted to the state-owned Plant Protection Production and Distribution Company affiliated to the Ministry of Agriculture, which distributed them only among firms that had a contract with the Ministry for the distribution of pesticides at the low administered prices. This practice had a devastating impact on many of the smaller firms that used to import their active ingredients individually and sell their products at market prices, but could not operate profitably at the government's administered prices because of their small scale.

These regulations were liberalized in the early 1990s, however, with individual formulators of pesticides being permitted to import the active ingredients they require. This new policy has resulted in formulated pesticides being exported to neighbouring countries by local manufacturers who find the subsidized domestic prices unattractive. They have reaped substantial gains from the difference between the lower foreign exchange rates earmarked for the import of active ingredients and higher prices obtained from their exports.

According to a survey conducted by UNIDO in 1984, Iran was the world's ninth largest importer of pesticides and the second largest importer among the developing countries after China. However, it is widely believed that a large gap between domestic and international prices resulted in a significant proportion of the imported pesticides being smuggled from Iran to neighbouring countries.

Table III.58. Imports of pesticides, 1976-93, selected years

		1976	1980	1982	1983	1990	1991	1992	1993
Pesticides	Thousand tonnes	21.0	21.3	33.4	37.4	29.0	44.8	11.4	..
Active ingredients	Tonnes	200	1,647	4,574	5,337	2,369	4,553	2,511	173

Sources: *Foreign Trade Statistical Yearbook*, various years; Plant Protection Production and Distribution Company.

Table III.59. Domestic pesticide formulation and distribution, 1981-93, selected years
(Thousand tonnes)

	1981	1982	1983	1984	1986	1988	1989	1990	1991	1992	1993
Pesticide formulation	22.0	26.0	24.9	35.9	24.0	20.5	22.5	25.9	27.8	18.6	13.9
Pesticide distribution[a/]	26.0	30.0	45.0	48.7	35.0	33.3	30.5	53.9	56.3	34.4	28.4

Source: Plant Protection Production and Distribution Company.

a/ Including imported fertilizers.

Iran's pesticide industry is confined to the production of insecticides. The annual capacity of the plants currently in operation, estimated at 30,000 tonnes, is significantly higher than the domestic demand for insecticides. In addition, the production capacity will rise further when another state-owned plant with a production capacity of about 5,000 tonnes per annum now under construction is completed.

Despite its considerable size, the pesticide formulation industry is entirely dependent on imports of active ingredients. An attempt to establish a domestic production capacity for such active ingredients was launched in 1973 with the formation of a foreign joint-venture company to manufacture these materials. The company's production facilities did not become operational until 1979, however, and its activities were subsequently curtailed because of the political and economic dislocations of the following years.

A feasibility study into the manufacture of a variety of phosphate-based active ingredients was undertaken during the mid-1980s. This resulted in the drafting of a plan for the establishment of a domestic production capacity of four types of active ingredients, with a total production capacity of 4,000 tonnes per annum, which was to be implemented by a company affiliated to the Ministry of Agriculture. Although negotiations have been held with foreign companies for technical cooperation in this project, no agreements have been reached as yet. In addition, the Iranian authorities have also approved eight other projects for the production of 21 types of active ingredients with a combined production capacity of 12,000 tonnes, but none of these has begun to be implemented either.

Constraints and prospects

Iran's pesticide formulation industry is likely to remain dependent on imports of active ingredients for the foreseeable future, since its ability to acquire the technical expertise for the development of a domestic active ingredients industry is hampered by a number of constraints. These include the country's ambiguous foreign investment laws as well as the prevailing scarcity of foreign exchange. In addition, Iran is still subject to a variety of sanctions on the transfer of technologies that could have possible military applications, including the production of potentially hazardous chemical compounds.

Although demand for insecticides accounts for the bulk of overall domestic demand for pesticides, significant quantities of imported herbicides and fungicides are also consumed. While the manufacture of these products may provide some scope for the further expansion of Iran's pesticide formulation industry, such growth is likely to remain limited in the foreseeable future. Shortages of foreign exchange, uncertainties about future government policies with regard to the distribution and pricing of pesticides, and difficulties in gaining access to the required raw materials and technologies will all play a part in restricting the industry's short-term growth.

PHARMACEUTICALS

Recent trends

The foundations of Iran's modern pharmaceutical industry were laid in 1946 when the small Dr. Abidi Laboratory was established. The industry did not take off until 1957, however, when a relatively large formulation firm known as the Towlid Darou Company came on stream, producing a variety of medicines under licence from several American and European multinational corporations. The following two decades witnessed a strong expansion of the industry, which benefited from substantial foreign investments. By 1979 no fewer than 17 multinationals had either established local subsidiaries or entered into joint ventures with Iranian partners.

The expansion of the pharmaceutical industry before to the 1980s resulted from the growth in demand for medicines caused by high population growth, rising *per capita* income, and enhanced urbanization. It was also stimulated from the mid-1960s onwards by the extension of Iran's health care programme into rural areas via small clinics and the establishment of a "Health Corps" composed of high school graduates completing their military conscription, who were required to promote health education in rural areas. In addition, it was promoted by the rapid expansion of social health care benefits to government and industrial workers following the unprecedented growth of the two sectors after the mid-1960s.

Despite its growth, the domestic pharmaceutical industry was unable to keep up with the sharp rise in demand for medical products, especially after the mid-1970s when the improvement in welfare standards supported by the rise in oil prices overwhelmed the already stretched supply side. The shortfall was compensated by imports, with an average of $500 million per year being spent on imports of pharmaceutical products in the late 1970s.

The industry witnessed substantial changes after 1979. For one thing, all major firms and a number of small laboratories came under state control. For another, the generic system was introduced in 1980, as a result of which all locally manufactured products, which have on average accounted for about 80 per cent of total supply in recent years, carry only generic names and the names of the companies manufacturing them.

While these measures have been highly successful in providing good quality products at low prices to a wide range of consumers, they have also had a number of disadvantages. The nationalization of the industry resulted in the departure of the foreign multinationals and a decline in investment to negligible levels, while the move to generic medicines deprived the Iranian market of many specialized new products available in the world market. As a result, the pharmaceutical industry is mainly confined to formulation and packaging activities. It consists of 49 firms, the bulk of which are small laboratories, with a further firm currently being established and scheduled to come on stream in 1995.

Table III.60. Production of major pharmaceutical products, 1987-93

	Units	1987	1988	1989	1990	1991	1992	1993
Tablets	Million units	8,009.1	6,704.3	8,710.3	10,570.0	9,891.0	8,718.0	8,429.0
Capsules	Million units	1,322.9	1,186.3	1,358.2	1,862.3	1,742.0	1,645.0	1,404.0
Syrup	Thousand units	16,421.5	14,755.3	18,999.0	20,277.7	18,312.0	17,989.0	15,218.0
Drops	Thousand litres	755.8	561.0	887.9	1,042.3	941.2	927.0	751.0
Ampoules	Million units	263.8	277.8	336.5	374.4	338.3	383.0	300.6

Source: Ministry of Industry.

The domestic price of medicines has been heavily subsidized since the 1980s through the allocation of low-priced foreign exchange for the import of basic materials. Although foreign exchange rates have been adjusted upwards in the early 1990s in the context of the government's overall strategy to rationalize the exchange rate system, the industry remains subsidized through priority foreign exchange allocations at reduced rates. This subsidy is passed on to consumers through strict price controls, and has helped to sustain high levels of pharmaceutical use in Iran. The country currently has one of the highest *per capita* rates of medicine consumption in Asia.

While Iran's pharmaceutical industry is mainly confined to formulation activities and thus dependent on imported active materials, a number of projects have been undertaken to establish a domestic production capacity for these materials. The most important of these is the Shahid Modarres Complex (SMC), which is still in the process of completion but has already been licensed to produce 51 such items. Its production of magnesium by-products, with a capacity of 60 tonnes per annum, started during 1994, and the production of sorbitol, with a capacity of 7,150 tonnes per year is scheduled to begin in mid-1995. The production of a number of other raw materials, including ampicillin trihydrate with an annual capacity of 200 tonnes, is also under evaluation.

Table III.61. Export of herbs for pharmaceutical and industrial use, 1970-92, selected years
(Thousand tonnes)

1970	1976	1980	1985	1989	1990	1991	1992
35.6	9.2	5.3	9.5	21.7	22.8	19.9	19.6

Source: *Foreign Trade Statistical Yearbook*, various issues.

In addition, Iran has recently established a plant for the production of eight types of raw materials with the assistance of UNIDO, which came on stream in early 1994. Two other plants for the production of pharmaceutical raw materials, the Tenadiran and Shahid Razkani companies, are

also in the final stage of completion. In another development, the production of dextrose was begun in the early 1990s by the newly established Dextrose Company.

Iran has a long history in the production and export of herbal drugs and their use in the manufacturing sector. A wide variety of such products, including liquorice, clover, hempseed, aniseed, coriander, madder, gum tragacanth, henna and linseed have been exported since the early 1900s. A report prepared by the Ministry of Agriculture in 1985 estimated the export potential of such products at about 140,000 tonnes per year.

Table III.62. Import of pharmaceutical products, 1980-92, selected years
(Tonnes)

	1980	1985	1989	1990	1991	1992
Final products						
Vitamins	256.5	351.5	269.0	1,412.6	1,849.3	610.0
Antibiotics	43.6	325.5	686.5	1,050.8	1,070.0	808.2
Active materials						
Barium sulphate	535.7	1,030.4	-	66.0	2,775.5	2,173.9
Sulphadimidine	160.4	195.7	20.0	30.5	54.9	6.4
Cupric sulphate	349.6	61.2	-	307.6	309.4	47.1
Zinc oxide	336.9	307.1	981.1	4,048.9	291.3	605.1
Boric acid	174.8	1,642.0	2,170.4	1,749.1	1,900.2	460.9
Sodium sulphate	5,618.6	18,018.9	27,174.8	33,296.7	44,208.1	31,781.3

Source: *Foreign Trade Statistical Yearbook.*

Constraints and prospects

The pharmaceutical industry's prospects remain mixed. Although Iran has a big and growing market, the comparatively high *per capita* consumption of drugs is expected to decline when the existing subsidies are removed. The issue of subsidies for this sector may not be easily resolved, however, as it has become a socially sensitive issue. This may, in turn, result in continued state intervention in the industry, thereby restraining further the domestic competition required to improve quality and support the development and introduction of new drugs. Other constraints facing the industry include the break in its technical links with the multinationals and the prevailing foreign exchange difficulties, which will hamper its attempts to upgrade its ageing equipment and machinery.

E. NON-METALLIC MINERAL PRODUCTS (BUILDING MATERIALS)

The resource base

Iran is richly endowed with a wide range of non-metallic mineral resources, including limestone, gypsum, refractory sand, salt, barites, marble and other building stones, kaolin and clay, dolomite, bentonite, and talc. The country is therefore well placed for the mass production of building and

refractory materials. Large deposits of limestone, clay, gypsum and quartz, the principal raw materials for cement production, exist throughout the central plateau, but are only marginally utilized. The latest report by the Ministry of Mines and Metals estimates Iran's known limestone reserves at around 4.5 billion tonnes in 241 mines. The reserves of the 416 existing gypsum mines are estimated at 3.4 billion tonnes, while reserves of kaolin, used in the production of white cement, are put at more than 15.3 million tonnes.

Energy plays a major role in the production of most building materials. Consequently, Iran's cost advantage for the production of energy-intensive building materials like cement, lime and plaster is further enhanced by the abundance of the country's energy resources. Gas oil, available in substantial quantities, has emerged as an important source of energy for most industries, including cement, in recent years. In addition, gas also provides a further abundant source of energy, which can be substituted for gas oil whenever the need arises.

CEMENT

Recent trends

Iran's cement industry was created in 1933 when the state-owned Ciman-e-Ray plant went into operation with a daily production capacity of 100 tonnes. The country's second plant, a small manufacturing facility with a daily production capacity of 60 tonnes, was established by private investors almost two decades later. The establishment of two additional plants in subsequent years increased total domestic production capacity to 460 tonnes per day by 1955. During the next two decades eight new plants came on stream, while at the same time the production capacity of the existing plants was also significantly increased. By 1975 a total of twelve factories with a combined daily capacity of 24,000 tonnes were in operation.

Demand for cement increased after 1950 as construction boomed in response to a growing demand for housing and the implementation of the first Five-Year Economic Development Plan, which called for substantial public expenditure on infrastructural development. The quadrupling of Iran's foreign exchange revenues following the oil price rise of 1973/74 and the resulting upward revision of public capital expenditure in the fifth Five-Year Economic Development Plan brought in its wake an unprecedented growth of the construction industry as both private and public investment in this field increased sharply. This prompted a sharp increase in imports of cement as domestic production fell far short of domestic demand.

The government's strong sensitivity towards domestic inflation resulted in the imposition of a strict price control regime until the mid-1970s and discouraged new investments. The shortfall in domestic production, interspersed with irregular imports, gave rise to a flourishing black market for cement during the early part of the 1970s. The situation improved dramatically as a result of the increase in international oil prices in 1973/74, however, which triggered a strong growth of GDP during the latter half of the decade and offered favourable prospects for a further growth in domestic demand for cement.

An upward revision of cement prices in 1974 stimulated by the growth in demand led to a marked improvement in the investment climate for the cement industry. During the latter part of the 1970s, eleven proposals from private entrepreneurs for the construction of new plants and/or the expansion of existing ones were approved by the Ministry of Industry and Mines. This resulted in an overall increase in the industry's production capacity by 26,500 tonnes per day by the end of the decade.

While only two firms were state-owned prior to 1979, most of the existing firms were brought under state ownership in the following years, with the government taking majority shares in all of the remaining plants. Despite this, local production expanded steadily during the 1980s, mainly as a result of the completion of projects undertaken prior to 1979. By 1994, a total of 17 factories were in operation, of which 16 with a combined annual capacity of 17.3 million tonnes were producing grey cement, and one with an annual capacity of 78,000 tonnes was producing white cement.

Despite this increase in domestic output, a chronic shortage of cement persisted into the 1980s. Demand outpaced supply again as a result of the growing need for residential units, as well as the sale of land at very low prices by the government and the provision of building materials at highly subsidized prices. More importantly, however, the reconstruction of the areas devastated by the 1980-88 war and the impact of earthquakes and floods has also generated considerable demand for cement both by the private and public sector during the last 15 years.

With demand remaining strong, the government provided potent incentives for investment in the cement industry throughout the 1980s, mainly through the allocation of foreign exchange at highly undervalued exchange rates for the import of plant and equipment, and through the provision of land and building materials at prices significantly below their market values. These incentives proved more than sufficient to offset the deterrent effect of the artificially low prices and tight controls on the distribution of cement imposed during this period, and resulted in hundreds of applications being submitted for the establishment of new cement plants. Of these, 50 investment projects with production capacities ranging from 300 tonnes per day to 10,000 tonnes per day were approved, of which 19 succeeded in securing subsidized foreign exchange. Twelve of these, with a combined capacity of 23,700 tonnes per day, are scheduled for completion by mid-1995. In the meantime, moreover, the government has also relaxed the previously enforced price and trade restrictions on the cement industry as part of its post-war economic reform programme, which should help to stimulate further investment interest in the coming years.

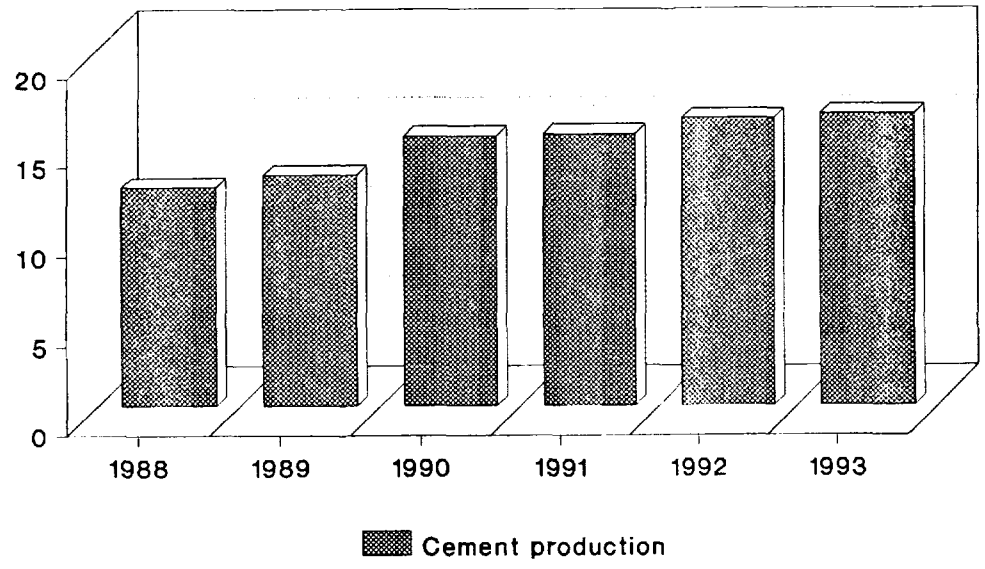
Table III.63. Production, imports and exports of cement, 1970-93, selected years
(Thousand tonnes)

	1970	1975	1980	1985	1988	1989	1990	1991	1992	1993
Production	2,660	5,421	8,200	11,954	12,193	12,869	15,055	15,152	16,000	16,260
Imports	112	828	300	-	2	1	2	1	1	-
Exports	85	-	-	-	45	169	60	40	-	-

Sources: Ministry of Mines and Metals; *Foreign Trade Statistical Yearbook*, various issues.

An important downstream activity associated with the cement industry involves the manufacture of asbestos products such as pipes and roofing materials. The first asbestos plant, with an initial production capacity of 30,000 tonnes per annum, was established in 1959 as a joint venture with a French firm. A second plant was set up in 1969 with an annual production capacity of 120,000 tonnes. By 1980 the number of factories producing asbestos products had increased to eight, with the industry's overall production capacity rising to more than 500,000 tonnes per year.

Fig. III.J. Production of cement, 1988-93
(Thousand tonnes)



Source: Ministry of Mines and Metals.

Table III.64. Output of asbestos products, 1970-93, selected years
(Thousand tonnes)

	1970	1975	1977	1989	1990	1991	1992	1993
Asbestos products	66.3	148.2	350	236.7	370.2	342.3	353.9	374.0

Source: Ministry of Industry.

Constraints and prospects

The cement industry in Iran faces a number of serious constraints, one of the most important of which is the low efficiency of the state-owned enterprises, which have a capacity utilization rate of only 75-80 per cent. Transportation also poses a serious problem in view of the large size of the country and the prevailing infrastructural constraints. This necessitates bagged rather than bulk transport, and results in high transport costs.

Domestic production capacity will increase by almost 40 per cent, from 18 million tonnes per annum to more than 25 million tonnes per annum, when the twelve new factories scheduled to go on stream by mid-1995 are completed. This figure will increase further to almost 30 million tonnes when seven other plants currently under construction commence production in the late

1990s. In addition, the liberalization of the cement market in the early 1990s will almost certainly stimulate further investment interest in the industry.

The prospects for demand growth are more uncertain, however. Although the government has ambitious plans for the construction of 25 new towns, 2.5 million housing units, and a number of hospitals and community centres during the Second Socio-Economic and Cultural Development Plan period (1995-2000), the execution of these projects could be hampered by resource constraints arising from the reduction in the government's budgetary revenues as a result of the weakness in oil prices, which is expected to persist into the foreseeable future. At the same time, construction of new housing by the private sector is likely to be curbed by the anticipated slowdown in the growth of *per capita* incomes, the effects of which may be exacerbated by the tight anti-inflationary monetary policy pursued by the Central Bank since the early 1980s.

It therefore appears likely that the industry may encounter some excess capacity upon completion of current projects. This problem may be alleviated, however, through the pursuit of a more vigorous export-promotion strategy. The countries of the Persian Gulf and Afghanistan have traditionally been important export markets for Iran's cement industry, and shipments to these markets could be substantially increased through improvements in marketing and product quality.

LIME

Recent trends

Lime is obtained by the calcination of limestone and calcium carbonate. It has modest but wide ranging applications in industry and agriculture, but its main use is in the construction sector. Traditionally, a mixture of lime and clay was used in lieu of cement in Iran, but the introduction of cement has substantially reduced the use of lime by the construction industry. It is still used for building houses in some rural areas of the country.

At present the lime producing industry consists of two large factories with a capacity of 60,000 tonnes per annum, and a large number of small manufacturers accounting for almost half of Iran's total output. The remainder is produced as a by-product by a wide variety of other industries, including steel mills, the sugar industry, and producers of petrochemicals and fertilizers. While no production data are available for the latter half of the 1980s and the early 1990s, the available data indicate relatively high production levels in the early 1980s. This was prompted largely by the acute cement shortages prevailing in those years, which caused a sharp rise in the consumption of lime in the rural areas. Since the late 1980s 25 new projects with a combined capacity of more than 1.2 million tonnes per annum have been licensed for the commercial production of lime by private investors, although only a few of them have begun to be implemented as yet.

Table III.65. Lime production, 1982-86
(Thousand tonnes)

	1982	1983	1984	1985	1986
Lime production	157.9	185.8	173.3	120.1	62.5

Source: Ministry of Mines and Metals.

Constraints and prospects

The future growth prospects for the lime producing industry remain limited. Though once widely used in the construction industry, lime has been largely replaced by cement, and its consumption by other sectors of the economy is also limited. If all of the licensed projects are undertaken, commercial production capacity will increase more than sevenfold, which will inevitably result in the emergence of a substantial degree of excess capacity.

PLASTER

Recent trends

The use of plaster as a building material has historical roots in Iran dating back to 2000 B.C. The gypsum obtained from shallow mines scattered throughout the country was processed into plaster using traditional methods until comparatively recently, although these traditional techniques have now been replaced by modern manufacturing methods. The first plaster manufacturing facility was established in 1971 with a nominal capacity of 720,000 tonnes of packaged plaster and 450,000 square metres of prefabricated plaster products per year. The second processing plant came on stream in the following year with an annual production capacity of 432,000 tonnes. By 1977 the number of gypsum processing plants had grown to nine, and their combined capacity had risen to 2.2 million tonnes per annum. In addition, nine further plants with a total annual capacity of 2 million tonnes were in the process of being set up.

The consumption of plaster in the construction sector is comparatively high due to its widespread use as a covering for walls and ceilings in Iran. These high consumption levels attracted a large number of new investors as construction boomed during the 1970s and the 1980s. By 1992 the number of plaster factories amounted to 58, with a combined production capacity of 8 million tonnes per year. As many as 105 additional projects with a total annual capacity of 8.5 million tonnes have been licensed, but only a relatively small number of these projects are under way.

Table III.66. Production of plaster, 1973-93, selected years
(Thousand tonnes)

	1973	1974	1975	1976	1977	1989	1990	1991	1992	1993
Plaster	2,239	2,720	4,000	5,200	6,032	3,400	3,700	3,900	3,500	3,290

Source: Ministry of Mines and Metals.

Constraints and prospects

Prospects will be grim if many of the authorized projects come on stream in the near future because the domestic market will not be able to absorb all of the additional output. The best estimates suggest that the demand for plaster will reach 6 million tonnes per annum during the Second Socio-Economic and Cultural Development Plan period (1995-2000) even if the government's known massive construction plans are carried out. This figure represents almost 75

per cent of the existing production capacity and only 38 per cent of the production capacity established when all the licensed projects are completed.

There are, however, good prospects for the export of plaster to neighbouring countries, although this will require a reorientation of production for export and aggressive marketing. In addition, there is also some scope for increasing the production of prefabricated plaster products, such as internal partitioning walls. The use of plaster blocks is also becoming increasingly popular, especially in high-rise buildings, as they are comparatively light and easy to handle at high speed.

GLASS

The resource base

With rich deposits of all of the principal materials required for glass production, including silica and limestone, Iran is in a good position to produce glass on a mass scale. The country's easy access to cheap and diverse sources of energy reinforces its favourable position. The only major ingredient for the production of glass not produced in sufficient quantities within the country is sodium carbonate or soda ash.

Recent trends

Iranians have been acquainted with the production of glass since ancient times. In contemporary times, however, the commercial production of glass has its origin in the establishment of the Iran Glass Company in 1940. This was originally a comparatively small facility producing glassware and sheet glass, but has gradually been expanded to its present annual production level of 20,000 tonnes.

A second glass manufacturing plant was set up at Qazvin in 1968 as a joint venture between the state, several local private investors and the Nippon Sheet Glass Company of Japan, which later limited its involvement to technical assistance only. The production capacity of the Qazvin plant was originally set at 12,000 tonnes per annum, but was increased in several phases to the present level of 120,000 tonnes per annum.

Heavy demand generated by the construction boom of the late 1960s stimulated further investment in the glass industry. Abgineh, Iran's third major manufacturer of glass products, came on stream in 1972 with an annual production capacity of 20,000 tonnes. The company was initially established as a joint venture between the Bank of Industry and Mines, local private investors and the Belgian firm Glaverbel, which sold its shares to the Iranian partners in 1976.

Iran's total production capacity for sheet glass had risen to 200,000 tonnes by 1980, but declined considerably during the following years due to inadequate replacement investment. Two new projects to produce sheet glass with a combined annual production capacity of 125,000 tonnes are now in progress at Sareh in the Markazi province and at the Abgineh glass factory, however, and on completion will increase the country's total production capacity to around 285,000 tonnes per annum in the coming years. Two further projects with a combined capacity of 160,000 tonnes per annum have also been authorized in recent years.

The commercial production of bottles and glassware expanded rapidly in the years following the establishment of the Iran Glass Company. The demand for glass bottles and other containers grew substantially as the beverage and food industry expanded, attracting substantial volumes of private investment. This branch of the industry now comprises four major firms with a combined

production capacity of 120,000 tonnes per annum and several small-scale traditional producers with an estimated production capacity of 8,000 tonnes per year. In addition, nine investment projects for the production of glassware with a total capacity of 106,000 tonnes per annum have been approved by the Ministry of Industry in recent years, of which three projects, with a total capacity of 64,000 tonnes per year, are in the process of completion.

Table III.67. Production of sheet glass and glassware, 1989-93

		1989	1990	1991	1992	1993
Sheet glass	Thousand tonnes	161.2	194.3	189.6	224.6	256.2
Security glass	Thousand square metres	569.4	928.3	1,154.6	1,204.6	1,000.1
Glassware	Thousand tonnes	113.9	97.0	117.5	128.7	117.9

Source: Ministry of Industry.

The investment boom in the pharmaceutical industry during the 1970s was not accompanied by a corresponding investment in production facilities for the glass containers required by this industry. This was due mainly to the fact that most pharmaceutical plants were completed in the late 1970s, and that in the years after 1979 medicine imports were heavily subsidized through the provision of substantially undervalued foreign exchange allocations that also covered imports of glass containers. The artificially low import prices discouraged private investors until the early 1990s, when a partial adjustment of the prices of pharmaceutical products was initiated. This new climate has encouraged investments in the manufacture of medicine and its glass containers, with four major projects with a combined capacity of almost 34,000 tonnes per annum having been launched in the past few years. The first of these is expected to be completed in 1995/96.

An activity associated with the glass industry is the production of security glass. The first Iranian manufacturer of this product, the Miral Glass Company, was established in 1965 with an initial production capacity of 70,000 square metres, or almost 1,000 tonnes, per year. The rapid expansion of the automotive industry as well as the construction boom in this period prompted a considerable expansion of this plant, with its production capacity being almost doubled to 1.3 million square metres, or about 20,000 tonnes, by 1966. Three further plants, with a combined capacity of 11,500 tonnes per annum, came on stream during the 1980s, increasing Iran's total production capacity to 31,500 tonnes per annum.

Constraints and prospects

Despite its rich resource base, Iran is still dependent on imports of sheet glass and glassware. A major obstacle to new investments during the 1980s was the government's price control policy, which seriously distorted the price of sheet glass. Similarly, the domestic manufacture of glass containers for the pharmaceutical industry was hampered by the government's subsidization policy, which effectively encouraged imports against domestic production.

Table III.68. Imports of glass and glassware, 1977-92, selected years
(Tonnes)

	1977	1980	1982	1986	1987	1988	1989	1990	1991	1992
Sheet glass	46,465	33,489	22,490	36,370	9,292	6,660	9,408	12,676	53,395	41,215
Security glass	527	586	36	24	199	27	166	59	236	268
Bottles/ jars	18,840	2,377	5,980	8,729	6,504	13,130	17,347	12,664	28,453	27,083
Empty ampoules	2,208	883	1,871	2,252	771	2,023	1,788	2,761	4,372	1,858
Fibre glass and glass wool	234	438	2,048	1,717	2,242	947	489	3,603	3,095	3,761

Source: *Foreign Trade Statistical Yearbook*, various issues.

While Iran's dependence on imports will be significantly reduced upon completion of projects in progress, the quality of domestically produced glass needs to be improved. A major step in this direction has been taken in recent years by the licensing of several projects to treat the silica obtained from Iranian mines more effectively. Another measure expected to result in quality improvements is the introduction of float technology for the production of sheet glass by several of the new plants currently under construction.

Iran is heavily dependent on the import of sodium carbonate. Until very recently the Shiraz Petrochemical Company was the only domestic producer of this chemical, with a production capacity of 80,000 tonnes per annum. In 1993 a second plant with an annual production capacity of 50,000 tonnes also came on stream. While two more plants with a combined production capacity of 180,000 tonnes per annum are also under construction, there will still be a large gap of about 120,000 tonnes per annum in the domestic supply-demand balance for sodium carbonate even after these plants have come on stream.

Notwithstanding the industry's constraints, Iran has considerable potential for increasing its exports of sheet glass and glassware, especially to neighbouring countries. This will, however, require a restructuring of the existing import substitution policy to one of export promotion. It will also require firm measures to be taken to improve product quality and tap external markets.

CERAMICS

The resource base

Huge deposits of raw materials for the production of ceramics are found throughout Iran. With particularly large reserves of common clay, feldspar, kaolin and quartz, Iran is in a commanding position to support a major ceramics industry. In addition, the country also has extensive resources of gypsum, and most other major outer lining materials, including glaze, are also available. The only important raw material needing to be imported in significant quantities is dye.

Recent trends

The production of ceramic tiles has traditionally enjoyed a great artistic importance in Iran and has special historic roots in the country's culture. Indeed, many of Iran's major tourist attractions include centuries-old monuments and mosques which are decorated with unique hand-made tiles. They form part and parcel of the Iranian heritage.

The commercial production of tiles dates back to 1960, when the first large factory, the Irana Tiles Company, started production. When a second major manufacturing unit started work in 1965, the industry also entered the export market. By 1966 more than 8,000 square metres were exported.

The construction boom of the 1970s played a leading role in developing the ceramic industry, but at the same time had a negative impact on exports. During 1971-76 the export of ceramics plummeted from 150,000 square metres to 12,000 square metres, while imports surged from 1,000 square metres to 2 million square metres. By 1979 the industry comprised 14 large and medium-sized manufacturing units with a combined production capacity of almost 16 million square metres of wall and floor tiles, all of which were privately owned.

Major changes were introduced to the ceramics industry after 1979, with all of the larger producers being brought under government control and a number of restrictions being imposed on the market for tiles and related products. These included a ban on imports, which gave rise to severe shortages in the domestic markets, and strict price controls, which deterred investments in the industry. The situation changed as a result of the introduction of the post-war economic reforms and price deregulation measures in the late 1980s and early 1990s, which resulted in a number of new investments being approved and measures being taken to modernize and expand the existing units.

By 1994 the Iranian ceramics industry had expanded to 45 factories with a total production capacity of 38.5 million square metres of wall and floor tiles. Of these, 31 units, with a combined capacity of almost 33 million square metres, supply wall tiles, and 14 units, with a total capacity of 5.5 million square metres, produce floor tiles. Moreover, 34 new projects with a combined capacity of 65 million square metres per year have been licensed by the government. Of these, 21 projects with 95 production lines and a total capacity of 48 million square metres are intended to produce wall tiles, and 13 projects with 45 production lines will specialize in the production of floor tiles.

The deregulation of the ceramics industry since the late 1980s has also had other advantages. The quality and designs of domestically produced tiles have improved substantially, which in turn has helped the industry to resume exports after a long interval. Official statistics suggest that the exports of two leading domestic tile manufacturers amounted to $1.4 million in the year to March 1992.

Another important segment of the ceramics industry that has experienced rapid, albeit irregular, growth during the past 25 years is the sanitary fittings industry. The first unit producing a wide range of sanitary ware came into existence in 1969, with an initial production capacity of 2,000 tonnes per annum, which was subsequently raised to 11,000 tonnes per annum. The construction boom of the 1970s attracted substantial new investments into the industry, although this was followed by a period of stagnation in the 1980s as a result of the imposition of strict price controls and regulatory policies by the government. Investment interest revived in the post-war era, however, as the restrictive policy measures were eased.

The latest available statistics suggest that Iran had eight major producers of sanitary ware in 1993 with a total annual production capacity of 31,000 tonnes. This capacity is expected to rise to 48,000 tonnes as the production base of four of the existing firms, which have recently joined the industry, is increased to the designed level.

The deregulation of the industry during the post-war period has also resulted in a marked improvement in output quality and the introduction of more innovative designs. This, in turn, has helped to improve the industry's export potential. The Pars Seramco Company, one of the oldest and largest producers of sanitary ware in Iran, exported as much as 30 per cent of its total output during 1992.

Iran's chinaware industry grew substantially in the 1970s in response to the increased demand generated by the oil boom and the associated increase in *per capita* incomes. This industry currently consists of 15 firms with a combined annual production capacity of 19,000 tonnes. The total output of the industry has grown rapidly in recent years, and it has also begun to export some of its production. One producer, Gilan China Ware, exported $150,000 worth of products in 1991.

The production of glaze is an associated activity that has expanded rapidly over the past two decades in line with the growth of the ceramics industry. This sector has five producers with capacities ranging from 400 tonnes per year to 15,000 tonnes per year, with the total annual production capacity amounting to 26,000 tonnes in 1993. Actual production in recent years has fallen well short of the industry's installed capacity, however, amounting to 13,400 tonnes, 15,800 tonnes and 16,500 tonnes respectively in 1989, 1990 and 1991.

Table III.69. Production of tiles and sanitary fittings, 1986-93, selected years

		1986	1989	1990	1991	1992	1993
Tiles	Million square metres	19.5	21.0	24.2	27.8	31.7	34.5
Sanitary fittings	Thousand tonnes	16.7	19.3	26.4	27.9	30.6	36.8
Chinaware	Thousand tonnes	-	6.6	10.5	14.9	16.7	17.2

Source: Ministry of Industry.

Constraints and prospects

With the growth in real *per capita* GDP likely to remain modest during the coming years, the ceramics industry is expected to face slack domestic demand for the foreseeable future. The ambitious housing construction targets set in the Second Socio-Economic and Cultural Development Plan may prove difficult to achieve, especially if the tight monetary policies pursued in recent years to combat inflation are retained. Against this background of weak domestic demand the increase in production capacity arising from the completion of the new projects currently in progress will inevitably result in low rates of capacity utilization, particularly in the tile production industries.

With the many advantages provided by the abundant availability of the principal raw materials, the ceramics industry has the potential to become a thriving export industry. While exports of ceramics products including tiles, sanitary ware and chinaware are almost certain to increase to some degree in the coming years, the development of the industry into a major exporter will require substantial further improvements in quality and design. The achievement of these improvements will, in turn, require significant investments to upgrade and modernize many of the existing production facilities, and to introduce new technologies for the processing of raw materials and the production of high-quality dyes and powdered glaze.

F. IRON AND STEEL

THE UPSTREAM INDUSTRY

The resource base

Iran is richly endowed with the principal raw materials required for the establishment of iron and steel industries, although the quality of many of these materials obtained from the existing mines has been causing operational problems. The latest available data on proven reserves of iron ore indicate a total of 1,070 million tonnes in the five most important mines currently in operation - the Chaghart and Chadormalo mines, with reserves of 330 million tonnes and 285 million tonnes respectively in the Bafgh area, and the Zarand, Gol Gahar and Tangeh Zagh mines in the Kerman/Bandar Abbas region, with reserves of 115 million tonnes, 240 million tonnes and 100 million tonnes respectively. The probable reserves of these mines are reportedly higher, i.e. between 2,400-2,900 million tonnes, with an average iron content of 58-61 per cent.

Iran's coal reserves are substantial. The proven reserves of the two main Alborz and Kerman basins are estimated at 100 million and 230 million tonnes respectively. It is widely believed, however, that the potential reserves of coal surpass this figure by a substantial margin. The combined reserves of these basins, each covering an area of almost 65,000 square kilometres, are estimated to be around 4,070 million tonnes. The Tabas deposit in the south of the country, though not yet exploited, is also believed to be highly promising both in terms of the quality and the quantity of its reserves, which are estimated at 800 million tonnes.

Although the exploitation of the currently operational coal mines is often costly and difficult due to the thinness of the seams and the great depth of deposits, Iran is extremely rich in many of the other resources required by the iron and steel industry, including natural gas, limestone, and various types of refractory sands. Iran's reserves of natural gas and limestone in particular are the second largest in the world. The abundant availability of natural gas provides the country with a strong resource base for operating an iron and steel industry, especially one which employs direct reduction processing technologies.

Recent trends

After a series of unsuccessful attempts by various Iranian governments since 1926 to establish an iron and steel industry, the country's first steelworks was eventually set up in 1972 near the city of Esfahan. This plant was established as part of a package deal between the governments of Iran and the former USSR, under which the latter provided a loan to finance the project, which was to be amortized through shipments of natural gas from Iran to the USSR. At its inception this fully integrated state-owned facility consisted of four production units, all based on blast furnace processing technology, and had a production capacity of 600,000 tonnes per annum.

The capacity of the Esfahan complex was increased significantly in the following years. The construction of a second plant at the site, with a production capacity of 1.3 million tonnes per annum, commenced in 1973 but was not completed until 1983 as a result of interruptions caused by political and economic developments during this period. A feasibility study for a third plant, with a production capacity of 2.3 million tonnes per annum, was undertaken in 1984, but the plant was not constructed. The final annual capacity of the two plants amounts to 1.9 million tonnes of pig iron and 1.7 million tonnes of billets.

The development of direct reduction processing technology during the 1960s augured well for the government's long desire to expand Iran's iron and steel industry, that had hitherto been handicapped by the low quality of the coke produced from Iranian coal. The abundant supplies of natural gas and the increased oil revenues during the 1970s prompted the government to embark on an ambitious industrial programme that included five steel complexes based on direct reduction processing in Ahvaz, Bandar Abbas, Esfahan, Kangan and Mashhad.

The construction of the Ahvaz steel complex, which was intended to have a total production capacity of 2.53 million tonnes per annum, began in 1975. It was designed to consist of seven production units, including one purofer unit, three midrex units and three HYL units, as well as bloom and slab plants with capacities of 530,000 tonnes and 1 million tonnes respectively. The excess output of sponge iron relative to the production capacity of on-site slab and bloom plants was expected to be processed by the private sector or exported. The purofer unit, with a capacity of 330,000 tonnes per annum, went on stream in 1977, but construction of the other six units, with a combined production capacity of 2.2 million tonnes, and the slab and billet plants was delayed until 1989 due to the revolution and war.

After 1979 a new feasibility study of the remaining four projects was conducted. It resulted in the cancellation of the Kangan and Mashhad projects, which had been planned to have production capacities of 2.5 million tonnes and 400,000 tonnes respectively, and the merging of the Bandar Abbas and Esfahan projects, which had been intended to have production capacities of 2.53 million tonnes and 1.2 million tonnes respectively. This merger led to the establishment of the Mobarakeh Steel Complex in Esfahan, which became operational in 1992. It is equipped with three midrex units with a total annual production capacity of 3.2 million tonnes of sponge iron, and a continuous casting bloom plant with a production capacity of 2.4 million tonnes per annum.

Iran's iron and steel industry also comprises two other bloom plants for processing sponge iron with an annual capacity estimated at 400,000 tonnes. These plants were established in the early 1970s by the private Shahryar Industrial Group, but were nationalized after the revolution and now operate under the auspices of the Iran National Industrial Group. Their principal raw material, sponge iron, is provided by the Ahvaz Steel Co.

In addition, feasibility studies have been conducted for the construction of three new steel complexes in the provinces of Khorassan, Hormozgan and Azerbaijan, with planned annual capacities of 1.2 million, 250,000 and 350,000 tonnes respectively. Preliminary work for construction of the Khorassan steel complex has already commenced. A small alloyed steel production unit with an annual capacity of 140,000 tonnes, Yazd Alloyed Steel, has also been authorized in the central province of Yazd.

The commissioning of the Mobarakeh Steel Complex substantially increased Iran's combined production capacity for pig iron and sponge iron, and for the first time resulted in an exportable surplus of slab, bloom and billets in 1992. Having gradually reduced its combined imports of these

items from 713,600 tonnes to 270,000 tonnes between 1990 and 1992, Iran was thus able to export 358,000 tonnes of these products in the latter year.

All of Iran's three upstream steel plants - the Esfahan Steel Company, the Ahvaz Steel Company and the Mobarakeh Steel Company - are state-owned and operate under the auspices of the Iran National Steel Company.

Table III.70. Imports of iron and steel products, 1970-92, selected years
(Thousand tonnes)

	1970	1977	1980	1985	1989	1990	1991	1992
Scrap metal	7.7	1.5	0.4	0.5	-	-	-	-
Slabs, blooms and billets	203.8	723.6	91.6	507.1	639.3	713.3	488.7	270.6

Source: *Foreign Trade Statistical Yearbook*, various years.

Table III.71. Exports of iron and steel products, 1970-92, selected years
(Thousand tonnes)

	1970	1977	1980	1985	1989	1990	1991	1992
Scrap metal	1.0	-	0.4	0.1	-	2.0	5.5	2.8

Source: *Foreign Trade Statistical Yearbook*, various years.

Table III.72. Export of upstream iron and steel products, 1992-94
(Thousand tonnes)

	1992	1993	1994[a/]
Slabs	260	486.7	171.5
Billets	-	47.3	-
Blooms	98	248.7	73.6
Total	**358**	**782.7**	**245.1**

Source: Ministry of Mines and Metals.

a/ 22 March 1994 to 22 July 1994.

Constraints and prospects

The prospects for the expansion of Iran's upstream iron and steel industry remain favourable thanks to the country's substantial raw material resources. Although the use of blast furnace-based processing technology poses problems due to the substandard quality of the available coal resources and the high excavation and quarrying costs of the existing mines, the advantages of this type of processing cannot be completely ruled out. While direct reduction appears to be a highly suitable technology in view of the country's abundant gas resources, problems arising from the presence of impurities in the iron ore remain to be resolved. Moreover, the expansion of the iron and steel industry is likely to be hampered in the short term by the prevailing foreign exchange shortages unless this sector is opened to private investments and measures are taken to attract foreign investors.

Iran's iron and steel industry has played an import substituting role since its establishment. The establishment of the Mobarakeh Steel Complex has significantly raised the country's upstream production capacity to almost 6.3 million tonnes per annum in recent years, substantially reducing Iran's import requirements and permitting the emergence of an exportable surplus. Ironically, however, the decision to shift the plant from the originally proposed site of Bandar Abbas, in the vicinity of one of the country's largest ports, to Mobarakeh in Esfahan could significantly constrain the industry's export performance because of the substantial additional transport costs it implies.

THE DOWNSTREAM INDUSTRY

The resource base

The steel products required for downstream manufacturing activities are now largely provided by Iran's upstream industry. The establishment of the Esfahan steelworks in 1972, which produces H beams, reinforcing rods and profiles, helped to meet the demand for these goods from the construction sector. The growing demand for pipes by the oil industry caused by the increased production and distribution of oil and natural gas during the early 1970s also set the pace for the establishment of a downstream pipe manufacturing industry. On the other hand, however, the substantial increase in demand for steel sheets arising from the growth of the manufacturing sector in general and the automotive industry in particular since the late 1960s was not met from domestic sources until the early 1990s.

Recent trends

Iran's downstream iron and steel industry has developed gradually since the 1960s as a result of increased investments in infrastructure, the growth of real *per capita* income, and the spread of import-substituting industrialization. Although the tariff structures installed during the 1960s and 1970s to promote industrialization offered little protection to downstream activities associated with iron and steel, a strong investment interest was stimulated in this sector by the growing demand for iron and steel products from various sectors of the economy.

One of these was the pipe manufacturing industry, as the establishment of extensive distribution networks for oil, gas and water boosted the production of various types of welded and seamless pipes. Of the total production capacity of about 900,000 tonnes per annum registered by downstream manufacturers of iron and steel products in 1970, 80 per cent was related to the production of pipes and profiles. However, this distribution of the industry's production capacity in downstream activities was substantially altered in the following years as a result of the

construction boom triggered by the rise in oil prices, which prompted the establishment of new capacities for the production of construction-related products such as H beams and reinforcing rods. By the late 1970s Iran's total manufacturing capacity for downstream iron and steel products had increased to about 3 million. Of the total additional capacity of about 2.0 million tonnes established during the 1970s, H beams and reinforcing bars accounted for 65 per cent, and pipes, profiles and wire rods for the bulk of the balance.

Although Iran's first production facility for the manufacture of hot-rolled coil (HRC) with an annual capacity of 140,000 tonnes became operational in 1971, production of steel sheets constituted only a small percentage of the total downstream output prior to 1979. The establishment of a second production facility for steel sheets, the Kavian Company, was begun in 1973, but its completion was delayed until 1991. It has a production capacity of 400,000 tonnes of thick steel sheet, and employs both hot and cold rolling processes. In addition, the Kavian Company also has a production capacity for 100,000 tonnes of profiles and 300,000 tonnes of thin slabs provided by Ahvaz Steel Company.

The country's largest producer of steel sheet is the Mobarakeh Steel Company, which came on stream in the early 1990s. It has a total production capacity of 2.5 million tonnes of steel sheet per annum, comprising 1.4 million tonnes of hot-rolled coil and 1.1 million tonnes of cold-rolled coil. Although the inauguration of this plant has meant that Iran now possesses a sufficient potential for the production of flat products to meet its domestic needs, it remains dependent on imports of galvanized iron (GI) sheet since its capacity to process the locally produced steel sheets into GI sheets has remained very limited at 10,000 tonnes per annum.

Another important downstream activity is the manufacture of cans, which has expanded rapidly in recent years in line with the growth of the canning industry. The Iran Packaging Industry Company was the first enterprise in this field, which started in 1970. Two other firms, the Pars Can Making Company and the Mashhad Packaging Company, followed suit in the following years. After a long break, a number of new firms have also been established in the early 1990s, raising Iran's total capacity to 500 million cans per annum.

Table III.73. Production of downstream iron and steel products, 1970-93, selected years
(Thousand tonnes)

	1970	1973	1975	1977	1980	1985	1989	1990	1991	1992	1993
H beams	-	358	420	473	343	550	921	1,073	1,662	1,398	1,009
Reinforcing rods	101	299	387	414	193	381	550	663	845	496	565
Profiles	-	2	40	37	23	150	110	126	369	171	191
Pipes[a/]	-	-	-	6	4	36	39	47	74	55	2
Steel sheets	-	-	-	-	-	-	-	-	-	335	770

Sources: Iran National Steel Company; Ministry of Mines and Metals.

a/ Output of Iran National Steel Company only, comprising only a limited proportion of total output.

Table III.74. Imports of downstream iron and steel products, 1970-93, selected years
(Thousand tonnes)

	1970	1977	1980	1985	1989	1990	1991	1992	1993
H beams	269	754	765	586	36	44	252	121	54
Reinforcing rods	17	88	105	205	121	862	190	252	228
Profiles	-	-	34	168	102	59	106	280	182
Pipes	55	698	145	379	88	208	342	330	172
Steel sheets	459	1,370	741	2,013	686	2,355	1,162	1,686	..

Sources: Iran National Steel Company; Ministry of Mines and Metals.

While the private sector accounted for about 80 per cent of the downstream industry's output in the late 1970s, the bulk of the industry came under state ownership in the following decade and remains in the public sector to the present day. Private investment was hampered during much of the 1980s by government regulation and the imposition of rigid price controls. Consequently, there were only modest levels of private investment during this period, with the total annual production capacity reached by the 30 or so private firms in the industry, which were mainly engaged in the manufacture of pipes, light profiles, pipe fittings and nails, remaining in the range of 300,000-400,000 tonnes. The most significant increase in production capacity during this period occurred following the expansion of the state-owned integrated Esfahan Complex in 1983, with an increase in the total production capacity of downstream iron and steel products to almost 4.5 million tonnes per annum by the mid-1980s; but this resulted in the share of the private sector in total output falling to less than 15 per cent.

Table III.75. Exports of downstream iron and steel products, 1992-94
(Thousand tonnes)

	1992	1993	1994
H beams	12	18	..
Reinforcing rods	360	176	197
Profiles	29	278	..
Steel sheets	100	170	84
Total	**501**	**642**	..

Sources: Iran National Steel Company; Ministry of Mines and Metals.

The previously privately-owned iron and steel plants are operated by the Iran National Steel Industry Group (INSIG), which was established after the revolution as a government holding company. INSIG owns a blooming mill with a production capacity of 360,000 tonnes as well as six other plants engaged in downstream activities, and has recently invested in upgrading and expanding some of these units. In particular, it has increased the capacities of its factories

producing reinforcing bars and wire rods from 250,000 tonnes to 500,00 tonnes, the capacity of its H beam plant from 290,000 tonnes to 390,000 tonnes, and the capacity of its pipe producing units from 190,000 tonnes to 250,000 tonnes.

Constraints and prospects

Iran's downstream iron and steel manufacturing sector was developed as an import-substituting industry, but has been unable to match the rapid growth in domestic demand despite its expansion during the past two decades. This prevented the industry from penetrating export markets and adopting an outward-looking strategy. This could restrict the further development of the industry in the coming years if Iran's external debt problems continue and the pace of industrialization and public investment in infrastructural projects slows provoking a weakening of domestic demand.

While a reorientation of the industry towards international markets is highly desirable, its achievement will necessitate a significant increase in the efficiency of most of Iran's existing downstream manufacturing units and an improvement in the quality of their output. This may prove to be difficult in view of the necessary replacement investment, and the prevailing macroeconomic problems associated with the persistence of an administered pricing system. The removal of these distortions could, however, result in the Mobarakeh Steel Complex proving to be a burden for downstream activities because of its high manufacturing costs related to the comparatively high cost of building the complex.

G. NON-FERROUS METALS

COPPER

The resource base

Iran has extensive deposits of copper. The largest mine currently under exploitation is the Sarcheshmeh copper mine in Kerman Province with total reserves of 1,223 million tonnes. Of this total, 499.5 million tonnes are known reserves with a 1.12 per cent copper content, and the balance are indicated reserves with an average copper content of 0.67 per cent.

The Midouk copper mine, located 130 kilometres northwest of Sarcheshmeh, is now being readied for exploitation. It has known reserves of 145 million tonnes of sulphedite ore with a copper content of 0.84 per cent. A third copper mine, Songoun, located in the town of Ahar in East Azerbaijan province also appears promising. It is currently under exploration and is scheduled for exploitation by the year 2000.

Recent trends

Plans to develop the copper mining industry and associated activities were initially formulated in the early 1970s, when a substantial rise in foreign exchange earnings facilitated the undertaking of major capital-intensive projects deemed essential by the state for expanding the country's manufacturing activities and diversifying its export revenues, which were almost totally dependent on the oil sector at the time. Although copper processing had commenced earlier with the creation of the Ghaniabad Copper Complex affiliated to the Ministry of Defence, the most important result of this policy initiative was the development of the Sarcheshmeh Kerman Copper Complex (SKCC), which was established in 1982 and is currently the largest integrated project for

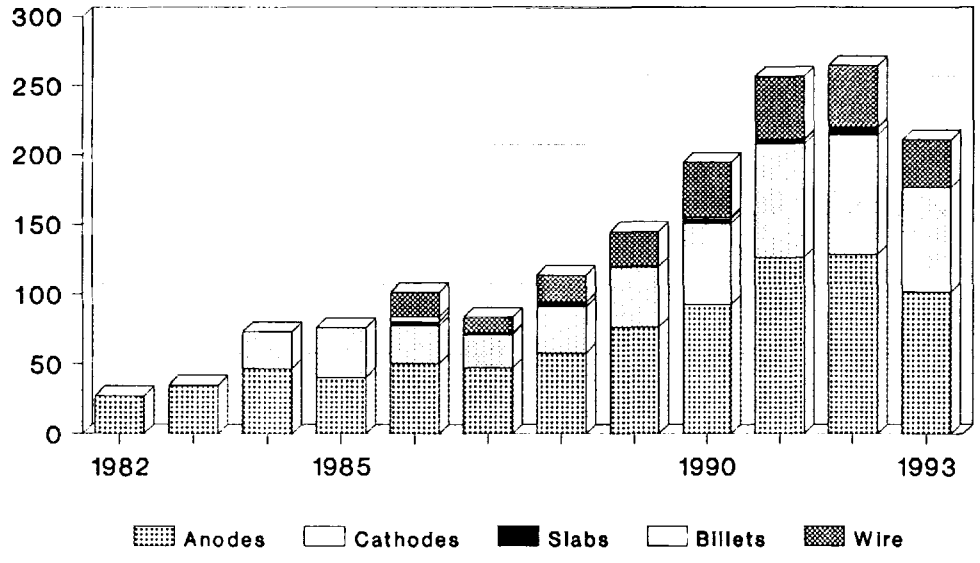
copper mining and processing in Iran. In addition to its mining activities, SKCC is also engaged in the production of copper concentrates, anodes, cathodes, slabs, billets and wire.

The mining capacity of Sarcheshmeh amounts to 15 million tonnes of sulphedite ore per year, which is processed into copper concentrates at an associated unit with a production capacity of 476,400 tonnes of concentrates having a copper and molybdenum content of about 32 per cent. These concentrates are smelted and refined on site in plants with production capacities of 145,000 tonnes of anodes (with a purity of 99.6 per cent) and 171,000 tonnes of cathodes (with a purity of 99.9 per cent). In addition, the complex has a casting plant comprising continuous and semi-continuous casting mills with a capacity of 86,000 tonnes of copper rods, billets and slabs.

The output of all products produced at SKCC followed a rising trend, albeit with some fluctuations, between 1981 and 1992. This has stimulated a steady increase in the domestic use of locally produced copper metal from 2,700 tonnes in 1982 to about 75,400 tonnes in 1992. The result has been a significant decline in imports of copper products, with foreign procurements of such items as slabs, billets and wire having dropped to negligible levels in recent years.

The Shahid Bahonar Copper Industry (SBCI) was established in the 1980s, 21 kilometres from the city of Kerman, and is the largest downstream copper manufacturer, producing a wide range of copper and copper-alloyed products including sheets, pipes, wire, bars and strips. The plant is equipped with a slab and billet mill, with an annual production capacity of about 44,000 tonnes, a cold rolling mill with an annual capacity of 30,000 tonnes, and a copper extrusion plant with an annual capacity of 19,500 tonnes. Its total production amounted to 9,922 tonnes in 1991 and 11,946 tonnes in 1992, of which about 30 per cent was exported.

Fig. III.K. Output of copper products, 1982-93
(Thousand tonnes)



Sources: Iran National Steel Company; Ministry of Mines and Metals.

While an unknown number of small firms and workshops produce an assorted range of copper products with a combined annual production capacity estimated at 8,000 tonnes, the electrical cable industry has emerged as the most prominent copper-based downstream activity. This industry started as a small plant in 1965, but expanded rapidly during the 1970s in anticipation of a favourable market in a fast growing economy as well as an improved resource base following the completion of the huge state-owned petrochemical and copper production complexes then under consideration. The electrical cable industry now comprises 34 enterprises of varying size and has an annual production capacity of about 130,000 tonnes. It is mainly geared to the manufacture of low voltage electrical cables with the exception of one firm, Alborz Cable Company, which also has a small production capacity for high voltage electrical cables of up to 20 kVA. In addition, four companies with a total annual capacity of 6,200 tonnes produce coil, three firms with a capacity of 15,700 tonnes produce high-tension cables, and one with a capacity of 35,000 tonnes produces aluminium-based cables. Four firms with a combined capacity of 9,000 million conductor metres (MCM) produce telecommunication cables, of which three also produce electric copper cables.

The Iran National Copper Industries Company, affiliated to the Ministry of Mines and Metals, has exclusive rights for copper mining and production, and has conducted a series of feasibility studies to raise the country's copper production. These include a project scheduled to boost the sulphedite ore production at the Sarcheshmeh mine by 6.8 million tonnes per annum, a processing unit for copper concentrates with an annual capacity of 240,000 tonnes, and a smelter with a capacity of 80,000-100,000 tonnes per annum, all of which are scheduled to be completed by 1998.

Table III.76. Production of copper concentrates, anodes, cathodes, slabs, billets and wire, 1981-93
(Thousand tonnes)

	1981	1982	1983	1984	1985	1986	1987
Sulphedite ore	807.1	4,454.9	4,329.2	4,722.4	4,356.3	4,975.4	5,104.5
Copper and molybdenum concentrate	14.9	116.2	156.5	135.3	131.8	142.8	163.8
Anodes	-	27.4	34.7	46.8	40.3	50.2	47.1
Cathodes	-	-	0.3	26.0	35.2	26.7	23.7
Slabs	-	-	-	-	-	3.1	0.2
Billets	-	-	-	-	-	3.4	0.9
Wire	-	-	-	-	-	17.5	11.1

	1988	1989	1990	1991	1992	1993
Sulphedite ore	5,133.0	5,680.0	6,832.9	9,163.1	8,988.0	11,940
Copper and molybdenum concentrate	164.2	167.4	219.7	289.6	303.9	322.8
Anodes	57.9	76.1	92.2	125.9	128.1	101.5
Cathodes	33.0	43.2	58.2	81.8	86.3	74.7
Slabs	3.3	-	3.2	2.6	5.1	..
Billets	0.1	0.3	1.4	0.9	0.5	..
Wire	19.0	25.0	39.2	45.3	44.3	34.7

Sources: Iran National Copper Industries Company; Ministry of Mines and Metals.

Table III.77. Exports and domestic use of copper, 1982-92
(Thousand tonnes)

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Exports	-	-	3.8	19.7	42.9	21.8	31.7	12.3	34.1	12.0	28.7
Domestic use	2.7	4.8	5.7	12.6	19.6	22.6	28.8	29.5	61.9	56.0	75.4

Sources: Ministry of Mines and Metals; *Foreign Trade Statistical Yearbook*, various issues.

Table III.78. Production of copper wires and cables, 1981-92
(Thousand tonnes)

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Electric cables and wire	33.1	35.0	48.2	38.9	30.0	34.4	26.7	23.3	33.0	38.6	54.7	56.7
Telecommunication												
Cables	-	-	-	-	-	-	-	-	-	8.0	12.6	3.3
Wires	147.0	111.7	70.4	74.4	25.2	63.7	16.4	1.5	3.2	3.5	4.1	..
Coil	-	-	0.8	1.2	1.6	1.9	1.4	2.0	2.7	2.5	128.1	101.5

Source: Ministry of Industry.

A leaching plant is under construction to process oxidized ore, the deposits of which are estimated at 27 million tonnes, from the Sarcheshmeh mines. Since its copper content amounts to only 0.62 per cent, it cannot be extracted through normal flotation. The plant, which is to be opened by 1997, will have an annual anode copper production capacity of 14,000 tonnes.

Constraints and prospects

Considerable further investments in the development of Iran's copper-based industries are currently in progress. The Midouk Copper Mining Complex, with a sulphide ore mining capacity of 5 million tonnes and a processing capacity of 150,000 tonnes of concentrate with a 30 per cent copper content is scheduled to go on stream by 1998. The Khatoun Abad smelter plant in Kerman province, which is intended to process the Midouk concentrate at a rate of 70,000 tonnes per year, is scheduled to start operations by 2000. Finally, the Songoun project for mining and processing 152,000 tonnes of copper concentrates, also located in Kerman, is scheduled to be completed in the opening years of the next century. However, foreign exchange constraints could yet delay the completion of these projects beyond the target dates.

Over the shorter term, however, further increases in Iran's copper production will be restrained by bottlenecks arising from the supply side. The SKCC smelter was already operating at only about 88 per cent of its nominal capacity in 1992 owing to a reduced flow of raw materials from the Sarcheshmeh mine, where the yield is gradually diminishing owing to a declining copper content as the mine deepens, and to insufficient new investments in quarrying equipment. Any future growth of downstream activities will therefore require a corresponding growth of the industry's upstream components, including the mining, copper concentration and smelting activities.

Growth in domestic demand will largely depend on the performance of two major sectors: the electric cable industry, and the rolling and extrusion industry. The growth of the electric cable industry, which already has a comparatively large capacity, will in turn depend on its share of the export market, as domestic demand is likely to be sated in the forthcoming years. The development of export markets may prove a challenge, however, since the industry is not equipped with the modern technology and expertise to ensure its competitiveness in international markets. The prospects for the growth of the rolling and extrusion industry appear more favourable as it still has considerable scope for import substitution and increased exports.

ALUMINIUM

The resource base

Iran only has modest deposits of bauxite. According to the latest available figures, the known reserves in the six mines discovered to date are estimated at 32.9 million tonnes. The country does possess vast deposits of alumite (hydrous potassium aluminum sulphate), however, as it is located on an alumite belt stretching from the northwest through the central regions to the southeastern parts of the country. The known reserves of the five main mines in the north of the country are estimated at 687 million tonnes, while indicated reserves are put at 983 million tonnes. In addition, there are a large but unknown number of alumite deposits scattered throughout the country.

Abundant deposits of nepheline are also available. The Boz-Goush mine in the province of Azerbaijan has estimated reserves of 10.8 billion tonnes with an alumina content of 20 per cent. Other major mines with huge deposits of nepheline include the Razgah and Coliber mines, also located in the province of East Azerbaijan.

In view of the highly energy-intensive nature of the upstream aluminium industry, however, Iran's principal resource base for the development of a production capacity in this field lies in its vast hydrocarbon resources. Natural gas plays a particularly important role in this context, and provides the main source of fuel for the Iranian aluminium industry.

Recent trends

Iran's upstream aluminium industry consists of a single firm, the Iran Aluminum Company (IRALCO), which was established in 1972 as a joint venture between a state affiliated organization, a US company and the government of Pakistan. At the time of its inauguration the firm had an annual production capacity of 45,000 tonnes of aluminium ingots, but this was subsequently expanded to 70,000 tonnes. Apart from being equipped with a smelter, IRALCO is the only company with casting facilities for the production of aluminium slabs and billets. After sustaining damage during the war, IRALCO rapidly restored its earlier production capacity in the post-war period, and by 1994 had expanded it further to 120,000 tonnes per annum.

In view of the limited availability of bauxite, and the inadequate exploitation of Iran's vast nepheline resources, IRALCO is entirely dependent on imported alumina powder. Its output of aluminium ingots, slabs and billets has fluctuated considerably during the past decades, due to a variety of economic constraints and the effect of the 1980-88 war. New foreign exchange allocations in the post-war years have boosted the company's fortunes, however, and allowed an increase in both capacity and output.

Table III.79. Upstream aluminium production, 1972-93, selected years
(Thousand tonnes)

	1972	1974	1976	1980	1985	1986	1988	1990	1991	1992	1993
Aluminium ingots	10.1	51.1	28.9	15.3	42.9	32.1	19.7	67.0	73.2	77.0	90.0
Slabs and billets	9.4	50.0	32.2	15.6	63.3	37.8	28.8	101.1	113.3	124.4	103.9

Sources: IRALCO; Ministry of Mines and Metals.

Further downstream, Iran produces a wide range of intermediate and end-use aluminium products. The aluminium sheet industry, which rolls both imported and locally produced slabs into sheets, comprises two firms. One, Aluminum Sazi Arak, was established in the early 1970s in the city of Arak in the Central province, and has hot and cold rolling facilities with an annual capacity of about 15,000 tonnes. The other, Alum Pars, was set up in 1977 in Saveh in the Central province, and has a cold rolling plant with an annual capacity at 12,000 tonnes.

Increasing construction activity during the mid-1960s and 1970s attracted substantial investments in the extrusion industry producing assorted aluminium profiles, which were rapidly replacing wood and steel for the manufacture of doors and windows. Some 20, mainly large-scale, firms were established between the mid-1960s and 1980, with a total production capacity of 20,000 tonnes of long products. The extrusion industry continued to grow in line with demand during the 1980s and now comprises 87 enterprises of various sizes with a combined production capacity estimated to

exceed 50,000 tonnes. Three of these firms also have anodizing units with a total capacity of 5,500 tonnes.

The casting industry has also grown rapidly in the past two decades in response to high demand from a variety of sectors, including the construction and automotive industries. It consists of several enterprises producing an assortment of goods, including five specializing in the production of heating radiators. The latter have a total output capacity of 700,000 square metres of radiators and have registered a healthy growth since 1980.

The post-war period also witnessed an impressive growth in the production of aluminium tube containers. Companies were quick to grasp the opportunities created by the health care industry in seeking to replace the outmoded tinplate containers. Increasingly, however, aluminium tubes are also being replaced by plastic containers.

The aluminium products industry was given a further boost in the late 1980s and early 1990s by the growth of satellite broadcasting, which prompted local manufacturers to begin producing satellite dishes. Because of legal strictures affecting such dish antennae, however, no official production figures are reported, but all the available qualitative evidence suggests that their production has soared in recent years. This trend is likely to be reversed in the near future, however, since the passage of legislation prohibiting the use of dish antennae.

Table III.80. Imports of selected aluminium products, 1980-92, selected years
(Thousand tonnes)

	1980	1985	1989	1990	1991	1992
Ingots	7.5	6.5	10.1	19.3	34.9	27.5
Slabs and billets	8.1	10.5	1.0	27.5	57.7	10.3
Sheet/strip coils	7.1	4.4	0.6	5.4	6.1	5.4
Foils	4.5	4.2	2.8	3.9	3.7	4.4

Source: *Foreign Trade Statistical Yearbook*, various issues.

Foreign exchange shortages in the final years of the war and in the early post-war period restrained the supply of both imported and locally produced slabs and billets. The resulting surge in prices attracted considerable investment interest in the downstream industry despite the prevailing low levels of capacity utilization. This resulted in 330 new investment permits being issued for the manufacture of various types of long and flat products in the post-war years. Only a few of these projects have actually been implemented, however, since a subsequent increase in imports and local production of slabs and billets led to a downward adjustment of prices and discouraged entrepreneurs from undertaking the approved investments.

On the upstream side, the government announced plans in 1991 to construct a large smelter with an initial annual capacity of 200,000 tonnes, expandable to 300,000 tonnes. This plant, to be known as the Al-Mahdi Complex, is to be established as a joint venture between the Iranian government

and a private business group at a total investment cost of $1.5 billion. To be located in the southern port city of Bandar Abbas, the project was originally planned to be export oriented, and based on the processing of imported alumina powder by means of the region's vast gas resources. The undertaking was scaled down to one-tenth of its original capacity, however, and has failed to meet its initial completion target of 1992 because of the lack of sufficient financial resources to meet the cost of the necessary imports of plant and equipment.

Table III.81. Production of downstream aluminium products, 1986-92

	Unit	1986	1987	1988	1989	1990	1991	1992
Heating radiators	Thousand square metres	-	158.7[a/]	58.0[a/]	58.4[a/]	385.9	580.9	563.5
Cable and wire rods	Thousand tonnes	5.8	3.3	5.1	8.6	15.7	21.7	14.2
Tubes	Million units	69.5	73.7	71.1	119.6	234.0	273.9	204.5
Sheets	Thousand tonnes	-	-	8.9	-	21.8	21.2	-
Welded pipes	Tonnes	-	1,168.5	-	-	975.0	1,239.0	467.0
Profiles	Thousand tonnes	-	-	-	-	-	29.1	28.1

Source: Ministry of Industry

a/ Output of one unit not included.

Constraints and prospects

The anticipated slow pace of economic growth in the coming years is likely to restrain the further growth of the downstream aluminium industry. The extrusion industry, specializing in door and window frames, is expected to be affected particularly seriously as a result of the resulting slowdown in the growth of construction activity. The government's ability to implement its ambitious housing construction programme will also be restrained by its severe budget deficits and its commitment to remedy the situation. In addition, the extrusion industry will also be affected by the government's expected introduction of structural adjustment policies, which will remove or reduce the high levels of protection and subsidies provided to the industry for much of the past decade.

At the upstream end, however, Iran will remain a potential location for the production of slabs and billets for both the domestic and export markets despite its dependence on alumina imports. This is due largely to the country's vast gas resources, which give it a significant cost advantage for the operation of such an energy-intensive industry. Any major effort to expand the production capacity of Iran's upstream aluminium industry will also necessitate heavy investments in the oil and gas sector, however, in order to raise energy production to the required levels.

OTHER NON-FERROUS METALS

The resource base

Iran has large deposits of lead. Its known reserves are estimated at 72 million tonnes with a lead metal content of 2.6 million tonnes. Its potential reserves, meanwhile, are estimated at 110 million tonnes with a lead metal content of 4.2 million tonnes.

There are also substantial quantities of zinc, often near the lead reserves. The most important lead-zinc deposits are located at Angoran in the province of Zanjan; at Iran Kouh and Nakhlak in the province of Esfahan; at Mehdiabad, Mansourabad and Koushk in Yazd; at Lekan and Hevdeh Emarat in Markazi Province; at Ahangran in Hamedan, and Beyana in Mazandaran.

Gold, silver and molybdenum are also found in modest quantities. The Mouteh gold mine near Esfahan has known deposits of 1.7 million tonnes with an average gold content of 5 grammes per tonne. In addition, gold is also extracted from associated deposits, especially at the Sarcheshmeh copper mine, which yields modest quantities of both gold and silver. Molybdenum is also extracted mainly from this copper mine, although its total known reserves throughout the country are estimated at 68,000 tonnes of metal.

Lead and zinc

Recent trends

The mining of lead in contemporary Iran dates back to the period preceding the Second World War, although the production of lead concentrate through flotation was first practised in 1957 at the Nakhlak mine in Esfahan Province. While the bulk of the lead concentrate produced at Nakhlak was exported, some 500 tonnes per year were processed further for the domestic market at a small smelter set up in the vicinity of Nakhlak.

The lead and zinc mining industry developed steadily after the 1950s and by the early 1970s about 40 mines were in operation. The output of most of these mines was intended primarily for the export market, and the later collapse of international lead prices resulted in the closure of a number of these mines. At present only nine mines are in operation, with a total capacity of 625,000 tonnes and a processing capacity of 195,000 tonnes of concentrates. The main mining firms, all of which are state-owned, are the Kaliesman Company, the Bafq Mines Company, and the Bama Mining Company.

With the small smelter at Nakhlak having been shut down in 1974 due to its uneconomical yield of 500 tonnes per annum, the only available facility for the further processing of lead and zinc concentrates in Iran until 1992 was a smelter with an annual capacity of 16,000 tonnes at the Ghaniabad Copper Smelter Complex affiliated to the Ministry of Defence. This small plant, which is only capable of recovering lead from scrap, supplies a portion of the lead requirements of Iran's two car battery manufacturers, Nour and Niro, also affiliated to the Ministry of Defence.

Iran's domestic lead requirements are estimated at 60,000 tonnes per annum, with car battery manufacturers accounting for 45,000 tonnes, the arms industry for 11,000 tonnes, and other industries for the balance. Since these domestic needs fall well short of Iran's potential production levels, the possibility of processing locally produced lead and zinc concentrates for export has long been mooted. The idea first emerged in 1968, with a proposal to set up a smelter plant in cooperation with the former USSR. The project was abandoned, however, after feasibility studies showed it to be only marginally viable.

In 1986 a project was launched by the Iran Lead and Zinc Company to establish a smelter to process lead concentrates obtained from the Dandee flotation plant at the Angoran mine in the province of Zanjan. The project, undertaken largely to supply the domestic market, was completed in mid-1992. The plant is operated by a consortium of state enterprises and has an annual production capacity of 40,000 tonnes of lead metal.

A similar proposal to establish a 60,000 tonne smelter to process zinc concentrates from Dandee-Angoran proved impossible to implement, however, because of the unsuitability of Angoran zinc deposits. Although the original project was abandoned, efforts continued to acquire or develop appropriate technologies for the processing of the deposits found at Angoran. By 1992 these efforts had proved successful, and resulted in the establishment of a pilot plant with an annual capacity of 100 tonnes.

Table III.82. Production and imports of lead and zinc, 1986-92
(Thousand tonnes)

	1986	1987	1988	1989	1990	1991	1992
Production							
Lead concentrate	42.2	22.1	16.4	19.2	19.3	27.3	32.6
Zinc concentrate	32.7	79.1	26.4	55.2	49.4	96.7	119.2
Imports[a/]							
Lead metal	13.8	12.2	33.3	-	1.2	1.0	2.9
Alloyed lead	4.5	65.1	-	-	8.9	10.3	10.6
Zinc metal	12.0	9.5	4.8	6.5	16.7	14.4	16.9

Sources: Ministry of Mines and Metals; *Foreign Trade Statistical Yearbook*, various issues.

a/ Excludes imports by the Ministry of Defence.

Constraints and prospects

The major consumer of lead metal in Iran is the Ministry of Defence and its car battery manufacturing plants. With demand for this metal from other industries remaining small, the production performance of the newly installed lead smelter will hinge largely on the needs of the two battery makers. The export potential of this sector is also unclear as it was initially intended only to supply local needs.

While difficulties in acquiring the technical expertise to process locally produced zinc concentrates persist, early indications suggest that they are in the process of being overcome. Domestic demand for zinc from the downstream industries does not yet call for the establishment of a major smelter, however, despite the significant quantities of zinc used by the Shahid Bahonar Copper Complex to produce alloyed copper. Any plans to establish a zinc smelting facility would therefore have to be partially export-oriented.

Gold, silver and molybdenum

Recent trends

The Mouteh gold mine, the only operational gold mine in the country, came on stream in the early 1990s, and has an annual capacity of 120,000 tonnes of ore. A small processing facility, including a smelter and a purifying unit, has also been set up near the mine. In addition, small quantities of gold are also obtained from associated deposits at the Sarcheshmeh copper mine, which also yields modest deposits of silver and molybdenum. The bulk of the molybdenum produced in Iran is exported, with only a small volume being utilized within the country in the production of ferrous metal products.

Table III.83. Production of molybdenum concentrates, 1983-92
(Tonnes)

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Molybdenum concentrates	510	524	1,024	818	874	1,181	1,396	889	77	1,510

Source: Ministry of Mines and Metals.

While the Sarcheshmeh is currently the only source of molybdenum, silver is also obtained from associated deposits at the Angoran lead-zinc mine. The newly inaugurated lead smelter is estimated to yield 12,000 kilograms of silver per year when it begins running at its full installed capacity of 40,000 tonnes.

In spite of the comparatively small quantities of precious metals obtained from local mines, the use of gold and silver has traditional roots in Iran's craft works industry. A wide range of gold and silver products, including jewellery, tableware and cutlery are produced locally. Production of chiselled silver has traditionally been an important craft activity, but its popularity has diminished in recent times.

Constraints and prospects

Domestic production of precious metals is expected to increase gradually as the recently inaugurated Mouteh gold mine and the Angoran lead smelter reach their full production capacity. In overall terms, however, the gold and silver obtained from domestic mining activities will almost certainly remain modest in volume. This is due not only to the comparatively small scale of the precious metals mining industry, but also to the very low content of precious metals in the existing mines. The gold content of the Mouteh mine thus averages only about 5 grammes per tonne, while the gold and silver content at Sarcheshmeh is registered at 0.27 grammes and 3.9 grammes per tonne respectively.

The outlook remains mixed for the further growth of downstream activities, which consist almost entirely of craft-based industries. While the traditional preference of the Iranians to hold their assets in gold coins and jewellery is expected to contribute to a further growth of the industry, the

anticipated slowdown in the growth of real *per capita* incomes in the coming years is likely to curb its growth momentum.

H. MACHINERY, TRANSPORT EQUIPMENT AND ELECTRICAL ENGINEERING

MACHINERY

The resource base

Iran's resource base for the development of a machinery industry is tenuous. Although activities such as iron casting, forging and the production of mechanical parts in small, privately-owned workshops have a long tradition in Iran, the output of these workshops tends to be of modest quality and geared to highly localized markets. At a more formal level, Iran possesses a large number of engineering firms capable of producing replicated machinery and equipment, mainly in the form of agricultural equipment and consumer durables. The human resource base also needs further development, with efforts needing to be concentrated in particular on the creation of an adequate pool of semi-skilled workers with a strong technical background.

Machine tools

Recent trends

In anticipation of the growing demand for machinery and capital goods likely to result from the country's industrialization programme, the government has placed a high priority on the development of the machinery industry. Faced with private sector reluctance to invest in such economically uncertain ventures, the government negotiated a deal with the former Czechoslovakia to establish an integrated plant, Machine Sazi Tabriz (MST), for the production of various types of machine tools, pumps, electric motors, compressors, and diesel engines in 1966. During the course of its implementation, however, the project was scaled down on the instructions of the government to produce only lathes and drilling machines in response to pledges from western firms to cooperate with Iran in the manufacture of such items as pumps, compressors, electric motors and diesel engines. MST eventually became operational in 1972 with an annual production capacity of about 7,000 lathes and drilling machines.

While MST has remained by far the most important producer of these goods, two small privately owned firms have also been established since 1979, of which one assembles drilling machines with an annual capacity of 400 units and the other assembles lathes with an annual capacity of 150 units. In addition, several small privately owned firms have been established to produce sawing, grinding, folding, rolling and cutting machines, which are able to satisfy a substantial proportion of domestic demand. The production of lathes and drilling machines increased steadily in the late 1980s and early 1990s in particular, following the liberalization of government policies governing the import of inputs required by the industry. The impact of these developments was reinforced, moreover, by a decision on the part of the Ministry of Heavy Industries to raise the level of capacity utilization at MST - one of its affiliates.

Imports of machine tools have varied according to the availability of foreign exchange, and its allocation at subsidized exchange rates. A particularly sharp increase in imports took place in 1990-92, when foreign exchange allocations were made available at only 40 per cent of the market exchange rate. The same foreign exchange policy also applied to imports of raw materials by

domestic manufacturers of lathes and drilling machines, who were in turn obliged to sell their finished products at government-controlled prices. These policies pushed up domestic demand for imported as well as locally produced machine tools in the hope of windfalls when the subsidies are removed. It is widely believed that large stocks of machine tools are lying idle, and that the country has a substantial unutilized capacity of machine tools.

Table III.84. Production and imports of machine tools, 1988-93

	1988	1989	1990	1991	1992	1993
Production (units)						
Lathes[a/]	704	1,035	2,056	2,463	1,465	300
Drilling machines[a/]	1,682	2,041	3,362	3,626	2,405	767
Milling machines	-	8	28	268	524	112
Imports (tonnes)						
Lathes/milling machines	7,124	4,186	7,233	11,454	13,673	..
Drilling machines	529	405	794	624	1,115	..
Grinding machines	735	674	984	2,191	2,134	..
Sawing machines	66	116	150	25	720	..
Folding and rolling machines	425	394	383	157	543	..
Cutting machines	14	208	30	398	425	..

Source: Ministry of Heavy Industries.
a/ Production by Machine Sazi Tabriz only.

Constraints and prospects

The further growth of the machine tools industry will remain limited as it lacks a substantive support base. The high production costs of the industry are to a great extent concealed by distorted foreign exchange policies that subsidize its imported inputs. Once these subsidies have been removed and domestic prices have increased, domestic demand for locally produced machine tools will almost inevitably decline.

The industry will also face considerable difficulties in tapping export markets to offset the anticipated weakening of domestic demand. This is partly due to the fact that its operation in a highly protected market for almost three decades has also rendered it internationally uncompetitive, and partly because it is confined to the production of simple machine tools, the production and use of which is contracting elsewhere in the world. While its output is thus suited to the domestic market, where the demand for more sophisticated machine tools is likely to remain limited in the foreseeable future owing to the lack of sufficiently trained technicians to operate them, it will not easily find customers elsewhere.

Agricultural machinery and equipment

Recent trends

Despite losing its earlier primacy, Iran's agricultural sector remains an important contributor to the country's economy. The strong demand for farming tools and agricultural equipment has prompted the establishment of a large number of small workshops as well as several medium and

large-scale manufacturers who now cater for the bulk of domestic demand for such tools and equipment.

Until the late 1960s Iran's agricultural equipment industry consisted mainly of small workshops geared to the production of simple tools and machines required by the largely traditional agricultural sector. The government's decision to mechanize the agricultural sector in the mid-1960s, following the introduction of a land reform programme, resulted in a significant transformation of the agricultural equipment industry by the mid-1970s.

Two firms, the Iran Tractor Manufacturing Company and Iran Jandier, were set up in 1967 and 1969 to manufacture tractors and combines. Both started operations at the start of the 1970s, which also witnessed the establishment of a hand tractor assembly plant with a capacity of 8,000 units of 4.5-13 hp, as well as several medium sized enterprises for the production of cultivation tools.

The growth of irrigated farming in the 1970s also resulted in a significant expansion of the water pump industry, which had first become established in the 1950s. By far the largest of many companies established in the 1970s for the production of irrigation pumps is the Pumpiran Company. The pump industry now comprises 24 enterprises of varying size with a combined capacity of about 100,000 pumps. Of these, about 40,000 are irrigation pumps and 5,000 are deep well turbines.

The development of the agricultural equipment industry slowed in the 1980s when the private sector decided to halt mechanized farming on large estates. When the government divided some of the large and medium-sized farms into smaller plots and distributed them among farmers, many reverted to traditional farming practices.

Despite the continued importance of the agricultural equipment industry, its performance is largely unrecorded by the statistical authorities. The latest comprehensive data for this industry date back to a survey conducted by the Plan and Budget Organization in 1987, the results of which are reproduced in Table III.85. The industry comprises a large number of small and medium sized enterprises manufacturing a wide range of farming tools, rice threshers and polishers, rice and flour milling units, and tea processing machines.

Table III.85. Production of agricultural equipment, 1982-86
(Units)

	1982	1983	1984	1985	1986
Hand tractors, threshers[a/]	7,855	14,303	18,637	15,206	11,916
Large tractors	13,570	13,570	14,513	15,826	10,555
Combines	315	619	612	612	338
Deep well turbines	4,256	4,127	4,692	1,724	-
Pesticide sprayers	10,690	10,690	50,707	52,680	-
Pumps[b/]	20,796	42,897	40,497	42,305	-
Tea processing machines	150	223	153	159	48
Pistachio peeling machines	246	298	304	308	368

Source: Statistical Centre of Iran, *Statistical Yearbook 1989.*
a/ Excludes rice threshers produced by small workshops.
b/ Including non-irrigation pumps.

Table III.86. Production of agricultural equipment, 1988-93, selected years
(Units)

	1988	1989	1990	1991	1992	1993
Large tractors	6,223	11,452	9,611	12,727	9,320	6,347
Combines	197	351	665	559	573	458
Pumps[a/]	17,535	23,973	28,020	32,982	..	..

Source: Ministry of Heavy Industries.

a/ Including non-irrigation pumps.

Constraints and prospects

In the near future, prospects for the agricultural tools and equipment industry remain unclear. The price adjustment policy of the government is bringing a gradual removal of subsidies provided for pesticides, which may adversely affect the volume of agricultural output. Subsidies were also provided on a range of important agricultural tools and equipment, including irrigation pumps, tractors and combines, as well as on agricultural processing equipment. This category was subsidized through the provision of steel sheets, profiles and other inputs at heavily subsidized prices. The disappearance of these extensive subsidies will result in substantial increases in the prices of agricultural equipment, and will also restrain demand for related products as many farmers may be forced to reevaluate their priorities.

Construction machinery

Recent trends

Iran's capacity for the production of heavy construction machinery is modest. While a few firms are periodically engaged in the manufacture of cranes and road rollers, only one enterprise, Hepco, makes other heavy construction machinery. The firm, originally established as a joint venture between the state and private investors in 1976 to meet the huge demand generated during the late 1960s and 1970s by the expanding investments in infrastructure during that period, is now fully state-owned. Its original annual production capacity of 1,000 units has been raised to 1,250 units of various machines, including graders (75 units), road rollers (200 units), bulldozers (175 units), wheel loaders (400 units), and excavators (200 units).

Domestic demand in excess of Hepco's capacity was met almost entirely from foreign suppliers in the 1970s. From the early 1980s onwards imports were curtailed by a slowdown in construction activity prompted by the war, although the war subsequently created its own demand for certain types of construction machinery, such as bulldozers and excavators. Moreover, the decline in imports during the war years can also be attributed to the accelerated operations of Hepco, which assembled more than 3,500 units between 1980 and 1986, and to the availability of substantial stocks of such machinery built up before 1980. Imports surged again in the post-war era as the government embarked on a major reconstruction drive, especially in the war-devastated areas.

The market for light construction machinery, including concrete mixers, stone crushers and concrete dumpers grew significantly in the 1970s in line with the construction boom precipitated by the oil price rise of 1973/74. At the same time, however, the growth of some sections of this industry, and especially those engaged in the production of machinery related to the use of concrete, did not match the growth of the construction sector. This was mainly due to the typical Iranian practice of using steel structures rather than reinforced concrete for construction. This trend was reversed in the 1980s, however, when government pricing policies resulted in a systematic rise in H bar prices relative to those of reinforcing bars and cement, and prompted a significant increase in the use of reinforced concrete structures in urban areas.

Other construction and related machinery produced in Iran includes asphalt mixers and sprayers, which are manufactured by three firms with a combined capacity of 80 units per year, stone crushers, which are produced by two firms, and concrete mixers and dumpers, which are produced by 15 firms. In addition, forklifts are also produced in Iran by the Sahand Forklift Manufacturing Company established in 1976 with a designed annual capacity of 1,300 units. After initially producing forklifts under licence from a UK company, Sahand switched to a Bulgarian firm in 1979.

Table III.87. Imports of construction machinery, 1970-92, selected years
(Tonnes)

	1970	1975	1980	1985	1989	1990	1991	1992
Road rollers	1,111.4	15,711.7	1.2	470.6	168.3	171.7	602.3	616.9
Cranes	791.4	6,913.3	5,614.5	1,845.9	10,094.0	1,432.6	5,040.5	4,040.8
Bulldozers and graders	2,433.3	7,383.7	271.3	2,439.4	1,010.0	4,628.9	23,196.6	12,511.9
Excavators	-	20,180.0	1,446.7	19,569.3	1,753.2	4,629.0	25,146.9	32,186.0
Loaders	3,574.0	2,696.8	1,192.9	1,071.2	313.1	995.7	4,926.3	7,185.7

Source: *Foreign Trade Statistical Yearbook*, various issues.

Table III.88. Production of construction equipment, 1981-93, selected years
(Units)

	1981	1985	1988	1989	1990	1991	1992	1993
Road rollers	125	297	..	84	260	340	335	313
Wheel loaders	108	..	..	66	7	136	699	407
Motor graders	25	..	..	-	46	..	..	..
Excavators	98	..	..	38	103	274	382	36
Bulldozers	131	..	..	7	37	179	172	77
Forklifts	..	1,441	361	145	698	672	428	..
Cranes	..	268	132	121	160	169	..	..

Source: Ministry of Heavy Industries.

Constraints and prospects

Domestic demand for heavy construction machinery is expected to decrease in the coming years as a result of sluggishness in infrastructural development due to the government's efforts to control its budget deficits. At the same time, slow growth of *per capita* incomes and the imposition of tight anti-inflationary monetary policies will curb the growth of private-sector construction activities. Against this background, the domestic market for construction machinery is likely to remain depressed for the foreseeable future.

Diesel engines, generators and electric motors

Recent trends

The production of diesel engines in Iran was begun by the Iran Diesel Motors Company (IDM) and the Iran Bonyan Diesel Company (IBD), formerly known as the Iran Dorman Diesel Company, in the early 1970s. This was followed by the setting up of two other plants, Charkhashgar, formerly known as Iran Leyland Diesel, and Saane Company, formerly known as Hoxiran Diesel, in 1975 and 1977 respectively. All four companies were joint ventures with foreign participation.

IDM was established by Daimler-Benz, a group of Iranian automotive manufacturers and the Bank of Industry and Mines. Its nominal annual production capacity is about 25,000 units, but actual output has fallen below this figure except in 1982-84, when sufficient foreign exchange was available to import the required engine parts. Although IDM still depends on imported components, its diesel engines now have a comparatively high local content.

IBD was originally established as a joint venture between a number of government-affiliated organizations and private local investors, and the British company Dorman. While the initial plan to produce four, five and six cylinder normal and turbo-charged Dorman engines were scaled down, IBD later added two Volvo diesel engines, assembled from imported completely-knocked-down (CKD) kits, to its product range. The company's total production peaked at 5,651 units in 1983/84, but gradually decreased in the second-half of the 1980s.

The Charkhashgar plant initially assembled engines entirely from CKD kits supplied by the Leyland Company of the UK, but this ceased in 1982, however, after the assembly of Leyland trucks by the erstwhile Iran Leyland Motors Company was discontinued. Since that time the plant has made Land Rover engines from kits supplied by Land Rover from Spain and the UK.

The Saane Company began producing non-automotive engines under licence from a group of UK companies including Hawker Siddeley Diesel Ltd., M. Blackstone Ltd., R. I. Lister Company Ltd. and Peters Ltd. The plant had a designed production capacity of 12,500 diesel engines per year with an engine power of up to 40 hp.

During the 1980s another plant, Motor Sazan Tractor Sazi Company (MSTS), was established in cooperation with the Perkins Company. The firm is affiliated to the Iran Tractor Manufacturing Company, and produces diesel engines under licence from Perkins, with an annual production capacity of 15,000 units.

All of the major plants forming Iran's diesel engine industry are situated around Tabriz, the capital of the province of East Azerbaijan. This concentration has had a beneficial impact on the industry by generating a wide range of external economies. In particular, it has enabled the industry to develop and sustain a labour force with the required skills.

Table III.89. Production and imports of automotive and non-automotive diesel engines, 1977-92, selected years

	1977	1980	1983	1989	1990	1991	1992
Production (thousand units)							
Automotive diesel engines	23.0	10.5	37.0	4.7	6.2	16.0	12.0
Non-automotive diesel engines	3.7	4.8	21.7	3.2	13.3	19.8	15.1
Imports (tonnes)							
Automotive diesel engines	-	92	2,128	3,458	3,484	8,526	3,913
Non-automotive diesel engines	-	1,515	12,783	780	5,493	5,647	11,070

Sources: Ministry of Heavy Industries; *Foreign Trade Statistical Yearbook*, various years.

The production of both automotive and non-automotive diesel engines has fluctuated considerably during the past two decades. After declining in 1977-80 due to the economic disruptions and social upheavals of the period, output increased sharply in 1980-83 as increased volumes of foreign exchange became available to finance the import of the required components. This was followed by a further decline between the mid-1980s and 1990 caused by renewed shortages of foreign exchange during the latter part of the war and in the early post-war years. This, in turn, was followed by an upturn in the early 1990 as increased volumes of hard currency were allocated for imports.

The Iranian generator industry evolved during the 1970s as an activity involving the coupling of imported alternators with locally produced diesel engines, and attracted the interest of a large but unknown number of small-scale enterprises and workshops. Several projects were approved by the Ministry of Heavy Industries in the 1980s for the local assembly of generators. Of these only two, Maah Niroo with a capacity of about 6,000 sets per annum and Pars Generator with a capacity of 1,000 sets per annum, became operational in the early 1990s. They are mainly involved in the assembly of low capacity generators of up to 50 kVA.

Despite the establishment of these firms, Iran remains largely dependent on imports of generators. The country's assembling and coupling industries are in their infancy, and can only meet a small share of total demand. To a large extent, moreover, they are only able to satisfy the demand for low capacity generators.

The country's electric motor industry dates back to 1957, but only took off when a joint venture was formed in 1973 between several state-affiliated organizations and the Gold Century Company of the USA to produce various types of electric motors. In 1976 Gold Century's stake was bought out by the state, and the company changed its name to Motogen.

With the demand for electric motors continuing to rise rapidly during the 1970s, a number of private sector enterprises also entered the industry, usually as an integrated part of the home appliances industry. Motogen has nevertheless remained a key player in the field, with an annual production capacity of 700,000 units. The company produces electric motors of a varying power range, but specializes in the production of low power units.

Table III.90. Imports of generators, 1985-92, selected years
(Tonnes)

	1985	1988	1989	1990	1991	1992
Diesel powered generators						
Up to 180 kVA	2,095.7	1,101.4	216.2	998.3	206.7	1,080.9
180-400 kVA	197.4	218.2	344.1	1,176.2	1,057.9	598.7
400 kVA and above	1,986.1	960.2	681.8	1,852.4	668.3	895.7
Others						
Up to 150 kVA	54.2	572.5	52.3	393.0	699.9	366.4
150-400 kVA	355.7	556.4	81.5	182.2	815.4	557.0
400 kVA and above	531.2	543.8	427.4	864.7	943.9	2,790.2

Source: *Foreign Trade Statistical Yearbook*, various issues.

Although Iran depends on imports to satisfy a proportion of domestic demand, Motogen has also exported a part of its output since 1985. While the volume of these exports has been relatively small for much of this period, it recorded a sharp increase to 392 tonnes in 1992. The firm's ability to tap export markets has been due in part to the unrealistically high exchange rates for the rial maintained by the government during the late 1980s and early 1990s, which helped to disguise the firm's true production costs by subsidizing its imported inputs.

Table III.91. Production, imports and exports of electric motors, 1977-93, selected years

	1977	1980	1988	1989	1990	1991	1992	1993
Production[a/] (Thousand units)	201.6	227.1	237.2	360.1	532.9	457.4	309.0	349.0
Imports (Tonnes)	12,995.2	9,941.8	12,422.1	10,057.6	11,818.4	3,105.5	16,796.4	..
Exports (Tonnes)	14.0	-	6.9	5.1	4.1	2.6	39.2	..

Sources: Ministry of Heavy Industries; *Foreign Trade Statistical Yearbook*, various issues.

a/ These data refer to Motogen only, which accounts for most local production.

Constraints and prospects

The diesel engine industry, which is now managed and operated entirely by state affiliated organizations, suffers from widespread inefficiencies related to a lack of financial, managerial and labour resources. A particularly significant weakness is the lack of a well developed design and engineering base, which remains embryonic despite the fact that the industry has been in existence

for more than 20 years. On the other hand, significant progress has been achieved in raising the local content of diesel powered engines produced by various firms in the industry.

In general terms, the outlook for the diesel engine industry appears favourable. While total domestic demand for diesel engines may weaken in the coming years in line with the anticipated slowdown in overall economic growth, demand is expected to switch in the coming years towards locally produced diesel engines. This trend could persist for some time, and is likely to be reinforced by Iran's increased foreign exchange problems.

TRANSPORT EQUIPMENT

The resource base

Iran's transport equipment industry developed under a restrictive trade regime that imposed quotas and a multitude of tariff barriers against imports of such equipment. Nurtured by a high degree of protection over the years, it has become an inefficient and high cost industry. The industry continues to depend on imports for many of its principal materials, including steel sheets, engines and spare parts. The component producing industry, which developed in a similarly protected environment, is also marked by a variety of inefficiencies, and may even have become a burden rather than a source of support for the automotive industry, which is obliged by existing regulations to use locally produced components.

Motor vehicles and automotive components

Recent trends

The construction of new roads and the improvement of the road transport infrastructure during the 1950s gradually led to a rise in demand for motor vehicles. This demand was stimulated by the rise in *per capita* incomes, the growth in urbanization and the increase in internal trade during these years, as well as by the introduction of high tariff barriers and the vehicle manufacturers' strategy of establishing assembling plants in consumer countries. The Iran Jeep Company set up its first assembly line in the early 1960s with a capacity of 3,000 jeeps per year. By the end of the decade several other plants were assembling cars from CKD kits supplied by the UK firms Rootes, Leyland and Rover and by American Motors, Daimler-Benz and Citroën. In addition, plants were established to assemble trucks under licence from Volvo and Mitsubishi.

The market soon came to be dominated by the Paykan (Arrow) passenger car, a four-cylinder Hillman Hunter produced by the former Iran National Company from CKD kits supplied by Rootes. The firm had initially been established in 1963 to assemble Mercedes-Benz buses and mini-buses, and added the Paykan assembly lines in 1967.

The Iranian automotive industry experienced a significant transformation during the 1970s when *per capita* incomes soared after the rise in oil prices. The noticeable improvement in the standard of living of the rapidly expanding middle class dictated some changes and opened up new prospects for the automotive industry, in response to the demand for better and more expensive cars. An increasing number of European and Japanese cars were imported between 1973 and 1979 despite the prevailing high tariffs. Aware of the challenges it faced in meeting the needs of a more affluent society, the domestic automotive industry also made a number of significant changes.

American Motors, which had suffered a loss of market share, was taken over by General Motors in 1974, which initially assembled six-cylinder Chevrolets, but later added Buicks and Cadillac Sevilles to its range. Similarly, the Citroën was replaced by an Iranian version of a four-cylinder 970-cc Renault. The former Iran National Company, recognizing the emergence of new market trends, entered into negotiations for the local assembly of certain models of Peugeot cars, although these were interrupted by the 1979 revolution. After the revolution the privately owned automotive industry was fully nationalized and the previously imposed import tariffs were replaced by a complete ban on imports until the mid-1980s.

Table III.92. Motor vehicle production, 1982-93, selected years
(Units)

	1982	1984	1986	1989	1990	1991	1992	1993
Passenger cars	50,054	57,709	22,111	11,209	19,722	48,782	33,151	39,511
Pick-ups	30,127	68,644	23,422	4,012	13,638	24,186	23,188	14,635
Buses	1,506	2,532	424	693	1,073	2,860	2,836[a/]	1,287[a/]
Mini-buses	4,169	8,170	1,327	2,168	2,313	7,611	5,678	2,728
Trucks	15,787	28,227	11,353	3,212	6,059	10,897	7,169	3,643
Jeeps and Land Rovers	7,588	12,645	3,048	3,544	5,709	5,404	3,237	1,322
Total	**109,231**	**178,008**	**61,685**	**24,838**	**48,514**	**97,437**	**75,259**	**63,126**

Source: Ministry of Heavy Industries.

a/ Data refer to production from one plant only.

Until 1985 the domestic supply of passenger cars was limited to those produced by local manufacturers. In that year a special import channel was opened that allowed limited imports of foreign cars through individual permits issued to Iranian citizens who had studied abroad and to those returning to Iran after working in Arab states. The quota restriction was subsequently replaced by high tariffs and other barriers in 1991, which are still in place.

The production of General Motors cars ceased in 1985 and was replaced by the Nissan Patrol, a four-wheel drive passenger vehicle. The assembly of Renault cars was discontinued in 1993, and switched to a passenger car from the Republic of Korea. Meanwhile, local assembly of the Peugeot 405 commenced in 1991.

The need to produce new models of passenger cars involving advanced design and technology caused serious problems for the Iranian automotive industry after the end of the 1980-88 war. Attempts to introduce a locally-designed "national car" to replace the existing types failed. This underlined the fact that the industry had never managed to create a significant base for automotive design and engineering. Even the Paykan, which had become the most popular of all Iranian-assembled cars, was produced as initially designed for more than a quarter of a century with no notable alteration or improvement. The same is true of the cars produced by the country's two other car manufacturers. Eventually, the path followed by Pars Khodrow, the former assembler of General Motors vehicles which began assembling the Nissan Patrol, was also pursued by Iran Khodrow, the former Iran National Company, and by Saipa, which had previously assembled

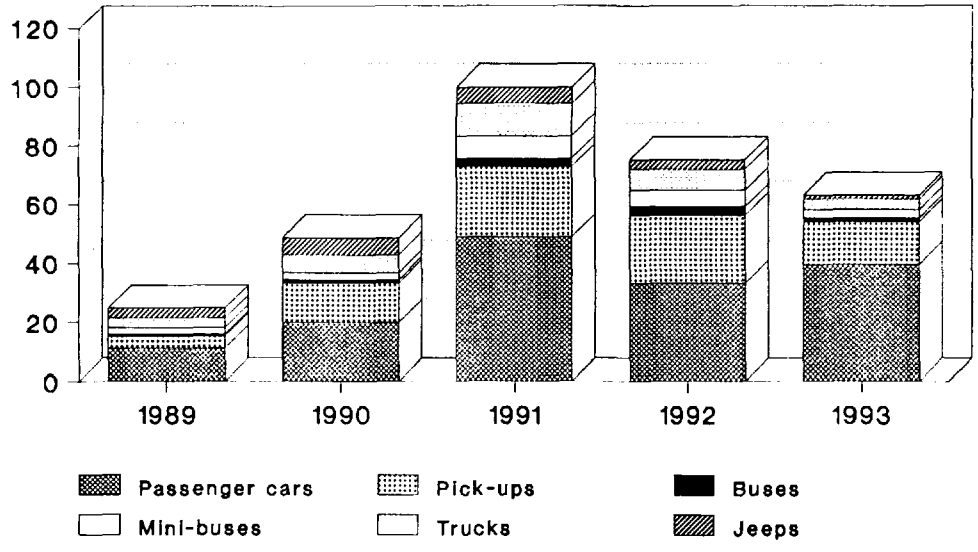
Renault cars. These two companies started assembling Peugeot models and Kia models from the Republic of Korea.

In addition to the companies mentioned above, the Iranian automotive industry comprises eight other firms producing a variety of vehicles including Land Rovers, pick-ups and larger trucks, fire engines, buses and mini-buses. Since Iran has only a relatively small railway network and virtually no internal waterways for the transport of goods and passengers, the bulk of the country's internal transport is carried out by trucks, while pick-ups are generally used in intercity transport and in rural areas. The demand for these vehicles is consequently quite high, and they accounted for 15-33 per cent of Iran's total output of motor vehicles between 1982 and 1991, although this share showed a gradual decline from the early 1980s, when it was boosted by the logistical needs of the war, to the late 1980s.

Rigid import policies and the limited local production of vehicles slowed the inflow of new cars into the market, thus raising the average life of Iran's vehicle fleet. It is estimated that about 65 per cent of the 2.8 million vehicles on the country's roads are more than ten years old. This has entailed significant costs in terms of imports of parts and components required for maintaining these vehicles.

The lifting of quota restrictions on imports of vehicles in 1990 resulted in a substantial inflow of a variety of new cars, despite the imposition of high tariffs. This relatively liberal import policy was adopted as part of a broader framework of restructuring Iran's stagnating automotive industry. The assembly sector was opened to private investors for the first time after 1979, despite the retention of some ambiguous laws which defined the automotive industry as being a nationalized industry.

Fig. III.L. Motor vehicle production, 1989-93
(Thousand units)



Source: Ministry of Heavy Industries.

To encourage investment in this sector the government adopted measures during 1990-92, which allowed potential investors to import a fixed number (from 5,000 to 10,000 units) of vehicles that were to be assembled at a discounted duty then equalling about $2,500 per passenger car. These measures resulted in a revival of interest among some investors, who also speculated on a long-awaited recovery in demand stimulated by the economic sectoral growth targets set by the First Socio-Economic and Cultural Development Plan. Consequently, 16 new projects for the production of vehicles were approved by the Ministry of Heavy Industries in 1990-92, representing a combined annual capacity of about 200,000 vehicles, although none of these projects has got off the ground as yet.

The production of car components grew simultaneously with the expansion of the automotive industry, and was stimulated further by the imposition of various local content requirements on the motor vehicle assemblers. The parts and components industry now comprises some 30 state- and privately-owned firms producing and/or assembling about 20 different types of automotive components such as engines, radiators, exhaust systems, cabins, carburettors, water pumps, pistons, chassis, axles, engine valves, shock absorbers, transmissions and electrical equipment including batteries, spark plugs, starters, dynamos and delco points. Table III.93 summarizes the growth of this industry, although its data may understate actual output since a number of component producing units are vertically integrated with the local automotive manufacturers and do not therefore report separate data for their component production activities.

An associated sector which has expanded gradually since 1958 is the tyre industry. The first tyre manufacturing plant was established in 1958 as a joint venture between local investors and BF Goodrich. The second plant was inaugurated in 1963 in collaboration with General Tires. This was followed by partnerships between local industrialists and Bridgestone and Pirelli. All of these firms were nationalized after 1979, however, and a further state-owned firm, the Kerman Tyre Company, was set up in 1992. This firm has an annual capacity of 25,000 tonnes, and its inauguration raised the country's total capacity to about 120,000 tonnes.

Table III.93. Production of selected automotive components, 1977-93, selected years

	Units	1977	1985	1989	1990	1991	1992	1993
Radiators	Thousand tonnes	0.2	4.1	1.2	2.7	3.0	3.0	2.5
Shock-absorbers	Thousand units	..	..	0.2	0.5	0.7	0.5	0.5
Carburettors	Thousand units	..	..	..	..	16.7	7.8	..
Pistons	Million units	-	0.7	0.6	1.0	0.2	0.1	..
Gear boxes	Thousand units	..	..	1.9	6.1	13.9	14.7	3.1
Spark plugs	Million units	0.8	0.1	0.2	0.7	0.9	0.2	..a/
Starters	Thousand units	..	3.8	7.1	32.0	20.0	44.2a/	0.1a/
Dynamos	Thousand units	..	3.5	9.8	8.5	1.6	..a/	..a/

Source: Ministry of Heavy Industries.

a/ Starters and dynamos combined.

The tyre industry also came into existence in response to a rapidly growing protected domestic market. The industry is entirely dependent on imports for most of its major raw materials, including natural rubber, styrene butadiene rubber (SBR), beadwire, thread and the required

chemicals. The only raw material produced domestically in significant quantities is carbon black, although a local production capacity for SBR was due to be in place by early 1995.

The protected domestic market and growing demand for tyres has attracted some investment interest in the industry. This has been reinforced by the availability of subsidized foreign exchange for imports of machinery, which has emerged as a potent incentive for investors, who anticipate a growing demand for various types of tyres, many of which are currently imported. Nine investment permits with a total capacity of 187,500 tonnes were thus issued by the Ministry of Industry between 1985 and 1991. Only one of these projects, the Kerman Tyre Company, has so far become operational, however.

Table III.94. Production and imports of tyres, 1984-92, selected years
(Thousand tonnes)

	1984	1985	1986	1987	1988	1989	1990	1991	1992
Production	50.6	47.5	43.1	51.8	51.3	59.3	81.6	89.0	..
Imports	-	68.4	40.6	46.6	27.9	59.7	9.2	14.9	19.0

Sources: Ministry of Industry; *Foreign Trade Statistical Yearbook*, various issues.

Iran also has a few tyre retreading firms, although their number is expected to increase in the coming years, with 21 projects in this industry having been approved between 1987 and 1991. When completed, these new plants will raise the industry's capacity to about 62,000 tonnes per annum. Even in its currently relatively small state, however, the industry still relies on imports of used tyres as domestic stocks of such tyres are limited.

Constraints and prospects

The survival of the automotive industry in a market environment that is not highly protected is hard to imagine, since its demand base appears too narrow to support further sustained growth. Although there has been some expansion in the components industry, the quality of its output is often low and affects the quality of the vehicles in which these components are installed. However, the increasing average age of Iran's motor vehicle fleet poses significant challenges. The protectionist measures necessary to ensure the survival of the industry will entail high domestic prices, which in turn will restrict the demand for new cars, particularly if *per capita* incomes rise more slowly than in the past few years. A reduction of domestic prices, on the other hand, may jeopardize the industry, which is regarded as strategic by the government and is also a source of national pride.

The demand for heavy and semi-heavy vehicles is expected to grow strongly in the coming years. Since Iran is a big country with dispersed population centres, road transport will continue to play an increasingly significant role in the movement of goods and people as other means of transport remain limited. In addition, the anticipated slowdown in the growth of *per capita* incomes will prevent a shift from public to private transport.

Motorcycles and bicycles

Recent trends

The Iranian motorcycle industry is based on five companies assembling CKD kits imported from Japan and Europe. The first of these, the Jahan Rex Company, was established in 1968 to assemble an outmoded German scooter, and had an annual capacity of 25,000 units. The second firm, Iran Docharkh, went on stream in 1972 and assembles two Peugeot models and a number of Yamaha models with engine capacities ranging from 80 cc to 125 cc. With an annual assembling capacity of 60,000 scooters and 120,000 motorcycles, Iran Docharkh is presently the largest producer of such vehicles in Iran.

Rising *per capita* incomes and the growing population stimulated a significant increase in demand for motorcycles. This was especially true in the increasingly congested cities, although the increasing wealth of the population also prompted a shift from animal transport to motorcycles in the rural areas. Two more firms entered the market to meet this increase in domestic demand, a growing section of which was met by foreign suppliers. The Jahan Rou Company (formerly known as Tahari) was established in 1973 to assemble Kawasaki motorcycles, with a capacity of 40,000 units per annum. It was followed by the Tiz Rou Company in 1976, which assembled Honda motorcycles and had an annual capacity of about 50,000 units. After a long break, a fifth plant, Iran Niro Mohreke, was established by the state in the early 1990s to assemble Vespa scooters from CKD kits imported from the Italian firm Piaggio.

Like the automotive industry, the motorcycle industry also came into existence in a highly protected market as an import-substituting industry at a time of sharply rising domestic demand following a significant growth of real *per capita* incomes. This steady growth in demand was arrested in the 1980s, however, with both production and import levels fluctuating widely during that period. During the first half of the decade the domestic assemblers benefited from the allocation of foreign exchange at highly subsidized rates, which resulted in a gradual increase in domestic output to a peak of 192,500 units, while imports declined. This was followed by a decline in both production and imports in the second half of the decade as Iran's oil revenues fell. The industry recovered again in the early 1990s as increased allocations of foreign exchange allowed an increase in both production and imports to meet the substantial backlog of unsatisfied demand generated by the subsidized prices of motorcycles.

Table III.95. Production and imports of motorcycles, 1970-92, selected years

	1970	1977	1980	1985	1988	1989	1990	1991	1992	1993
Production (Thousand units)	7.0	134.9	101.5	192.5	63.6	12.4	38.1	88.6	109.8	35.0
Imports (Tonnes)	4,001.1	17,649.0	11,802.5	448.3	7.2	361.5	144.3	2,857.7	6,717.8	..

Sources: Ministry of Heavy Industries; *Foreign Trade Statistical Yearbook*, various issues.

The surge in imports during 1991-93 prompted many investors to seek licences allowing the domestic assembly of scooters and motorcycles, with 13 projects being approved in 1992. None of these has become operational as yet, however, and their establishment is almost certain to be delayed by the renewed restrictions on imports imposed in 1994 as a result of the deterioration in Iran's external payments position.

Iran's bicycle industry was created in 1960 by the establishment of the Tehran Sakai Bicycle Company as a joint venture between Iranian and Japanese investors. Since then the industry has established a modest assembling capacity and now comprises six manufacturers, three of which are also engaged in the motorcycle industry. In addition, a small plant for the production of wheelchairs was inaugurated during the 1980s to meet the increased demand resulting from the effects of the 1980-88 war.

Since the production of bicycles is heavily dependent on imported parts and components, the industry's output levels have tended to fluctuate in line with the particular foreign exchange policies adopted by the government. Moreover, the bulk of domestic demand has been met by foreign suppliers due to the low quality of locally assembled bicycles. This has been facilitated by the relatively liberal import policy pursued by the government with regard to bicycles, regarded as a means of transport for the young and low income groups.

The sharp drop in imports during 1986-89 indicated by the data in Table III.96 may be misleading, since these statistics do not reflect trade conducted through Iran's free trade areas. In fact large numbers of bicycles and other consumer durables were imported through the free trade zones during this period, and via the Kish Free Trade Zone (KFTZ) in particular.

Table III.96. Production and imports of bicycles, 1975-92, selected years

	Unit	1975	1980	1985	1988	1989	1990	1991	1992
Production	Thousand units	20.0	0.3[a/]	46.5	139.7	..	12.0[a/]	59.5[a/]	37.8[b/]
Imports	Tonnes	5,447.8	9,406.8	8,965.0	2,252.3	109.1	1,194.0	4,197.2	7,296.3

Sources: Ministry of Heavy Industries; *Foreign Trade Statistical Yearbook*, various issues.

a/ Data based on output of only one assembly plant.
b/ Data based on output of only two assembly plants.

Constraints and prospects

The increasing demand for cheap motorized transport by the growing population will ensure that the demand for locally assembled motorcycles will remain firm in the foreseeable future. On the supply side, however, the performance of the industry will depend on its access to foreign exchange in order to import CKD kits for local assembly. The tightening of foreign exchange regulations witnessed in 1994 suggests that production and import levels will decline in the short term, pending an improvement in Iran's foreign payments position.

Even with the extensive bicycle imports of the last two decades, supply has still lagged behind demand. The ability of the domestic industry to meet this demand remains uncertain, not only because of the inhibiting effect on component imports resulting from the tightening foreign exchange constraints, but also because the industry is not yet able to compete on quality grounds in export markets, which would enable it to expand.

ELECTRONIC AND ELECTRICAL PRODUCTS

The resource base

Iran lacks the resource base to support a sustainable electronic and electrical goods industry. At present, the country's abundant supply of low-cost labour lends only a modest advantage to the engineering industry, as it often does not have the necessary technical skills. The same is true to some degree of its relatively large population of high school and university graduates, who could be an important source of comparative advantage in this value-adding sector.

Over the past few decades Iran has established, in a highly protected market environment, a considerable production capacity for a number of components used in the manufacture of electronic and electrical goods. They are frequently not competitive in terms of either price or quality with similar goods available from external suppliers. Current regulations nevertheless prohibit the import of any components that can be produced locally, regardless of their price and quality.

Recent trends

The electronic and electrical industry was created in the early 1960s when the government adopted a blanket import-substitution programme for a wide range of consumer durables as part of its overall strategy to restructure the otherwise essentially traditional agricultural-based economy. This policy had some initial successes, boosted by the availability of a substantial low-cost labour force and by the growing number of high school and university graduates. On-the-job training and special training courses provided by the industry and public institutions during the 1960s and the early 1970s also helped to enhance the quality of the workforce.

The supply of skilled and semi-skilled labour could not keep pace with the expansion of the industry, which grew almost fourfold during 1968-75 in response to sharply rising domestic demand. The situation was aggravated further by the exodus of skilled technicians and managers after 1979. Over the following decade the industry's *modus operandi* also changed, with the industry's requirements for imported and locally produced inputs being procured at subsidized prices and its finished products being sold at similarly low administratively-determined prices. These comparatively low administered prices helped to stimulate a steady growth in demand for locally assembled electronic and electrical appliances, which was reinforced by a variety of import restrictions. As a result of the reforms introduced in the early 1990s, however, the implicit subsidies offered to the industry were reduced, and the quota restrictions on imports were replaced by tariffs.

The production of television sets began in 1962 when two assembly plants became operational. The industry expanded gradually during the following three decades, and now comprises nine firms with a combined annual assembling capacity of about 1 million sets, of which five firms also produce colour televisions. Eight of these also have a production capacity for radios and cassette recorders, with two other firms producing only audio equipment. The total production capacity for radios and cassette recorders is estimated at about 500,000 units per annum. After 1979 a

large proportion of this industry, which had hitherto been entirely privately-owned, came under state ownership.

The refrigerator industry has expanded in a broadly similar pattern to the TV and radio/cassette recorder industries, and now consists of 17 plants with a total capacity of about 1 million units per year. Rising prices resulting from high protection have encouraged many private investors to apply for production permits in recent years, with 28 investment permits representing a total capacity increase of about 950,000 units having been issued by the Ministry of Industry in the early 1990s. Since many of these applications had been prompted by the availability of subsidized foreign exchange for the importation of machinery, spares and raw materials, the shift in foreign exchange policy towards more realistic exchange rates during the past two years may discourage many potential investors from undertaking the approved projects.

Other important electronic and electrical appliances produced locally include: water coolers, which are made by eight companies with a total capacity of 650,000 units; vacuum cleaners, by three firms with a capacity of 240,000 units; meat grinders, juicers and rice cookers, by two firms with a total capacity of 160,000, 90,000 and 310,000 units respectively; and electric fans by five firms with a combined capacity of 600,000 units. Electric plugs, meanwhile, are produced by 18 firms with a capacity of 81 million units, and light bulbs and tubes by three firms with a capacity of about 70 million units. An additional four projects for the production of light bulbs and tubes, each with a capacity of 16 million units per annum, have been approved by the Ministry of Industry. Some of these are currently under construction.

Telephone receivers and telephone exchange equipment, including PABX, are produced by two companies established by the state-owned Iran Telecommunication Industries (ITI) in 1963 in a joint venture with Siemens, the Ministry of Posts, Telegraphs and Telephones, and the Bank of Industry and Mines. In 1987 ITI signed a new contract with Siemens and SEL to produce digital telephone exchanges with a capacity of up to 1 million lines by 1994 to replace the existing outdated analogue system. Two other government companies also produce PABX systems, and a further two firms affiliated to the Ministry of Posts, Telegraphs and Telephones also produce telephone exchanges.

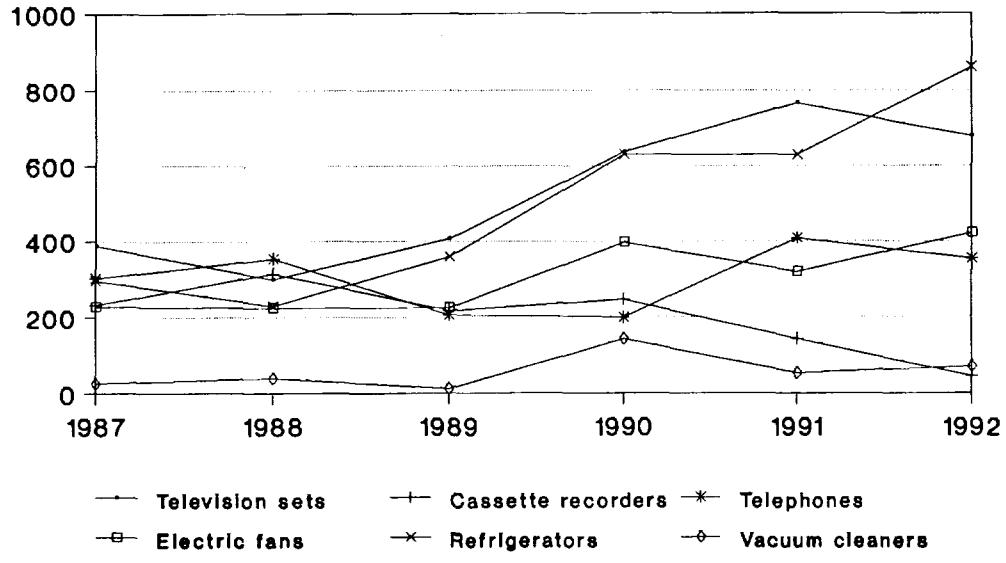
A significant development in the electronics industry since 1989 has been the establishment of two plants assembling personal computers with a combined production capacity of 10,000 units per annum. This sector came into existence mainly in response to the prevailing foreign exchange policies that entitled the industry to subsidized rates for importing equipment and CKD kits, while the import of completely built-up (CBU) units was subject to substantially higher foreign exchange rates. It is uncertain whether these industries will remain viable in the absence of subsidies.

Other related activities that expanded in the protected market during the past two decades include the production of simple electrical boards, which are produced by 72 firms with a capacity of 84 million cells, and the manufacture of various types of electrical fuses and switches by 14 local firms. In addition, two firms with a total capacity of 48,000 units manufacture automatic electronic transformers, while another two with a total capacity of 5,000 units produce invertors, and a further two are engaged in the production of electronic eyes.

While the electrical and electronic appliances industry is largely dependent on imported components, a number of such components are also produced domestically. Refrigerator compressors are thus produced by one domestic company with an annual capacity of 250,000 units, and television picture tubes are produced by another firm with a capacity of 300,000 units per year. Another firm with a capacity of 1 million units per annum produces electrolyte cells, and printed

circuits are produced by nine companies with a combined production capacity of about 250,000 square metres per annum.

Fig. III.M. Production of electrical goods, 1987-92
(Thousand units)



Source: Ministry of Industry.

As indicated by the data in Table III.97, the output of almost all sectors of the electrical and electronic goods industry fluctuated considerably during 1980-92. This reflects primarily changes in the allocation of foreign exchange to these import-intensive industries by the government. Thus, the industry's output increased significantly in 1980-85 when the foreign exchange constraint was relatively weak, but declined in the following five years as these constraints became stronger. The relaxation of foreign exchange controls after 1990, supported by increased foreign borrowing, permitted a recovery in output levels in 1990-92.

Constraints and prospects

The growth prospects for the electronic and electrical goods industry are uncertain. As indicated above, it must contend with the disadvantages of insufficient raw materials and the shortage of a suitably skilled labour force. Having operated in a highly protected market for almost three decades, and been under state control for almost half of the time, the industry has also not faced the competitive pressures that would have helped to enhance its efficiency. Although high levels of protectionism are expected to remain in force for the foreseeable future, domestic demand may not remain as firm as was in the 1980s, when it was stimulated by substantial subsidies on imported components. These foreign exchange subsidies are likely to be substantially reduced in the coming years, however, while Iran seeks to improve its external payments position.

Table III.97. Production of electronic and electrical goods, 1980-92, selected years
(Thousand units unless otherwise stated)

	1980	1983	1985	1987	1988	1989	1990	1991	1992
Television sets	246	555	487	388	299	406	635	765	678
Radio and cassette recorders	32	171	311	233	315	217	246	144	45
Telephone exchanges and PABX (thousand lines)	-	133	150	166	196	180	350[a/]	600[a/]	850[a/]
Telephone receivers	132	321	331	303	353	206	199	407	353
Electric fans	-	481	647	228	225	225	396	320	421
Refrigerators	476	863	721	296	229	359	629	629	860
Water coolers	114	461	481	217	139	98	207	315	309
Vacuum cleaners	-	-	82	26	39	12	144	53	70
Juice extractors	-	96	66	26	54	25	12	165	107
Rice cookers	-	260	243	106	107	120	126	231	224
Washing machines	-	8	60	18	1	10	19	48	65
Meat mincers	-	138	147	77	98	122	206	176	93
Electricity meters	514	915	637	311	140	208	412	533	416
Water meters	228	341	437	357	255	304	397	467	587
Light bulbs and tubes (million units)	22	51	49	30	33	37	38	47	48
Electric plugs (million units)	32	44	39	18	30	33	35	34	28

Source: Ministry of Industry.

a/ Planned production.

ANNEX A
STATISTICAL TABLES

Table A-1. Population distribution by province, 1976-91, selected years

Province	Area (Thousand square kilometres)	Population (Thousand)			Population density[a/] (Per square kilometre)			Population growth (Annual average, percentage)	
		1976	1986	1991	1976	1986	1991	1976-86	1986-91
Tehran	28.2	5,331	8,712	9,982	189	309	354	5.0	2.8
Markazi	29.5	1,090	1,082	1,183	37	37	40	0.0	1.8
Gilan	14.8	1,582	2,081	2,204	107	140	149	2.8	1.2
Mazandaran	46.6	2,387	3,419	3,793	51	73	81	3.7	2.1
East Azerbaijan[b/]	65.8	3,197	4,114	4,420	49	62	67	2.6	1.5
West Azerbaijan	37.6	1,407	1,972	2,284	37	52	61	3.4	3.0
Bakhtaran (Kermanshah)	23.6	1,031	1,463	1,622	44	62	69	3.6	2.1
Khuzestan	66.5	2,187	2,682	3,176	33	40	48	2.1	3.4
Fars	120.0	2,036	3,194	3,544	17	27	30	4.6	2.1
Kerman	185.7	1,091	1,623	1,863	6	9	10	4.1	2.8
Khorassan	315.7	3,264	5,281	6,013	10	17	19	4.9	2.6
Esfahan	105.8	2,177	3,294	3,682	21	31	35	4.2	2.3
Sistan ve Baluchestan	181.5	664	1,197	1,455	4	7	8	6.1	4.0
Kordestan	27.9	782	1,078	1,234	28	39	44	3.3	2.7
Hamedan	19.4	1,088	1,506	1,651	56	77	85	3.3	1.9
Chaharmahal ve Bakhtiyar	14.8	394	631	747	27	43	50	4.8	3.4
Lorestan	28.6	934	1,367	1,502	33	48	53	3.9	1.9
Elam	19.9	246	382	441	13	20	23	4.5	2.9
Kohgiluyeh ve Boher Ahmad	13.7	244	412	497	18	30	36	5.4	3.8
Bushehr	25.4	348	612	694	14	24	27	5.8	2.6
Zanjan	36.4	1,117	1,589	1,776	31	44	49	3.6	2.3
Semnan	91.5	290	417	458	3	5	5	3.7	1.9
Yazd	69.6	357	574	691	5	8	10	4.9	3.8
Hormozgan	65.4	462	762	924	7	12	14	5.1	3.9
Total	**1,633.2[c/]**	**33,706**	**49,444**	**55,836**	**21**	**30**	**34**	**3.9**	**2.5**

Source: Statistical Centre of Iran, *Housing and Population Census,* years indicated.

a/ According to area of each province reported in 1992.

b/ This province was divided up into two separate entities, East Azerbaijan and Ardebil, in late 1993.

c/ Land area only, excluding inland waters.

Table A-2. Cities and towns with a population of 100,000 or over in 1991, and their population in selected years
(Thousands)

	1956	1966	1976	1986	1991
Tehran	1,512	2,720	4,530	6,043	6,476
Mashhad	242	410	668	1,464	1,759
Esfahan	255	424	662	987	1,127
Tabriz	290	403	598	972	1,089
Shiraz	171	270	426	848	965
Ahvaz	120	206	343	580	725
Qom	100	134	247	543	681
Bakhtaran (Kermanshah)	125	188	291	561	624
Karaj	15	44	210	275	442
Zahedan	175	40	94	282	362
Urumiyeh	68	111	164	301	357
Hamedan	100	124	166	273	350
Rasht	110	144	189	291	341
Arak	59	72	117	265	331
Kerman	62	85	141	257	312
Ardebil	66	84	148	282	311
Qazvin	66	88	139	249	279
Yazd	64	93	136	231	275
Zanjan	47	59	100	215	254
Bandar Abbas	18	35	88	202	250
Khorramabad	39	60	105	209	249
Sanandaj	41	55	96	205	244
Eslamshahr	-	-	50	215	230
Borujerd	49	72	101	184	201
Khorramshahr	-	-	-	58	197
Dezful	52	85	121	151	181
Sari	26	45	71	141	168
Gorgan	18	51	88	139	163
Rajaishahr	-	-	8	118	160
Najafabad	30	43	75	129	160
Kashan	46	59	85	139	155
Sabzvar	31	42	70	129	148
Amol	22	40	69	118	140
Khoy	35	48	70	115	138
Babol	36	50	68	115	137
Neyshabur	26	34	60	109	136
Bushehr	18	24	59	121	133
Malayer	21	28	47	104	130
Qaemshahr	23	39	63	109	124
Khomeynishahr	-	47	66	105	118
Maragheh	37	54	65	101	117
Elam	81	15	33	89	116
Bojnurd	19	31	48	93	112
Sirjan	12	20	40	90	108
Masjed-e-soleyman	45	65	77	105	108
Gonbad-e-kavus	18	41	61	87	103
Birjand	14	26	47	82	101

Source: Statistical Centre of Iran, *Statistical Yearbook 1992.*

Table A-3. Distribution of population by age group and sex, 1986 and 1991

Age group	1986 Male	1986 Female	1986 Total	1991 Male	1991 Female	1991 Total
A. Thousands						
0-4	4,596	4,449	9,045	4,156	3,985	8,141
5-9	3,844	3,682	7,526	4,612	4,423	9,035
10-14	3,054	2,850	5,904	3,902	3,646	7,548
15-19	2,660	2,532	5,192	3,058	2,851	5,909
20-24	2,104	2,090	4,194	2,520	2,427	4,947
25-29	1,840	1,813	3,653	2,013	1,993	4,006
30-34	1,482	1,447	2,929	1,762	1,742	3,504
35-39	1,044	1,073	2,117	1,428	1,439	2,867
40-44	834	822	1,656	1,018	1,020	2,038
45-49	829	766	1,595	798	780	1,578
50-54	857	742	1,599	822	749	1,571
55-59	715	622	1,337	793	650	1,443
60-64	652	533	1,185	723	580	1,303
65-69	309	264	573	514	371	885
70-74	175	167	342	264	201	465
75-79	102	107	209	103	83	186
80-84	86	98	184	73	66	139
85 and over	95	98	193	38	38	76
Unspecified	14	8	22	28	24	52
Total[a/]	**25,292**	**24,163**	**49,455**	**28,625**	**27,068**	**55,693**
B. Percentage of total						
0-4	18.2	18.4	18.3	14.5	14.7	14.6
5-9	15.2	15.2	15.2	16.1	16.3	16.2
10-14	12.1	11.8	11.9	13.6	13.5	13.6
15-19	10.5	10.5	10.5	10.7	10.5	10.6
20-24	8.3	8.6	8.5	8.8	9.0	8.9
25-29	7.3	7.5	7.4	7.0	7.4	7.2
30-34	5.9	6.0	5.9	6.2	6.4	6.3
35-39	4.1	4.4	4.3	5.0	5.3	5.2
40-44	3.3	3.4	3.3	3.6	3.8	3.7
45-49	3.2	3.2	3.2	2.8	2.9	2.8
50-54	3.4	3.1	3.2	2.9	2.8	2.8
55-59	2.8	2.6	2.7	2.8	2.4	2.6
60-64	2.6	2.2	2.4	2.5	2.1	2.3
65-69	1.2	1.1	1.2	1.8	1.4	1.6
70-74	0.7	0.7	0.7	0.9	0.8	0.8
75-79	0.4	0.4	0.4	0.4	0.3	0.3
80-84	0.3	0.4	0.4	0.3	0.2	0.3
85 and over	0.4	0.4	0.4	0.1	0.1	0.1
Unspecified	0.1	0.1	0.1	0.1	0.1	0.1
Total[a/]	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Statistical Centre of Iran, *Statistical Yearbooks,* various issues.

a/ Totals may not add due to rounding.

Table A-4. Employment by main economic activity, 1956-86, selected years

Economic activity	1956		1966		1976		1986	
	Thousand	Percentage share	Thousand	Percentage share	Thousand	Percentage share	Thousand	Percentage share
Agriculture, forestry, hunting and fishing	3,326	56.3	3,380	47.5	2,992	34.0	3,191	29.0
Mining and quarrying	25	0.4	26	0.4	90	1.0	32	0.3
Manufacturing	816	13.8	1,298	18.2	1,672	19.0	1,451	13.2
Electricity, gas and water	12	0.2	53	0.8	62	0.7	91	0.8
Construction	336	5.7	510	7.2	1,189	13.5	1,206	11.0
Wholesale and retail trade, restaurants and hotels	355	6.0	553	7.8	668	7.6	875	8.0
Transportation, communication and storage	208	3.5	224	3.1	431	4.9	631	5.7
Financial, insurance, real estate legal and trade services	-	-	-	-	100	1.1	114	1.0
Public, social and personal services	655	11.1	934	13.1	1,520	17.3	3,050	27.7
Unspecified	176	3.0	138	1.9	75	0.9	360	3.3
Total	**5,909**	**100.0**	**7,116**	**100.0**	**8,799**	**100.0**	**11,001**	**100.0**

Source: Statistical Centre of Iran, *Population and Housing Census*, years indicated.

Table A-5. Employment by main economic activity, 1992

	Thousands	Percentage share
Agriculture	3,401	22.4
Petroleum	136	0.9
Industry and mines	1,864	12.3
Construction	1,497	9.9
Services	6,552	43.1
Total employed persons	13,450	88.6
Unemployed	1,731	11.4
Total active population	**15,181**	**100.0**

Source: Statistical Centre of Iran.

Table A-6. Labour force according to education and status, 1986
(Thousand persons)

	Private sector				Public sector			
Schooling	Employees	Self-employed	Wage and salary earners	Unpaid family workers	Employees	Unspecified	Subtotal	Total
Elementary school	95	974	477	136	748	120	1,682	2,551
Guidance school	19	225	178	50	457	76	472	1,005
High school	47	292	161	18	1,210	98	518	1,826
Tertiary education	13	28	28	1	406	22	70	498
Others	30	342	109	31	162	29	512	703
No schooling	139	2,535	928	260	471	118	3,862	4,451
Unspecified	-	1	1	-	1	1	3	5

Source: Statistical Centre of Iran, *Statistical Yearbook 1986.*

Table A-7. Gross domestic product by industrial origin, 1980-92, selected years
(Billion rials at current prices)

	1980	1985	1987	1988	1989	1990	1991	1992
Agriculture	1,164.4	3,109.8	4,891.3	5,208.7	6,669.9	8,419.1	11,221.6	15,392.0
Oil	838.6	1,490.2	893.7	990.6	1,714.5	3,793.8	3,989.7	5,669.0
Industry	1,264.5	2,714.8	3,317.0	3,769.0	4,629.4	6,419.8	9,778.2	13,033.0
Mining	38.7	104.7	111.0	109.5	130.6	173.2	261.5	361.9
Manufacturing	613.2	1,296.1	1,837.2	2,288.1	2,906.4	4,413.9	6,833.2	9,218.0
Water and power	72.2	139.7	201.0	260.7	304.8	395.2	554.4	834.3
Construction	540.4	1,174.3	1,167.8	1,110.7	1,287.6	1,437.5	2,129.1	2,618.8
Services	3,203.6	7,853.0	10,182.0	11,785.3	14,015.0	17,122.3	23,683.1	31,911.5
Trade	561.2	2,280.7	3,568.8	4,468.8	5,528.8	6,541.6	8,645.8	11,308.0
Transportation and communication	560.1	1,182.1	1,315.9	1,491.4	1,790.9	2,652.4	4,371.0	5,273.9
Banking and insurance	307.4	189.6	166.9	204.5	218.0	358.2	540.4	711.7
Ownership of dwellings	646.9	1,905.3	2,352.5	2,796.9	3,395.5	3,937.9	5,358.3	7,383.7
Public services	1,172.4	1,979.3	2,330.0	2,400.9	2,606.8	3,091.6	4,200.9	6,504.9
Private services	148.2	402.4	454.0	559.7	622.8	817.2	1,076.2	1,403.4
Imputed bank service charges	192.6	86.4	6.1	136.9	147.8	276.6	509.5	674.1
GPD at factor cost	6,471.1	15,167.8	19,284.0	21,753.6	27,028.8	35,755.0	48,672.6	66,005.5
Non-oil GDP at factor cost	5,632.5	13,677.6	18,390.3	20,763.0	25,314.3	31,961.2	44,682.9	60,336.5
Net indirect taxes	161.3	607.6	665.0	550.5	758.3	889.6	1,434.8	1,805.3
GDP at market prices	6,632.4	15,775.4	19,949.0	22,304.1	27,787.1	36,644.6	50,107.4	67,810.8

Source: Central Bank of Iran.

Table A-8. Gross domestic product by industrial origin, 1980-92, selected years
(Billion rials at constant 1982 prices)

	1980	1985	1987	1988	1989	1990	1991	1992
Agriculture	1,914.9	2,537.6	2,715.8	2,648.0	2,746.0	2,967.5	3,120.2	3,351.6
Oil	866.1	1,644.4	1,598.7	1,754.0	1,889.5	2,264.7	2,516.7	2,569.3
Industry	1,874.4	2,232.2	2,084.1	1,978.1	2,109.1	2,391.8	2,802.0	2,932.9
Mining	53.9	71.6	65.5	56.6	58.6	63.1	68.4	72.9
Manufacturing	964.8	1,225.9	1,275.6	1,301.8	1,417.9	1,643.8	1,940.3	2,002.4
Water and power	92.5	161.8	193.2	186.3	206.7	246.7	285.0	548.5
Construction	763.2	772.9	549.8	433.4	425.9	438.2	508.3	309.1
Services	4,573.8	5,309.4	4,337.6	3,980.5	4,055.3	4,421.2	4,825.2	5,210.6
Trade	785.8	1,171.5	1,042.2	1,008.4	1,068.9	1,136.4	1,257.9	1,325.0
Transportation and communication	903.4	906.9	642.9	599.7	654.9	796.2	925.5	1,032.2
Banking and insurance	450.0	140.6	78.0	74.1	67.3	101.5	128.0	138.7
Ownership of dwellings	809.4	1,400.5	1,222.4	1,195.1	1,237.3	1,290.3	1,383.5	1,490.0
Public services	1,716.5	1,468.3	1,093.4	870.8	805.1	876.3	921.9	1,003.0
Private services	189.9	285.4	261.6	282.1	267.4	298.9	329.1	353.0
Imputed bank service charges	282.0	63.8	2.9	49.7	45.6	78.4	120.7	131.3
Terms of trade (Iranian definition)	94.7	-116.2	-716.4	-1,126.3	-1,285.3	-1,380.3	-1,439.3	-1,497.5
GDP at factor cost (after terms of trade)	9,228.4	11,723.6	10,736.2	10,360.6	10,799.9	12,045.2	13,264.1	14,064.4
Non-oil GDP at factor cost	8,362.3	10,079.2	9,137.5	8,606.6	8,910.4	9,780.5	10,747.4	11,495.1
Net indirect taxes	232.4	464.9	348.3	233.7	266.9	265.3	356.4	343.7
GDP at market prices	9,460.8	12,188.5	11,084.5	10,594.3	11,066.8	12,310.5	13,620.5	14,408.1

Source: Central Bank of Iran.

Table A-9. Growth of gross domestic product by industrial origin at constant 1982 prices, 1986-92
(Percentage)

	1986	1987	1988	1989	1990	1991	1992
Agriculture	4.45	2.46	-2.50	3.70	8.07	5.15	7.42
Oil	-14.68	13.95	9.71	7.73	19.86	11.13	2.09
Industry	-8.94	-89.75	849.18	6.62	13.40	17.15	4.67
Mining	-12.99	5.14	-13.59	3.53	7.68	8.40	6.58
Manufacturing	-6.35	11.11	2.05	8.92	15.93	18.04	3.20
Water and power	7.23	11.35	-3.57	10.95	19.35	15.52	92.46
Construction	-16.04	-15.27	-21.17	-1.73	2.89	16.00	-39.19
Services	-13.24	-5.83	-8.23	1.88	9.02	9.14	7.99
Trade	-10.79	-0.28	-3.24	6.00	6.31	10.69	5.33
Transportation and communication	-13.39	-18.15	-6.72	9.20	21.58	16.24	11.53
Banking and insurance	-19.63	-30.97	-5.00	-9.18	50.82	26.11	8.36
Ownership and dwelling	-10.79	-2.16	-2.23	3.53	4.28	7.22	7.70
Public services	-16.50	-10.82	-20.36	-7.54	8.84	5.20	8.80
Private services	-17.45	11.04	7.84	-5.21	11.78	10.10	7.26
Imputed bank service charges	-24.14	-94.01	1,613.79	-8.25	71.93	53.95	8.78
Terms of trade (Iranian definition)	614.97	-13.77	57.22	14.12	7.39	4.27	4.04
GDP at factor cost (after terms of trade)	-8.80	0.41	-3.50	4.24	11.53	10.12	6.03
Non-oil GDP at factor cost	-7.83	-1.64	-5.81	3.53	9.76	9.89	6.96
Net indirect taxes	-16.71	-10.05	-32.90	14.21	-0.60	34.34	-3.56
GDP at market prices	-9.10	0.04	-4.42	4.46	11.24	10.64	5.78

Source: Central Bank of Iran.

Table A-10. National accounts by expenditure, 1980-92, selected years
(Billion rials at current prices)

	1980	1985	1987	1988	1989	1990	1991	1992
GDP at market prices	6,632.4	15,775.4	19,949.0	22,304.1	27,787.1	36,644.6	50,107.4	67,810.8
Net indirect taxes	161.3	607.6	665.0	550.5	758.3	889.6	1,434.8	1,805.3
GDP at factor cost	6,471.1	15,167.8	19,284.0	21,753.6	27,028.8	35,755.0	48,672.6	66,005.5
Resource balance	-205.9	-15.0	-113.3	-242.0	-820.5	-1,396.9	-2,309.5	-1,801.4
Export of goods and NFS	833.1	1,251.2	837.0	1,514.0	2,773.1	5,395.1	7,439.3	9,644.8
Imports of goods and NFS	1,089.0	1,266.2	950.3	1,756.0	3,593.6	6,792.0	9,748.8	11,446.2
Total domestic absorption	6,873.0	15,390.7	20,011.8	22,357.3	28,342.1	38,614.5	53,693.6	71,414.6
Total consumption	4,911.2	12,069.7	14,932.8	18,104.2	21,741.8	28,124.9	37,043.9	49,283.0
Private consumption	3,531.4	9,627.1	12,225.5	14,905.5	18,448.1	24,070.7	31,676.8	41,294.6
Government consumption	1,379.8	2,442.6	2,707.3	3,198.7	3,293.7	4,054.2	5,367.1	7,988.4
Statistical discrepancy	-34.7	399.7	50.5	188.8	265.5	-573.0	-1,276.7	-1,802.4
Gross domestic investment	1,961.8	3,321.0	5,079.0	4,253.1	6,600.3	10,489.6	16,649.7	22,131.6
Gross domestic fixed investment	1,442.1	2,759.0	2,662.4	2,956.8	3,709.2	5,662.6	10,844.0	15,690.9
Private sector	754.8	1,672.3	1,562.1	1,755.6	2,285.2	3,046.4	6,603.9	10,361.1
Public sector	687.3	1,086.7	1,100.3	1,201.2	1,424.0	2,616.2	4,240.1	5,329.8
Change in stock	519.7	562.0	2,416.6	1,296.3	2,891.1	4,827.0	5,805.7	6,440.7
Gross domestic savings	1,721.2	3,705.7	5,016.2	4,199.9	6,045.3	8,519.7	13,063.5	18,527.8
Net factor income from abroad	43.4	25.7	20.3	25.1	56.0	116.0	157.9	106.8
Net current transfers	0.1	0.0	0.0	0.0	565.0	767.5	816.0	1,200.0
GNP at market prices	6,675.9	15,801.1	19,969.3	22,329.2	28,408.1	37,528.1	51,081.3	69,117.6
Gross national savings	1,764.7	3,731.4	5,036.5	4,225.0	6,666.3	9,403.2	14,037.4	19,834.6

Source: Central Bank of Iran.

Table A-11. National accounts by expenditure, 1980-92, selected years
(Billion rials at constant 1982 prices)

	1980	1985	1986	1987	1988	1989	1990	1991	1992
GDP at market prices	9,460.8	12,188.5	11,079.7	11,084.5	10,594.3	11,066.8	12,310.5	13,620.5	14,408.1
Net indirect taxes	232.4	464.9	387.2	348.3	233.7	266.9	265.3	356.4	343.7
GDP at factor cost	9,228.4	11,723.6	10,692.5	10,736.2	10,360.6	10,799.9	12,045.2	13,264.1	14,064.4
Resource balance	-306.1	94.4	274.2	551.5	938.1	920.1	978.4	854.8	1,261.0
Export of goods and NFS	868.6	1,399.8	1,220.6	1,557.1	1,729.5	1,865.8	2,252.5	2,504.1	2,911.7
Import of goods and NFS	1,174.7	1,305.4	946.4	1,005.6	791.4	945.7	1,274.1	1,649.3	1,650.7
Total domestic absorption	9,903.8	11,628.0	10,108.5	9,602.5	8,999.8	9,282.5	11,100.7	12,765.4	13,147.1
Total consumption	7,328.5	9,188.7	8,051.3	7,544.1	7,567.9	7,516.5	8,900.1	10,002.1	10,332.4
Private consumption	5,360.1	7,290.6	6,543.7	6,141.3	6,171.8	6,327.1	7,563.5	8,600.0	8,846.4
Government consumption	1,968.4	1,898.1	1,507.6	1,402.8	1,396.1	1,189.4	1,336.6	1,402.1	1,486.0
Statistical discrepancy	-136.9	466.1	697.0	930.5	656.4	864.2	231.4	0.3	0.0
Gross domestic investment	2,575.3	2,439.3	2,057.2	2,058.4	1,431.9	1,766.0	2,200.6	2,763.3	2,814.7
Gross domestic fixed investment	1,848.4	2,153.3	1,645.9	1,360.6	1,143.6	1,216.8	1,378.8	1,942.6	2,081.1
Private sector	987.1	1,262.6	885.2	790.9	679.3	748.0	765.8	1,136.0	1,247.7
Public sector	861.3	890.7	760.7	569.7	464.3	468.8	613.0	806.6	833.4
Change in stock	726.9	286.0	411.3	697.8	288.3	549.2	821.8	820.7	733.6
Terms of trade effect	84.0	-109.9	-660.7	-671.4	-1,047.2	-1,136.0	-1,240.4	-1,245.5	-1,520.8
Capacity to import	952.6	1,289.9	559.9	885.7	682.3	729.8	1,012.1	1,258.6	1,390.9
GDP at market prices	9,460.8	12,188.5	11,079.9	11,084.5	10,594.3	11,066.8	12,310.5	13,620.5	14,408.1
Net factor income from abroad	61.9	19.9	15.6	11.3	11.9	22.3	39.0	42.9	22.7
	4.1		1.8	-8.9	-16.9	15.5	67.3	196.7	168.5
Net current transfers	0.2	0.0	0.0	0.0	0.0	225.0	257.8	221.8	255.0
Gross national product	9,522.9	12,208.4	11,095.3	11,095.8	10,606.2	11,314.1	12,607.3	13,885.2	14,685.8
Gross domestic savings	2,216.3	2,889.9	2,367.7	2,869.0	1,979.2	2,414.3	2,170.0	2,372.9	2,554.9
Gross national savings	2,278.4	2,909.8	2,383.4	2,880.3	1,991.2	2,661.6	2,466.8	2,637.6	2,832.6
Gross domestic income	9,544.8	12,078.6	10,419.0	10,413.1	9,547.1	9,930.8	11,070.1	12,375.0	12,887.3
Gross national income	9,606.9	12,098.5	10,434.7	10,424.4	9,559.1	10,178.1	11,366.9	12,639.7	13,165.0

Source: Central Bank of Iran.

Table A-12. Price indices, 1980-92, selected years
(1982 = 100)

	1980	1985	1986	1987	1988	1989	1990	1991	1992
Wholesale price index	73.6	124.5	155.8	202.1	246.5	291.9	361.7	463.5	605.8
Consumer price index	68.3	135.4	167.5	213.9	275.7	323.8	352.8	421.9	513.2
Imported goods index[a/]	92.7	97.0	98.8	94.5	221.9	380.0	533.1	591.1	693.4
Exported goods index[a/]	101.7	89.4	45.3	53.8	87.5	148.6	239.5	297.1	331.2
Terms of trade	109.7	92.2	45.9	56.9	39.5	39.1	44.9	50.3	47.8
GDP deflator	70.1	129.4	146.5	180.0	210.5	251.1	297.7	367.9	470.6
Percentage increase									
Wholesale price		7.33	25.14	29.72	21.97	18.42	23.91	28.14	30.70
Consumer price	23.54	6.84	23.77	27.69	28.89	17.44	8.96	19.58	21.64
GDP deflator		4.73	13.16	22.88	16.98	19.26	18.55	23.59	27.93

Source: Central Bank of Iran.

a/ These deflators are based on rial values.

Table A-13. Consumer price index, 1980-92, selected years
(Annual average, 1982 = 100)

	1980	1985	1986	1987	1988	1989	1990	1991	1992
Total	68.3	135.4	167.5	213.9	275.7	323.8	352.8	421.9	513.2
Food, beverages and tobacco	67.4	134.0	172.2	205.3	243.8	281.2	293.2	374.8	480.9
Clothing	66.0	135.1	146.5	206.9	322.0	441.0	538.6	608.1	681.7
Housing, fuel and light	81.2	136.3	163.3	201.1	256.5	300.5	323.3	389.0	475.7
Furniture	56.2	130.2	172.9	275.9	424.4	512.2	527.8	546.9	600.7
Communication and transport	58.9	144.4	168.4	241.7	331.6	368.0	449.4	555.3	655.6
Health	94.0	126.5	135.2	139.0	145.9	171.0	196.0	250.1	378.6
Education and social activities	73.7	160.3	298.0	436.1	609.2	607.7	562.4	533.9	550.2
Services and others	65.1	133.3	160.5	214.4	245.9	280.8	330.2	366.1	433.2
CPI end of year	77.7	146.5	186.6	241.0	314.6	336.3	379.9	478.6	562.7

Source: Central Bank of Iran.

Table A-14. Monetary survey: end-year stocks, 1980-92, selected years
(Billion rials)

	1980	1985	1986	1987	1988	1989	1990	1991	1992
Foreign assets (net)	713.5	771.9	773.3	736.8	667.3	761.9	1,322.6	1,189.5	1,356.7
Foreign assets	909.5	857.0	881.0	837.6	784.6	917.0	1,596.0	1,609.7	1,840.7
Foreign liabilities	196.0	85.1	107.7	100.8	117.3	155.1	273.4	420.2	484.0
Domestic assets (net)	3,934.2	8,481.7	10,179.9	12,307.1	15,396.2	18,272.7	22,065.6	28,041.3	35,082.1
Domestic credit	5,231.3	11,585.0	13,761.9	15,967.6	19,043.9	22,526.9	26,843.1	33,141.6	40,138.3
Claims/government (net)	1,584.0	5,776.9	7,428.1	8,747.5	10,537.2	11,673.6	11,643.0	12,233.3	12,358.7
Claims	2,353.0	6,919.3	8,691.0	10,155.6	12,219.4	13,522.9	14,048.3	15,048.2	15,732.6
Deposits	769.0	1,142.4	1,262.9	1,408.1	1,682.2	1,849.3	2,405.3	2,814.9	3,373.9
Claims/non financial public enterprises	586.9	726.2	755.4	803.7	1,027.5	1,155.8	2,043.2	2,611.0	4,189.8
Central Bank	562.3	692.6	631.0	636.7	675.6	684.8	1,220.7	1,658.0	2,133.7
Banks	24.6	33.6	124.4	167.0	351.9	471.0	822.5	953.0	2,056.1
Claims on private sector	3,060.4	5,081.9	5,578.4	6,416.4	7,479.2	9,697.5	13,156.9	18,297.3	23,589.8
Banks	3,060.4	5,081.9	5,578.4	6,416.4	7,479.2	9,697.5	13,156.9	18,297.3	23,589.8
Other items (net)	-1,297.1	-3,103.3	-3,582.0	-3,660.5	-3,647.7	-4,254.2	-4,777.5	-5,100.3	-5,056.2
Claims on banks: Central Bank	393.9	355.9	295.0	315.0	319.9	322.6	384.3	1,316.6	2,332.0
Import deposits: Central Bank	-229.7	-250.3	-308.4	-324.8	-327.7	-460.6	-594.8	-487.1	-542.8
Capital accounts: Central Bank	-178.0	-250.8	-261.4	-265.4	-270.5	-275.0	-275.0	-280.5	-280.5
Other items (net): Central Bank	-413.0	-863.7	-1,173.4	-898.0	-695.7	-962.8	-1,340.7	-1,631.5	-1,283.0
Credit from Central Banks	-393.9	-355.9	-295.0	-314.9	-319.9	-322.6	-384.3	-1,316.6	-2,332.0
Capital accounts: banks	0.0	-315.2	-296.1	-281.2	-233.1	-238.0	-196.8	-432.1	-1.003.6
Other items (net): banks	-476.4	-1,423.3	-1,542.7	-1,891.2	-2,120.7	-2,317.8	-2,370.2	-2,269.1	-1,946.3
Broad money	4,647.5	7,077.3	8,310.8	10,061.3	16,063.5	19,034.6	23,388.2	29,230.8	36,438.7
Money	2,511.1	2,994.8	3,395.7	4,164.1	8,128.2	9,262.7	11,608.1	14,236.2	16,933.3
Currency	1,231.0				3,552.5	3,644.8	4,119.3	4,579.9	5,359.3
Demand deposits	1,280.1	2,994.8	3,995.7	4,164.1	4,575.7	5,617.9	7,488.8	9,656.3	11,574.0
Central Bank	123.8	247.5	227.1	369.9	263.2	275.5	412.9	595.4	564.7
Banks	1,156.3	2,747.3	3,168.6	3,794.2	4,312.5	5,342.4	7,075.9	9,060.9	11,009.3
Quasi-money	2,136.4	4,082.5	4,915.1	5,897.8	7,935.3	9,771.9	11,780.1	14,994.6	19,505.4
Time deposits at Central Bank	1.9	4.0	3.5	5.8	5.8	5.8	5.8	7.0	8.0
Time deposits at banks	2,134.5	4,078.5	4,911.6	5,891.4	7,929.5	9,766.1	11,774.3	14,987.6	19,497.4

Source: Central Bank of Iran.

Table A-15. Monetary survey: annual changes, 1980-92, selected years
(Billion rials)

	1980	1985	1986	1987	1988	1989	1990	1991	1992
Foreign assets (net)	713.5	109.5	1.4	-36.5	-69.5	94.6	560.7	-133.1	167.2
Domestic assets (net)	3,934.2	905.7	1,698.2	2,127.2	3,089.1	2,876.5	3,792.9	5,975.7	7,040.8
Claims on government (net)	1,584.0	643.6	1,651.2	1,319.4	1,789.7	1,136.4	-30.6	590.3	125.4
Claims on non-financial public enterprises	586.9	24.8	29.2	48.3	223.8	128.3	887.4	567.8	1,578.8
Claims on private sector	3,060.4	581.2	496.5	838.0	1,062.8	2,218.3	3,459.4	5,140.4	5,292.5
Other items (net)	-1,297.1	-343.9	-478.7	-78.5	12.8	-606.5	-523.3	-322.8	44.1
Broad money	4,647.5	887.6	1,233.5	1,750.5	6,002.2	2,971.1	4,353.6	5,842.6	7,207.9
Currency	1,231.2	134.8	127.7	466.1	340.2	569.9	92.3	474.5	-4,119.3
Demand deposits	1,280.1	217.9	400.9	768.4	411.6	1,042.2	1,870.9	2,167.5	1,917.7
Term deposits	2,136.4	669.7	832.6	982.1	2,038.1	1,836.6	2,008.2	3,214.5	4,510.8

Source: Central Bank of Iran.

Table A-16. Outstanding bank credit, 1981-91, selected years
(Billion rials)

Year	Debt of public sector to banking system			Debt of government to banking system			Debt of state-owned enterprises to banking system		
	Total	To Central Bank	To other banks	Total	To Central Bank	To other banks	Total	To Central Bank	To other banks
1981	3,934	3,207	727	3,302	2,608	694	633	599	34
1986	9,446	8,087	1,359	8,691	7,456	1,235	755	631	124
1987	11,028	9,541	1,487	10,156	8,904	1,252	872	637	235
1988	13,251	11,651	1,600	12,223	10,975	1,248	1,028	676	352
1989	14,684	12,865	1,819	13,528	12,180	1,348	1,156	685	471
1990	16,096	13,928	2,168	14,053	12,707	1,346	2,044	1,221	823
1991	17,664	15,388	2,276	15,053	13,730	1,323	2,611	1,658	953

	Debt of private, commercial and specialized banks			Debt of private sector to commercial banks			Debt of private sector specialized banks		
	Total	Loans and credits	New facilities[a/]	Total	Loans and credits	New facilities[a/]	Total	Loans and credits	New facilities[a/]
1986	5,579	2,775	2,804	3,647	1,631	2,016	1,932	1,144	788
1987	6,348	2,447	3,901	4,359	1,474	2,885	1,990	974	1,016
1988	7,479	2,213	5,266	5,209	1,359	3,850	2,270	854	1,416
1989	9,697	2,084	7,613	7,032	1,326	5,706	2,667	759	1,908
1990	13,157	1,916	11,241	9,721	1,293	8,428	3,436	623	2,813
1991	18,297	1,872	16,425	13,599	1,293	12,306	4,698	579	4,119

Source: Statistical Centre of Iran, *Statistical Yearbook 1992.*

a/ New facilities refers to those extended under Islamic banking practices.

Table A-17. Deposit rates, 1985-92
(Percentage per annum)

	1985	1986	1987	1988	1989	1990	1991	1992[a/]
Short-term investment deposit	6.0	6.0	6.0	6.0	6.5	6.5	6.5	7.5
Long-term investment deposit								
One year	8.5	8.5	8.5	8.5	8.5	9.0	9.0	10.0
Two year[b/]	..	..	..	..	..	10.0	10.5	11.5
Three year[b/]	..	..	..	..	..	11.0	11.5	13.0
Five year[b/]	..	..	..	..	..	13.0	14.0	15.0
Bonds[c/]								
Seven years	..	..	..	..	..	7.0	7.0	7.0
Five years	..	..	..	..	..	6.5	6.5	6.5
Three years	..	..	..	..	..	6.0	6.0	6.0

Source: Central Bank of Iran.

a/ Since 1992, deposit rates have been determined by the market.
b/ These new types of deposits were introduced at the beginning of 1990.
c/ Banks also hold some interest-free bonds.

Table A-18. Bank lending rates, 1986-92
(Percentage per annum)

	1986	1987	1988	1989	1990	1991	1992
Agriculture	4-8	4-8	4-8	4-8	6-9	6-9	9
Industry and mining	6-12	6-12	6-12	6-12	11-13	11-13	13.0
Housing[a/]	8-12	8-12	8-12	8-12	12-14	12-16	12-16
Trade[b/]	8-12	8-12	8-12	8-12	17-19	..	..
Services[b/]	10-12	10-12	10-12	10-12	17-19	..	..

Source: Central Bank of Iran.

a/ Beginning in 1991, rates are based on the area of residential units.
b/ Beginning in 1991, rates are market determined.

Table A-19. General government revenue, 1980-92, selected years
(Billion rials)

	1980[a/]	1985	1987	1988	1989	1990	1991	1992
Total revenues	1,431.1	2,968.9	2,679.5	2,655.1	3,830.5	6,618.2	8,360.6	11,652.3
Oil and gas revenues of which	888.8	1,188.7	766.0	809.3	1,515.1	3,375.1	3,549.4	5,145.9
Profit from sale of foreign exchange	29.0	220.0	244.0	141.5	744.3	2,256.8	2,510.0	4,077.5
Non-oil revenues	542.3	1,780.2	1,747.5	1,690.7	2,109.6	2,885.1	4,301.2	5,723.9
Tax revenues	340.2	1,034.1	1,030.1	986.5	1,188.0	1,695.4	2,765.0	3,775.5
Income taxes	129.2	530.0	612.3	646.0	659.0	924.0	1,396.0	1,991.0
Government corporations[b/]	11.0	191.0	190.2	198.0	126.0	162.0	244.0	465.0
Private corporations	35.3	167.2	184.2	194.5	213.0	333.0	530.0	833.0
Salaries	52.0	87.0	70.8	69.7	89.0	127.0	230.0	212.0
Professions	9.0	36.2	79.9	86.5	114.0	155.0	219.0	293.0
Real estate[c/]	19.7	37.9	72.1	80.8	85.0	109.0	128.0	141.0
Other	2.9	11.2	15.1	16.5	22.0	26.0	31.0	35.0
Reconstruction tax on wealth	..	..	..	..	10.0	12.0	14.0	12.0
Taxes on production and consumption	49.9	230.3	216.6	195.0	179.0	269.0	417.0	539.0
Cigarettes	7.9	119.2	109.0	92.8	71.0	120.0	122.0	76.0
Petroleum products	28.6	55.7	48.2	34.7	39.0	54.0	44.0	50.0
Non-alcoholic beverages	-	11.2	19.9	29.1	29.0	36.0	42.0	39.0
Automobiles[d/]	-	14.6	9.7	8.2	7.0	20.0	60.0	130.0
Others	13.4	29.6	29.7	30.3	33.0	39.0	149.0	244.0
Taxes on international trade and transactions	161.1	273.8	201.2	145.5	350.0	502.4	952.0	1,245.5
Customs duties	100.0	109.0	66.2	49.8	70.0	115.0	180.0	213.0
Commercial profit tax	52.0	115.3	86.8	57.3	91.0	161.0	389.0	489.0
Order registration fee[e/]	7.1	27.0	44.7	35.4	179.0	215.0	306.0	400.0
Other[f/]	2.0	22.5	3.5	2.9	10.0	11.0	77.0	143.0
Non-tax revenue	96.7	443.8	375.0	289.6	471.6	562.4	618.9	963.1
Government monopolies	0.1	35.6	15.6	21.2	26.0	30.0	35.0	73.0
Income from foreign investments	25.5	5.4	5.2	3.7	4.0	4.0	1.0	48.0
Other revenues	41.9	182.4	110.7	84.7	145.0	197.0	223.0	404.0
Special revenues[g/]	105.4	302.3	342.4	414.6	450.0	627.3	917.3	985.3
OPCP revenue[h/]	-	-	166.0	155.1	205.8	358.0	510.0	782.5
Memo:								
Import duties	153.2	243.9	156.0	109.6	165.0	280.0	572.0	714.0
Private sector	153.0	231.7	154.8	108.2	162.0	277.0	569.0	702.0
Public sector	0.2	12.2	1.2	1.4	3.0	3.0	3.0	12.0

Source: Central Bank of Iran.

a/ Including revenue from the forward sales of oil of IR118.5 billion in 1981, IR126 billion in 1982, IR194.1 billion in 1983, IR91 billion in 1984 and IR31.6 billion in 1985. Information on forward sales of oil beyond 1985 is not available.

b/ Including procurement and distribution centres.

c/ Including property taxes and stamp duties on real estate transactions.

d/ Revenues from taxes on domestically manufactured cars. Tax rate was 5 per cent before 1985, 10 per cent for 1984 and 15 per cent thereafter.

e/ The registration fee of 2 per cent was increased to 3 per cent in 1985, to 5 per cent in 1986 and 1987, and further to 15 per cent in 1989.

f/ Including a special tax on the value of imported cars at a rate of 10 per cent prior to 1985, 20 per cent in 1985 and 30 per cent thereafter (Amendment 30, Budget Law 1986).

g/ Revenues earmarked for special expenditures.

h/ Organization for the Protection of Consumers and Producers, a quasi-governmental agency responsible for providing consumer subsidies financed in part through para-fiscal levies on some imports.

Table A-20. General government expenditure, 1980-92, selected years
(Billion rials)

	1980	1985	1986	1987	1988	1989	1990	1991	1992
Total expenditures and lending	2,357.7	3,615.5	3,465.6	3,978.4	4,701.7	4,931.7	7,338.1	9,489.6	12,849.1
Current expenditures[a/]	..	2,548.0	2,410.0	2,911.0	3,478.5	3,551.9	4,878.5	6,076.3	8,671.9
General services	252.3	274.8	278.5	291.8	331.6	350.6	468.0	696.0	..
National defence	375.0	480.2	470.2	460.7	525.9	634.0	729.0	848.0	..
Social services	603.9	951.5	1,026.8	1,125.6	1,327.5	1,559.5	2,056.0	2,699.0	..
Economic services	237.7	225.3	126.1	259.5	281.9	226.7	340.0	422.0	..
Other expenditures	214.8	616.3	508.7	773.8	927.3	614.4	692.0	899.0	..
OPCP expenditures[b/]	..	..	..	98.1	91.5	170.7	403.0	514.9	892.5
Capital expenditures	568.1	765.2	746.6	729.2	816.4	931.5	1,832.3	2,527.1	3,192.1
General Services	24.6	36.0	34.7	29.6	36.9	47.5	90.0	112.0	..
National defence	..	..	..	..	..	..	..	..	..
Social services	166.8	140.8	114.5	173.4	226.8	275.6	610.0	852.0	..
Economic services	322.2	497.1	471.0	438.4	435.2	562.8	1,042.0	1,533.0	..
Other expenditures	54.5	91.3	126.4	87.8	117.5	45.6	90.1	30.0	..
Special expenditure[c/]	105.4	302.3	309.0	342.0	414.6	450.0	627.3	917.3	985.3
Net lending	..	..	..	-3.8	-7.8	-1.7	..	-31.1	-0.2

Source: Central Bank of Iran.

a/ Excludes special expenditures.
b/ See note h/ under Table A-19.
c/ Expenditure financed through earmarked special revenues.

Table A-21. Balance of payments, 1980-92, selected years
($ million)

	1980	1985	1986	1987	1988	1989	1990	1991	1992
Exports of GNFS	13,069	14,545	7,413	12,147	10,953	13,527	19,741	19,311	20,020
Merchandise (FOB)	12,338	14,175	7,171	11,916	10,709	13,081	19,305	18,415	19,279
Oil and gas	11,693	13,710	6,255	10,755	9,673	12,037	17,993	15,802	16,343
Non-oil	645	465	916	1,161	1,036	1,044	1,312	2,613	2,936
Non-factor services	731	370	242	231	244	446	436	896	741
Imports of GNFS	16,111	15,314	12,867	14,377	12,963	16,466	22,292	29,524	26,849
Merchandise (FOB)	10,888	12,006	10,585	12,005	10,608	13,448	18,330	23,941	21,150
Non-factor services	5,223	3,308	2,282	2,372	2,355	3,018	3,962	5,583	5,699
Trade balance	-3,042	-769	-5,455	-2,230	-2,010	-2,939	-2,551	-10,213	-6,829
Net factor income	606	293	299	140	141	248	378	387	178
Factor receipts	1,004	393	365	206	223	352	456	472	340
Investment income	1,004	393	365	295	223	352	456	472	340
Factor payments	398	100	66	66	82	104	78	85	162
Investment income	398	100	66	66	82	104	78	85	162
Interest payment[a/]	432	259	246	228	291	333	430	619	619
Net current transfers	2	-	-	-	-	2,500	2,500	2,000	2,000
Current receipts	2	-	-	-	-	2,500	2,500	2,000	2,000
Workers remittances	-	-	-	-	-	-	-	-	-
Other current transfers	2	-	-	-	-	2,500	2,500	2,000	2,000
Current payments	-	-	-	-	-	-	-	-	-
Current balance	-2,434	-476	-5,156	-2,090	-1,869	-191	327	-7,826	-4,651
Capital account									
Long term capital	-5,261	-160	802	719	-38	1,036	48	1,137	2,784
Short term capital	-2,977	704	2,325	992	478	2,171	305	4,393	-195
Errors and omissions	948	549	856	193	472	-682	-981	199	-268
Overall balance	-9,724	617	-1,173	-187	-957	2,334	-301	-2,097	-2,330
Financing									
Arrears (+ = increase)	-	-	-	-	-	-	-	-	2,164
Net reserves (- = increase)	9,661	-617	1,173	187	957	-2,334	301	2,097	166

Source: Central Bank of Iran.

a/ Interest payments on usance letters of credit are included with imports.

Table A-22. Composition of merchandise exports by oil/gas and non-oil/gas products

Year	Oil/gas		Non-oil/gas		Total	
	$ billion	Percentage	$ billion	Percentage	$ billion	Percentage
1980	11.7	94.4	645	5.6	12.4	100.0
1981	11.5	97.5	340	2.5	11.8	100.0
1982	20.2	98.5	284	1.5	20.5	100.0
1983	21.2	98.1	357	1.9	21.6	100.0
1984	16.7	97.7	361	2.3	17.1	100.0
1985	13.7	96.5	465	3.5	14.2	100.0
1986	6.3	87.5	916	12.5	7.2	100.0
1987	10.8	90.0	1,161	10.0	12.0	100.0
1988	9.7	90.7	1,036	9.3	10.7	100.0
1989	12.0	92.3	1,044	7.7	13.0	100.0
1990	18.0	93.3	1,312	6.8	19.3	100.0
1991	13.8	84.2	2,613	15.8	16.4	100.0
1992	16.3	84.9	2,936	15.1	19.2	100.0
1993	..	..	3,865	..	..	100.0

Sources: Statistical Centre of Iran, *Statistical Yearbooks 1986, 1989* and *1992;* Central Bank of Iran, *Summary Economic Development of the Country 1990-92.*

Table A-23. Value of non-oil/gas merchandise exports, 1980-92, selected years
($ million)

	1980	1985	1986	1987	1988	1989	1990	1991	1992
Agricultural and traditional goods	601.7	371.0	780.7	990.7	770.3	894.4	1,038.4	1,959.7	2,043.9
Carpets	425.1	115.1	356.0	482.1	308.8	344.7	509.1	1,125.3	1,164.6
Cotton	5.3	10.6	11.1	10.0	0.4	-	-	-	-
Fresh and dry fruits	61.9	113.3	272.4	271.7	252.6	319.1	328.0	437.9	445.0
Skin and leather	49.5	60.5	60.6	103.0	78.2	94.2	56.8	57.6	75.1
Caviar	15.3	19.8	15.7	33.9	43.5	35.7	48.5	39.0	25.9
Casings	24.1	12.5	12.5	22.1	28.4	25.4	21.9	76.9	43.3
Gum tragacanth	0.4	2.1	2.1	1.7	1.7	2.0	3.6	1.9	3.4
Cumin	1.6	1.1	8.7	7.8	8.6	12.0	19.5	26.7	39.6
Other	18.5	36.0	41.6	58.4	48.1	61.3	51.0	194.4	247.0
Metal ores	19.5	30.0	24.9	38.3	32.8	26.9	32.3	39.2	36
Industrial goods	24.0	64.0	109.9	131.8	232.7	122.6	241.5	474.3	626.5
Detergents and soaps	-	-	0.8	2.8	0.4	3.8	1.6	3.2	5.1
Inorganic chemical products	0.2	4.5	11.0	17.4	32.6	34.2	15.9	47.3	62.3
Shoes	2.8	3.0	1.4	4.4	0.2	0.3	0.2	15.1	29.0
Copper ingots, sheets and wires	2.7	29.0	60.8	41.8	143.3	17.0	77.3	62.8	143.4
Ready-made cloths, knitwear and all kinds of fabrics	10.5	8.8	15.4	9.9	6.9	5.4	11.7	57.0	80.2
Cement, stones, tiles and construction materials	0.1	0.8	3.3	10.2	4.5	6.2	4.2	6.3	18.7
Transport vehicles	0.3	0.3	2.4	2.2	1.9	1.8	4.7	20.4	69.2
Other	7.4	17.6	14.8	43.1	42.9	53.9	125.9	262.2	218.6
Other	-	-	-	-	-	-	-	139.6	229.8
Total	**645.2**	**465.0**	**915.5**	**1,160.8**	**1,035.8**	**1,043.9**	**1,312.2**	**2,612.8**	**2,936.2**

Source: Central Bank of Iran.

Table A-24. Distribution of non-oil/gas exports by country, 1985-92
($ million)

	1985	1986	1987	1988	1989	1990	1991	1992
Austria	8.0	15.1	18.2	12.1	17.1	17.7	29.7	37.1
Belgium	2.4	9.4	11.6	7.2	8.4	10.4	40.5	18.2
Canada	1.6	4.5	8.1	8.0	11.3	18.2	29.8	49.9
Czechoslovakia	0.3	6.2	10.8	17.9	4.7	1.9	2.1	0.8
Denmark	1.0	4.7	5.7	3.9	4.5	5.0	6.7	3.8
France	4.3	16.9	29.2	19.2	25.7	36.1	52.4	84.9
Federal Republic of Germany	113.6	283.1	355.9	289.3	359.2	399.8[b/]	762.5[b/]	736.5[b/]
India	4.2	12.1	7.0	5.3	9.3	24.4	28.5	17.1
Italy	54.1	68.8	116.0	106.9	134.3	159.0	210.5	278.1
Japan	3.9	12.9	31.9	36.9	52.9	52.1	70.9	81.0
USSR	30.3	22.0	90.9	63.7	22.8	26.9	59.3[a/]	136.9[a/]
United Arab Emirates	65.2	163.3	155.1	145.8	143.6	152.5	390.0	330.4
Others	102.5	182.3	162.7	47.4	65.3	219.7	955.8	1,221.4
Total	**465.0**	**915.5**	**1,160.8**	**1,035.8**	**1,039.4**	**1,312.2**	**2,638.7**	**2,996.1**

Source: Central Bank of Iran.

a/ CIS.
b/ Including former German Democratic Republic.

Table A-25. Composition of merchandise imports by end-use, 1980-92, selected years
($ million)

	1980	1985	1986	1987	1988	1989	1990	1991	1992
Raw materials and intermediate goods	6,207	7,411	5,461	5,498	4,829	7,548	11,854	15,810	13,388
Industries and mines	4,580	5,570	4,017	4,161	3,492	5,859	9,574	12,762	10,808
Construction	517	391	405	407	424	488	830	1,099	931
Services	770	1,136	724	644	596	748	1,117	1,498	1,269
Agriculture and animal husbandry	340	314	315	286	317	453	333	451	380
Capital goods	1,738	2,421	2,199	2,209	1,869	2,915	4,363	5,819	4,928
Industries and mines	882	1,100	1,190	1,223	1,128	1,375	2,489	3,322	2,813
Services	708	1,078	887	954	665	1,421	1,575	2,097	1,777
Agriculture	148	243	122	32	76	119	299	400	339
Consumer goods	2,899	1,576	1,695	1,662	1,479	2,344	2,505	3,347	2,834
Total imports	10,844	11,408	9,355	9,369	8,177	12,807	18,722	24,975	21,150

Source: Statistical Centre of Iran.

Table A-26. Origin of merchandise imports by country, 1985-92
($ million)

	1985	1986	1987	1988	1989	1990	1991	1992
Argentina	472	254	381	159	457	545	361	339
Australia	315	243	327	216	451	684	313	194
Austria	250	163	146	161	226	450	481	436
Belgium	347	341	316	393	493	797	986	848
Brazil	239	246	552	343	362	645	577	315
Denmark	100	95	105	102	139	147	192	194
France	69	48	91	243	266	489	842	655
Italy	553	609	569	417	803	1,499	2,093	2,279
Japan	1,609	1,267	1,053	836	973	1,933	2,574	2,909
Netherlands	289	293	232	286	410	576	673	533
Romania	398	85	95	96	109	49	111	121
Spain	210	133	106	110	219	287	673	242
Switzerland	389	229	212	215	306	546	649	606
Republic of Korea	292	234	242	127	477	635	601	533
Turkey	898	587	474	425	699	726	818	509[a/]
USSR	116	93	198	217	200	305	313[a/]	291[a/]
United Arab Emirates	350	537	390	276	949	971	1,130	1,261
United Kingdom	677	634	550	556	567	1,015[b/]	1,130[b/]	1,333[b/]
Federal Republic of Germany	1,900	1,708	1,795	1,472	2,024	3,430[b/]	4,859[b/]	5,939[b/]
Others	1,349	1,146	1,136	1,006	2,122	2,331	4,244	4,582
Total	**11,408**	**9,355**	**9,369**	**8,177**	**12,807**	**18,722**	**24,053**	**24,240**

Source: Central Bank of Iran.

a/ CIS.
b/ Including former German Democratic Republic.

Table A-27. Foreign investment during pre-1979 development plans
($ million)

Plan	Period	Foreign investment
First	1949-56	68.0
Second	1950-63	78.5
Third	1963-68	2,728.0
Fourth	1968-73	7,699.0
Fifth	1973-78	25,405.0[a/]

Sources: *Iran Almanac and Book of Facts,* 14th edition, 1975; Ravasani, S., *Government and State in Iran,* (Persian), n.p., n.d., p. 173.

a/ Million rials, equivalent of about $360 million.

Table A-28. Summary of total external debt stocks and transactions, 1980-92, selected years
($ million)

	1980	1985	1986	1987	1988	1989	1990	1991	1992
Total debt outstanding and disbursed	4,508	5,003	4,769	3,975	4,169	5,926	6,219	10,882	14,603
Long-term PPG[a/]	4,508	1,336	1,355	2,280	2,055	1,862	1,797	2,067	3,456
IMF credit	-	-	-	-	-	-	-	-	-
Short-term[b/]	-	3,667	3,414	1,695	2,114	4,064	4,422	8,815	11,147
Total disbursements	265	87	42	11	157	-	139	440	2,980
Long-term PPG[a/]	265	87	42	11	157	-	139	440	2,980
IMF repurchases	-	-	-	-	-	-	-	-	-
Total principal repayments	532	354	322	214	334	124	225	183	195
Long-term PPG[a/]	532	354	322	214	334	124	225	183	195
IMF repurchases	-	-	-	-	-	-	-	-	-
Total charges	432	259	246	228	291	333	430	619	619
Long-term PPG[a/]	432	58	61	38	62	44	28	41	71
IMF charges	-	-	-	-	-	-	-	-	-
Short-term	-	201	185	190	229	289	402	578	548
Total debt services	964	613	568	443	625	457	655	803	814
Long-term PPG[a/]	964	412	383	253	396	168	253	225	266
IMF charges	-	-	-	-	-	-	-	-	-
Short-term	-	201	185	190	229	289	402	578	548

Source: World Bank, International Economics Department, Debt and International Finance Division.

a/ Public and publicly guaranteed.
b/ Data obtained from the IMF.

Table A-29. Production, exports and domestic consumption of oil, 1980-92, selected years
(Thousand barrels per day)

	1980	1985	1986	1987	1988	1989	1990	1991	1992
Crude oil production	..	2,540	2,174	2,460	2,557	2,947	3,231	3,366	3,502
Crude oil exports	762	1,460	1,250	1,546	1,647	1,823	2,224	2,460	2,397
Net crude oil exports in the form of consignment	..	91	99	76	290	228	261	244	283
Net exports of refined products	48	-46	-61	-72	-190	-85	-64	-29	..
Domestic consumption	..	848	789	806	685	836	893	999	993
Discrepancy[a/]	-810	150	97	104	125	145	-83	-308	-171

Source: Central Bank of Iran.

a/ Discrepancy includes change in inventories, crude oil flowing in the pipelines, refining wastage and wastage of oil due to war damage to the pipelines and tankers.

Table A-30. Natural gas production and use, 1985-92
(Billion standard cubic metres)

	1985	1986	1987	1988	1989	1990	1991	1992
Gross production[a/]	34.4	25.3	30.9	26.3	32.2	39.3	45.9	47.2
Domestic consumption	24.1	15.9	20.3	11.9	14.0	17.6	22.9	24.9
Exports	..	..	..	..	..	2.1	2.9	0.5
Flared	10.3	9.7	10.6	10.5	10.9	11.4	11.0	12.8

Source: National Iranian Oil Company.

a/ Excludes gas reinjected.

Table A-31. Manufacturing value added, 1975-92, selected years
(Billion rials)

	1975[a/]	1980	1985	1988	1989	1990	1991	1992[a/]
Food products	10.00	65.66	114.60	213.20	235.70	306.20	456.70	574.37
Beverages	4.35	10.25	27.50	45.10	54.40	63.00	66.70	84.80
Tobacco manufactures	7.65	7.91	9.40	42.40	28.50	34.00	77.80	96.59
Textiles	37.50	93.87	192.90	321.40	375.20	563.00	653.40	805.34
Wearing apparel other than footwear	0.80	5.48	6.90	21.90	22.70	35.20	26.00	32.09
Leather and leather substitutes	1.28	2.54	6.10	19.30	17.70	28.50	25.20	31.27
Leather footwear	2.80	7.05	15.00	30.30	35.40	35.30	38.50	48.64
Wood and cork products excluding furniture	1.92	4.78	10.90	32.90	40.40	44.90	42.20	52.17
Furniture and fixtures of wood	0.60	2.36	4.40	8.10	10.90	13.40	18.50	23.10
Paper and paper products	6.25	9.56	23.80	24.30	31.60	54.10	80.40	99.23
Printing, publishing and allied industries	3.95	5.63	8.80	19.60	41.80	47.20	51.20	63.95
Industrial chemicals	8.85	6.60	21.10	32.20	62.90	94.30	115.30	142.61
Non-industrial chemicals	7.35	19.60	55.20	77.80	131.50	171.20	166.90	205.44
Petroleum refineries	2.95	116.68	5.50	8.40	7.40	6.50	12.20	15.16
Miscellaneous products of petroleum and coal	0.13	0.11	2.90	7.10	12.50	15.90	13.60	16.93
Rubber products	4.35	6.59	16.40	25.20	40.00	48.40	61.50	76.92
Plastic products	2.65	13.97	21.40	41.40	47.20	68.30	74.30	91.66
Pottery, china and earthenware	0.62	3.19	6.90	8.90	10.30	17.10	16.50	20.47
Glass and glass products	2.95	8.09	15.20	54.10	26.20	30.20	70.00	86.67
Other non-metallic mineral products	12.50	57.83	124.60	177.20	211.50	285.90	373.90	514.55
Basic iron and steel industries	14.35	25.90	64.90	131.50	133.20	371.30	420.20	523.33
Basic non-ferrous metal industries	1.30	3.41	17.40	39.20	43.40	171.70	165.60	204.62
Metal products excluding machinery and equipment	4.85	22.54	50.50	64.50	105.20	140.60	185.90	232.09
Non-electrical machinery	11.95	14.68	57.50	119.50	160.00	301.00	445.10	547.99
Electrical machinery, apparatus and appliances	13.20	27.60	68.20	48.00	49.90	138.00	114.90	141.35
Transport equipment	15.65	28.20	84.40	53.80	84.00	209.50	587.40	722.40
Professional and scientific equipment	1.85	1.67	5.00	4.20	5.90	9.60	19.20	23.89
Miscellaneous manufacturing	0.20	0.80	2.40	4.50	5.50	11.70	20.00	25.87
Total manufacturing	**182.80**	**572.55**	**1,039.80**	**1,676.00**	**2,030.90**	**3,316.00**	**4,399.10**	**5,503.50**

Source: UNIDO Industrial Development Review Information Base.

a/ Estimates.

Table A-32. Gross manufacturing output, 1975-92, selected years
(Billion rials)

	1975[a/]	1980	1985	1988	1989	1990	1991	1992[a/]
Food products	80.67	180.40	329.10	598.50	775.70	1,014.60	1,340.00	1,685.24
Beverages	7.88	17.20	43.50	69.80	75.60	106.10	110.20	140.11
Tobacco manufactures	11.96	13.30	16.00	50.50	38.30	45.10	93.60	116.21
Textiles	60.35	183.50	371.70	626.70	778.00	1,034.60	1,432.60	1,765.74
Wearing apparel other than footwear	1.30	8.40	14.20	51.40	78.50	105.30	60.10	74.17
Leather and leather substitutes	3.00	9.50	25.80	69.00	69.40	84.20	81.80	101.49
Leather footwear	4.41	14.20	29.60	59.90	82.70	82.80	92.00	116.24
Wood and cork products excluding furniture	2.14	11.00	21.60	57.30	79.60	93.60	92.70	114.60
Furniture and fixtures of wood	0.81	4.30	8.40	16.90	23.40	34.00	43.50	54.31
Paper and paper products	8.62	23.90	46.70	56.70	83.60	123.60	201.00	248.07
Printing, publishing and allied industries	5.15	11.10	14.00	35.30	70.40	77.10	78.70	98.30
Industrial chemicals	13.86	10.70	41.90	63.20	115.40	203.30	218.50	270.26
Non-industrial chemicals	19.99	48.20	115.60	154.80	299.50	349.10	461.70	568.31
Petroleum refineries	5.15	138.00	7.70	12.10	14.10	11.60	21.40	26.59
Miscellaneous products of petroleum and coal	0.23	0.30	4.90	12.00	17.90	25.10	26.90	33.49
Rubber products	7.45	13.40	29.90	48.80	89.00	94.50	127.80	159.84
Plastic products	4.19	34.80	44.60	91.80	154.30	256.20	206.80	255.11
Pottery, china and earthenware	0.85	4.30	8.50	13.10	14.80	23.00	25.20	31.26
Glass and glass products	3.76	13.40	23.50	73.30	42.40	54.80	106.80	132.23
Other non-metallic mineral products	19.77	84.80	188.20	298.30	342.70	482.70	651.00	895.89
Basic iron and steel industries	50.36	59.00	162.40	212.50	296.10	920.40	1,021.70	1,272.45
Basic non-ferrous metal industries	3.37	7.60	41.80	77.40	117.70	395.40	438.30	541.57
Metal products excluding machinery and equipment	6.79	48.30	92.70	108.00	242.30	369.10	405.10	505.75
Non-electrical machinery	28.28	34.20	128.60	256.80	329.80	616.20	934.30	1,150.27
Electrical machinery, apparatus and appliances	18.80	54.90	127.20	89.30	96.90	214.80	252.30	310.37
Transport equipment	67.06	83.10	216.70	160.60	156.50	342.10	1,114.30	1,370.40
Professional and scientific equipment	2.72	2.80	7.90	7.30	11.40	26.10	41.70	51.88
Miscellaneous manufacturing	0.32	1.30	4.10	4.70	16.30	24.20	33.10	42.82
Total manufacturing	**439.24**	**1,115.90**	**2,166.80**	**3,376.00**	**4,512.30**	**7,209.60**	**9,713.10**	**12,132.97**

Source: UNIDO Industrial Development Review Information Base.

a/ Estimates.

Table A-33. Average number of employees, 1975-92, selected years

	1975[a/]	1980	1985	1988	1989	1990	1991	1992[a/]
Food products	14,589	58,880	68,770	71,100	77,800	67,600	69,383	71,000
Beverages	5,973	8,290	10,840	9,000	8,800	8,500	8,700	9,000
Tobacco manufactures	8,137	10,080	7,520	11,000	11,100	10,500	7,919	8,000
Textiles	81,584	99,440	125,760	144,600	145,400	132,700	132,618	133,000
Wearing apparel other than footwear	1,280	4,720	6,960	8,900	10,100	10,300	7,071	7,100
Leather and leather substitutes	1,660	2,630	4,430	5,200	4,400	4,300	3,368	3,400
Leather footwear	4,734	7,920	10,740	10,100	12,600	11,300	10,700	11,000
Wood and cork products excluding furniture	3,574	9,810	11,140	11,100	13,000	13,300	8,251	8,300
Furniture and fixtures of wood	745	2,410	4,380	3,100	3,200	4,400	3,765	3,825
Paper and paper products	4,775	8,010	10,650	8,600	10,700	9,800	12,149	12,200
Printing, publishing and allied industries	3,975	5,630	5,070	6,000	7,900	9,900	7,872	8,000
Industrial chemicals	4,948	4,960	10,860	13,200	14,000	15,200	10,731	10,800
Non-industrial chemicals	10,046	15,010	20,450	20,500	23,700	25,200	22,465	22,500
Petroleum refineries	880	18,760	1,210	2,400	2,700	1,100	2,423	2,450
Miscellaneous products of petroleum and coal	180	180	1,120	2,500	3,300	2,700	2,073	2,100
Rubber products	5,330	5,520	9,840	10,100	13,500	10,900	11,104	11,300
Plastic products	3,979	13,630	12,390	12,900	14,100	14,300	13,400	13,450
Pottery, china and earthenware	1,516	3,370	3,810	3,800	3,700	3,400	4,211	4,250
Glass and glass products	3,733	6,650	7,180	8,500	8,400	8,300	8,120	8,180
Other non-metallic mineral products	18,787	66,660	87,470	87,200	83,700	82,500	64,300	72,000
Basic iron and steel industries	18,030	18,260	35,470	38,500	38,700	47,800	52,301	53,000
Basic non-ferrous metal industries	1,422	2,870	5,870	11,500	11,200	11,800	11,319	11,380
Metal products excluding machinery and equipment	6,242	22,600	26,430	27,900	31,300	33,900	31,009	31,500
Non-electrical machinery	18,684	18,500	32,280	52,800	55,000	58,700	56,900	57,000
Electrical machinery, apparatus and appliances	14,749	25,310	36,550	18,500	18,400	17,300	17,983	18,000
Transport equipment	20,103	31,380	46,850	27,600	27,700	31,800	35,576	35,600
Professional and scientific equipment	1,660	1,470	2,690	2,400	2,200	3,200	3,754	3,800
Miscellaneous manufacturing	295	590	1,300	1,700	2,100	2,800	1,900	2,000
Total manufacturing	**261,610**	**473,540**	**608,030**	**630,700**	**658,700**	**653,500**	**621,365**	**634,135**

Source: UNIDO Industrial Development Review Information Base.

a/ Estimates.

Table A-34. Wages and salaries, 1975-92, selected years
(Billion rials)

	1975[a/]	1980	1985	1988	1989	1990	1991	1992[a/]
Food products	2.90	37.16	64.41	83.50	96.40	102.64	138.17	173.77
Beverages	1.05	5.57	11.26	11.23	10.51	14.66	22.17	28.19
Tobacco manufactures	3.14	7.24	9.23	12.41	14.18	14.11	21.16	26.27
Textiles	11.33	65.61	125.05	162.49	187.00	199.65	300.83	370.79
Wearing apparel other than footwear	0.56	2.22	5.09	6.70	9.70	11.12	12.50	15.43
Leather and leather substitutes	0.27	1.69	3.74	5.31	5.57	6.50	6.43	7.98
Leather footwear	0.64	5.21	9.46	9.84	14.93	16.76	20.19	25.51
Wood and cork products excluding furniture	0.44	5.57	9.60	11.30	15.39	13.32	23.20	28.68
Furniture and fixtures of wood	0.24	1.15	3.92	3.21	3.92	6.34	8.04	10.04
Paper and paper products	1.14	6.12	12.84	11.07	17.07	17.53	31.49	38.86
Printing, publishing and allied industries	2.30	3.94	5.12	6.94	11.20	15.49	21.38	26.70
Industrial chemicals	2.48	6.18	12.66	19.70	26.29	30.00	35.76	44.23
Non-industrial chemicals	2.17	10.33	21.44	26.03	35.76	44.37	59.54	73.29
Petroleum refineries	0.49	20.98	1.38	2.60	3.48	2.31	4.02	5.00
Miscellaneous products of petroleum and coal	0.09	0.10	0.97	2.15	4.40	3.49	3.72	4.64
Rubber products	1.36	4.69	11.22	16.59	22.12	19.67	30.43	38.06
Plastic products	0.57	8.59	11.92	14.99	20.51	21.84	30.57	37.71
Pottery, china and earthenware	0.23	1.97	3.65	4.90	5.21	5.30	9.92	12.30
Glass and glass products	0.81	4.69	8.27	11.80	13.47	12.83	19.59	24.25
Other non-metallic mineral products	3.83	36.49	79.30	95.10	100.12	118.51	157.53	216.79
Basic iron and steel industries	4.54	15.56	38.48	49.18	60.13	105.46	175.89	219.06
Basic non-ferrous metal industries	0.37	2.21	6.48	16.03	17.02	23.70	40.18	49.65
Metal products excluding machinery and equipment	1.21	14.64	26.00	32.87	44.93	52.72	75.41	94.15
Non-electrical machinery	3.72	12.34	34.94	64.84	80.10	104.67	159.87	196.83
Electrical machinery, apparatus and appliances	2.87	19.07	39.20	22.28	24.25	27.78	43.66	53.71
Transport equipment	4.44	24.49	56.09	38.60	49.08	64.22	95.43	117.36
Professional and scientific equipment	0.32	1.07	2.77	2.83	2.91	4.79	8.19	10.19
Miscellaneous manufacturing	0.07	0.28	1.02	1.33	2.02	3.62	3.76	4.86
Total manufacturing	**53.57**	**325.16**	**615.51**	**745.82**	**897.66**	**1,063.40**	**1,559.04**	**1,954.29**

Source: UNIDO Industrial Development Review Information Base.

a/ Estimates.

Table A-35. Gross profit, 1975-92, selected years
(Billion rials)

	1975[a/]	1980	1985	1988	1989	1990	1991	1992[a/]
Food products	7.10	28.50	50.19	129.70	130.30	203.56	318.53	400.60
Beverages	3.30	4.68	16.24	33.87	43.89	43.34	44.53	56.61
Tobacco manufactures	4.51	0.67	0.17	29.99	14.32	19.89	56.64	70.32
Textiles	26.17	28.26	67.85	158.91	188.20	363.35	352.57	434.55
Wearing apparel other than footwear	0.24	3.26	1.81	15.20	13.00	24.08	13.50	16.60
Leather and leather substitutes	1.01	0.85	2.36	13.99	12.13	22.00	18.77	23.29
Leather footwear	2.16	1.84	5.54	20.46	20.47	18.54	18.31	23.13
Wood and cork products excluding furniture	1.40	-0.79	1.30	21.60	25.01	31.58	19.00	23.49
Furniture and fixtures of wood	0.04	1.21	0.48	4.89	6.98	7.06	10.46	13.06
Paper and paper products	5.11	3.44	11.00	13.23	14.53	36.57	48.91	60.37
Printing, publishing and allied industries	1.65	1.69	3.68	12.66	30.60	31.71	29.82	37.25
Industrial chemicals	6.37	0.42	8.44	12.50	36.61	64.30	79.54	98.38
Non-industrial chemicals	5.18	9.27	36.88	51.77	95.74	126.83	107.36	132.15
Petroleum refineries	2.46	95.70	4.12	5.80	3.92	4.19	8.18	10.16
Miscellaneous products of petroleum and coal	0.04	0.01	1.93	4.95	8.11	12.41	9.88	12.29
Rubber products	2.99	1.90	5.18	8.61	17.88	28.73	31.07	38.86
Plastic products	2.08	5.38	9.48	26.41	26.69	46.46	43.73	53.95
Pottery, china and earthenware	0.39	1.22	3.25	4.00	5.09	11.80	6.58	8.17
Glass and glass products	2.14	3.40	6.93	42.30	12.73	17.37	50.41	62.42
Other non-metallic mineral products	8.67	21.34	45.30	82.10	111.38	167.39	216.37	297.76
Basic iron and steel industries	9.81	10.34	26.42	82.32	73.07	265.84	244.31	304.27
Basic non-ferrous metal industries	0.93	1.20	10.92	23.17	26.38	148.00	125.42	154.97
Metal products excluding machinery and equipment	3.64	7.90	24.50	31.63	60.27	87.88	110.49	137.94
Non-electrical machinery	8.23	2.34	22.56	54.66	79.90	196.33	285.23	351.16
Electrical machinery, apparatus and appliances	10.33	8.53	29.00	25.72	25.65	110.22	71.24	87.64
Transport equipment	11.21	3.71	28.31	15.20	34.92	145.28	491.97	605.04
Professional and scientific equipment	1.53	0.60	2.23	1.37	2.99	4.81	11.01	13.70
Miscellaneous manufacturing	0.13	0.52	1.38	3.17	3.48	8.08	16.24	21.01
Total manufacturing	**129.23**	**247.39**	**424.29**	**930.18**	**1,133.24**	**2,252.60**	**2,840.06**	**3,549.21**

Source: UNIDO Industrial Development Review Information Base.

a/ Estimates.

ANNEX B
CONTACT POINTS FOR INVESTORS

Chambers of Commerce, Industries and Mines

Iran Chamber of Commerce, Industries and Mines 254 Taleghani Avenue Tehran	Tel: Fax: Tlx:	884 6031-9 882 5111 213382 TCIM IR
Abadan Chamber of Commerce, Industries and Mines 4th Floor, Papen Building Salman-Farsi Avenue Ahvaz	Tel:	(061) 29819
Ahvaz Chamber of Commerce, Industries and Mines Loghman/Soghrat Square, Ammanieh Ahvaz	Tel:	(061) 32744 or (061) 32900
Bakhtaran Chamber of Commerce, Industries and Mines Modaress Avenue Bakhtaran	Tel:	(0431) 26300 or (0431) 22455
Bandar Abbas Chamber of Commerce, Industries and Mines Emam Khomeini Boulevard Bandar Abbas	Tel:	(0761) 22793 or (0761) 22182
Bandar Bushehr Chamber of Commerce, Industries and Mines Kargar Avenue, Near Edareh Rahnamai Bandar Bushehr	Tel:	(0771) 22803 or (0771) 22073
Esfahan Chamber of Commerce, Industries and Mines Bustane Feiz, Pole-Khaju Esfahan	Tel: Fax:	(031) 45097 (031) 45099
Ghom Chamber of Commerce, Industries and Mines 2nd Floor, Passage Musabn-Jafar Ghom	Tel:	(0251) 30038
Gorgan Chamber of Commerce, Industries and Mines Shahid Namju Avenue (Avale Lashkar) Gorgan	Tel:	(0271) 99799

Gilan Chamber of Commerce, Industries and Mines 226 Seighalan Square Dr. Shariati Avenue Rasht	Tel:	(0231) 32535
Hamedan Chamber of Commerce, Industries and Mines Meidan Emam Khomeini Hamedan	Tel:	(0261) 23422
Kashan Chamber of Commerce, Industries and Mines 22 Bahman Avenue Kashan	Tel:	(0251) 22288
Kerman Chamber of Commerce, Industries and Mines Jomhuri-Eslami Boulevard Kerman	Tel:	(0341) 23818
Khorramshahr Chamber of Commerce, Industries and Mines Loghman/Soghrat Square, Ammanieh Ahvaz	Tel:	(061) 32551 or (061) 32900
Mashhad Chamber of Commerce, Industries and Mines 413 Emam Khomeini Avenue Opp. Bank Melli Markazi Mashhad	Tel:	(051) 29881/2
Sanandaj Chamber of Commerce, Industries and Mines Namakiha Avenue Sanandaj	Tel:	(0471) 35035
Shiraz Chamber of Commerce, Industries and Mines Zand Avenue, Near Serrah Khayam Shiraz	Tel: Fax: Tlx:	(071) 54002/3 (071) 31220 332201 SCIM IR
Tabriz Chamber of Commerce, Industries and Mines 65 North Artesh Avenue Tabriz	Tel:	(041) 64589 or (041) 66110 or (041) 63154 or (041) 51951
Tehran Chamber of Commerce, Industries and Mines 254 Taleghani Avenue Tehran	Tel: Fax: Tlx:	(021) 8836031/39 (021) 8825111 213382 TCIM IR

Urumiyeh Chamber of Commerce, Industries and Mines
Emam Avenue
Opp. Telephone Rah-Dour
Urumiyeh
Tel: (0441) 26073

Yazd Chamber of Commerce, Industries and Mines
22 Bahman Boulevard, Opp. Emam-Shahr
Yazd
Tel: (0351) 33070/71

Zahedan Chamber of Commerce, Industries and Mines
35 Bahonar Square, Shariati Avenue
Zahedan
Tel: (0541) 25688 or (0541) 22243

Joint Chambers of Commerce

Irano-Belgian Chamber of Commerce
151/3 Kakh Bar Alley, Palestine Street
Tehran
Tel: 640 8718
Tlx: 212337 TARJ IR

Irano-French Joint Chamber of Commerce
Suite 20, 4th Floor
35 Khaled-Eslamboli Avenue
Tehran
Tel: 226 4851
Fax: 226 6689
Tlx: 215836 ASPA

Irano-German Chamber of Commerce and Industry
131 Khaled-Eslamboli Avenue
Tehran
Tel: 872 1123 & 872 8827
Tlx: 213252 DIHK-IR

Iran-Italian Joint Chamber of Commerce
19 Naeimi Street, Mirzaye-Shirazi Avenue
Tehran
Tel: 872 4140
Tlx: 214404 CC IR

Iran-Korea Economic Cooperation Committee
254 Taleghani Avenue
Tehran
Tel: 884 6031-9
Fax: 882 5111
Tlx: 213382 TCIM-IR

Irano-Russian Joint Chamber of Commerce
254 Taleghani Avenue
Tehran
Tel: 836 125
Fax: 882 5111
Tlx: 213382 TCIM IR

Export Associations affiliated to Iran Chamber of Commerce, Industries and Mines

Iran Carpet Exporters Association
29 Farashbashi Street,
Bazar Pachenar, Khayam Avenue
Tehran 11636
Tel: 561 4229
Fax: 563 4343

Iran Dried Fruit Exporters' Association
4th Floor
254 Taleghani Avenue
Tehran
Tel: 838 334
Fax: 882 5111
Tlx: 213382 TCIM IR

Iran Tragacanth, Gums, Herbal Roots and Seeds Exporters' Association
4th Floor
254 Taleghani Avenue
Tehran
Tel: 836031/39

Iran Fruits, Vegetables, Flowers and Plants Exporters' Association
3rd Floor
254 Taleghani Avenue
Tehran
Tel: 836124

Iran Skins, Pickled-Skins and Leather Exporters' Association
5th Floor, Seirafi Building
42 Amir-Kabir Avenue, Emam Khomeini Square
Tehran
Tel: 3119915
Tlx: 21363-39 TPBA-IR

Iran Casings Exporters' Association
2nd Floor, 826 Karbaschian Building
East 15-Khordad Avenue
P.O. Box 11175-148
Tehran
Tel: 353575
Tlx: 213636-8 TPBA-IR ATT.D-5019

Iran Handicrafts Exporters' Association
1st Floor
254 Taleghani Avenue
Tehran
Tel: 836031/39

Iran Knitted Fabric Exporters' Association
1st Floor
254 Taleghani Avenue
Tehran
Tel: 8825116

Non-Metallic Minerals Exporters' Association
3rd Floor
254 Taleghani Avenue
Tehran
Tel: 836031/39

Syndicates affiliated to Iran Chamber of Commerce, Industries and Mines

Syndicate of Pipes and Sectional Tubes Manufacturers of Iran
4th Floor, 1 Karvan Street
Azadi Avenue
Tehran
Tel: 648 6223

Syndicate of Cotton and Synthetic Textile Industries of Iran
5 Kandovan Street
Enghelab Avenue, Opp. Nejatollahi Avenue
Tehran
Tel: 675 450
675 770

Syndicate of International Transport Companies of Iran
90 Malayeri-Pour (Ex-Diba) Street
Mofateh Avenue
Tehran
Tel: 882 1359
882 2904
Fax: 882 2683
Tlx: 212809 ITCS IR

Syndicate of Woollen Textile Producers of Iran
3rd Floor, Keshmir Building
Jomhouri Crossroad
Tehran

Syndicate of Paint and Resin Producers of Iran
254 Taleghani Avenue
Tehran
Tel: 882 5117
Fax: 882 5111

Syndicate of Building Material Industries of Iran
16 Mehrani Alley
Kandovan Street, Enghelab Avenue
Tehran
Tel: 672 769
675 861

Syndicate of Construction Companies
86-88 South Saba Street
Taleghani Avenue
Tehran
Tel: 646 9105
646 4261
640 2037
Fax: 646 4084
Tlx: 212242 STSS IR

Gas-burning Equipment and Appliances Producers Council
10th Floor, Aluminum Building
Jomhuri Avenue
Tehran
Tel: 675 339
676 110

Bolt and Nut Producers Society of Iran
3rd Floor, Room No. 353
Bazar Abzard Yaragh
Emam Khomeini Avenue
Tehran
Tel: 671 024

Government Organizations

Ministry of Agriculture and Rural Development Keshavarz Boulevard Tehran	Tel: Fax: Tlx:	652 102-6 651 030 213507 IMEG-IR
Ministry of Commerce 492 Vali-e-Asr Avenue Tehran	Tel: Fax: Tlx:	889 3620-9 889 1753 212025 MCRH IR
Ministry of Commerce, Foreign Trade Deputy 492 Vali-e-Asr Avenue Tehran	Tel: Fax: Tlx:	889 2565 & 889 5420 889 3945 214415 CSD IR
Ministry of Construction Crusade 1 Patoor Square, Shahid Shoorideh Boulevard Tehran	Tel: Fax: Tlx:	61361 640 5969 214135 JHAD-IR
Ministry of Finance and Economic Affairs Nasser Khosrow Avenue Tehran	Tel: Fax: Tlx:	3251 305 562 212830 & 212838 MEFA IR
Ministry of Industry 30 Mousa Kalantari Street Villa Avenue Tehran	Tel: Fax: Tlx:	81061 894 419 & 897 448 212796 INM IR
Ministry of Labour and Social Affairs Azadi Avenue, After Khosh Cross Tehran	Tel: Fax: Tlx:	930 031-9 & 930 051-9 938 336 212279 MLSA-IR
Ministry of Mines and Metals 248 Somayeh Avenue P.O. Box 14155-1416 Tehran	Tel: Fax: Tlx:	81071 & 836 050-9 832028 212718 MMAM IR
Ministry of Oil 81 Taleghani Avenue Tehran	Tel: Fax: Tlx:	6151 615 2670 212182 NIOC IR
Ministry of Post, Telegraph and Telephone 797 Dr. Shariati Avenue Tehran	Tel: Fax: Tlx:	8191 864015 212444 PTT IR
Ministry of Roads and Transportation 49 Taleghani Avenue Tehran	Tel: Fax: Tlx:	6461034-9 & 893 065-6 609 4233 213381 MRTR IR

Customs Administration 741 Vali-Asr Avenue Tehran	Tel: Fax: Tlx:	8181 212093 899 7144 & 894 235
Commercial Services Promotion Center 67 N. Felestine Avenue Tehran	Tel: Tlx:	889 8023-5 212253 CSDC-IR
Export Promotion Center of Iran Vali-e-Asr Avenue Chamran Expway P.O. Box 1148 Tajrish	Tel: Fax: Tlx:	21911 292858 212896 FAIR IR
Institute for Commercial Studies and Research Kargar Avenue, Opposite Park Laleh Corner of Hamadan Alley Tehran	Tel: Fax: Tlx:	934 777 933 656 226284
Planning and Budget Organization 9 Shahid Nikkhu Street, Baharestan Square Tehran	Tel: Fax: Tlx:	3271 311 8712 & 390 109 212642 PLAN IR
Statistical Centre of Iran Rahi Moayari Street Fatemi Avenue Tehran	Tel: Fax: Tlx:	655061-9 653451 213233 & 215716 AMAR IR
Consumers and Producers Protection Organization 285 Motahari Avenue Tehran	Tel: Fax:	871 0508-9 871 3415
Defence Industries Organization Pasdaran Avenue Doulat Cross Tehran	Tel: Tlx:	254 0030-9,254 0020-9 214262 SMS IR
Industrial Development and Renovation Organization 29 Sepahbod Garani Avenue P.O. Box 15815/1976 Tehran	Tel: Fax: Tlx:	882 9181-9 882 9458 214234 IDRO IR
National Iranian Industries Organization 133 Fatemi Avenue P.O. Box 14155-3579 Tehran	Tel: Fax: Tlx:	656 031-40 658 070 214176 NIIO IR

Major Corporations

Government Trading Corporation (GTC) 185 Garaney Avenue Tehran	Tel: Fax: Tlx:	882 7121-8 883 5333 212369-213842 213720-222830 214163 GTC IR
Iran Air Mehrabad Airport Tehran	Tel: Fax: Tlx:	9111 903 248 212795 IRAN IR
Iran Carpet Corporation Ferdowsi Avenue, After Ferdowsi Square Tehran	Tel: Fax: Tlx:	678 232-4 675 545 213933 ICCB IR
Islamic Republic of Iran Railway Railway Square Tehran	Tel: Fax: Tlx:	5121 556133 213103 RAIR IR
Islamic Republic of Iran Shipping Lines 127 Ghaem Magham Farahani Avenue Tehran	Tel:	889 3801-20 & 882 4061-9
National Iranian Copper Ind. Co. 1091 Vali-Asr Avenue Tehran	Tel: Fax:	872 1101-6 653 641
National Iranian Gas Co. 491 Taleghani Avenue Tehran	Tel: Fax: Tlx:	8131 8839049 215620 NIGC IR
National Iranian Oil Company Taleghani Avenue Tehran	Tel: Fax: Tlx:	6151 883 9049 212182 & 212186 & 212177 NIOC IR
National Iranian Steel Co. 685 Vali-Asr Square Tehran	Tel: Tlx:	8161 212334 NISC IR
National Petrochemical Industries Karim Khan Zand Avenue P.O. Box 2895-3010-2877 Tehran	Tel: Fax: Tlx:	8822081-9 898 487 213520 NPC IR

Financial Institutions

Central Bank of Iran 213 Ferdowsi Avenue Tehran	Tel: Fax: Tlx:	311 0101-9 237 677 213965-8 MZBK IR

Agriculture Bank	Tel:	9121
129 P. Lumomba Street	Fax:	973 625
Jalal Al-Ahmad Expway		980 133
Tehran	Tlx:	212058 ADBI IR
Bank of Industry and Mines	Tel:	893 271-9
Karim Khan Zand Avenue	Tlx:	212816 IMB IR
Tehran		
Bank Mellat	Tel:	32491
15 Fayaz-Bakhsh Street	Fax:	673 396
Parke Shahr Avenue	Tlx:	213010 CNTM IR
Tehran		
Bank Melli Iran	Tel:	3231
S. Ferdowsi Avenue	Tlx:	215279 - 212890
Tehran		BMIT IR
Bank Saderat (Export)	Tel:	670 041-59
P.O. Box 2751	Tlx:	213077 SABK IR
Jomhori Islami Avenue		
Tehran		
Bank Sepah	Tel:	311090-9
Emam Khomeini Square	Fax:	311 9471
Tehran	Tlx:	213367 SEPA IR
Bank Tejarat	Tel:	890 131-9 & 81041
184 Taleghani Avenue	Tlx:	215009 & 215008
Tehran		TJGH IR
Export Development Bank of Iran	Tel:	872 6887
129 Khaled Eslamboli Street	Fax:	872 6979
Tehran	Tlx:	226895 EDBI IR
Housing Bank of Iran	Tel:	675 0 021-9
Ferdowsi Avenue	Fax:	673 369
Tehran	Tlx:	213904 BRI IR
Workers Welfare Bank	Tel:	882 5000
125 Dr. Mofateh Street	Fax:	837 879
P.O. Box 11/1628	Tlx:	213786 BRKT IR
Tehran		
Alborz Insurance Co.	Tel:	893 201-9
234 Sepahbod Garani Avenue	Fax:	898 088
Tehran	Tlx:	214134 AICT IR
Asia Insurance Co.	Tel:	835 201-5
Taleghani Avenue	Fax:	882 7196 & 835 203
Tehran	Tlx:	213664 AICI IR

Iran Central Insurance	Tel:	640 8865
149 Taleghani Avenue	Fax:	640 5729
Tehran	Tlx:	212888 & 215224 CENT IR
Iran Insurance Co.	Tel:	304 501-5
420 N. Saadi Avenue		305 595
Tehran	Fax:	311 1050
	Tlx:	214154 & 212782 BIMH IR
Tehran Stock Exchange	Tel:	670 219
Karimkhan Zand Avenue		670 309
Hafez Street	Fax:	672 524
Tehran		

Procurement and Distribution Centres

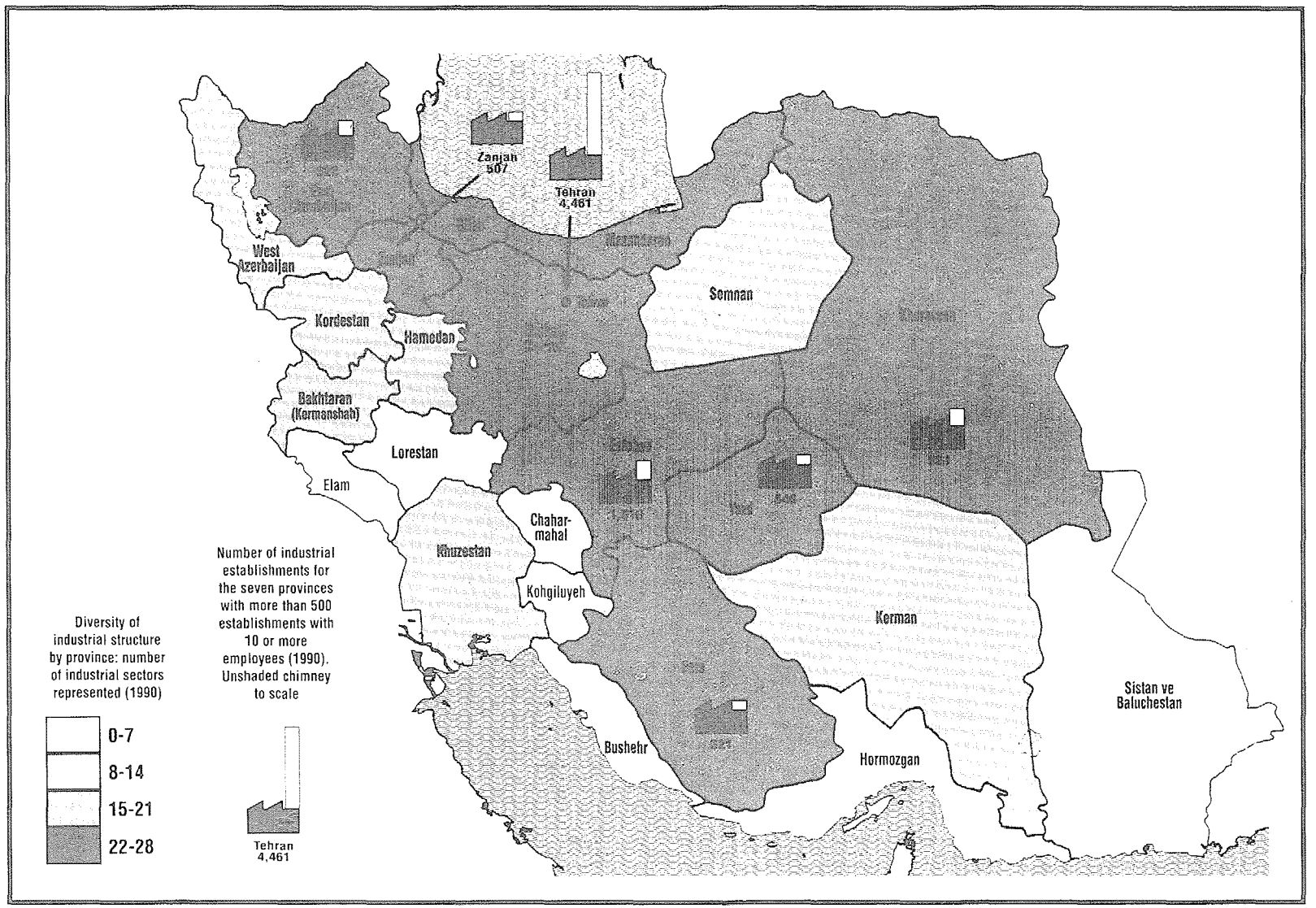
Tools and Hardware Procurement and Distribution Centre	Tel:	837 626-9
	Fax:	834 396
139 Sepahbod Garani Avenue	Tlx:	214021 THPC IR
Tehran		
Structural Metal Procurement and Distribution Centre	Tel:	899 216-20
	Fax:	892 382
6 Kalantari Street	Tlx:	212141 SHIA IR
Sepahbod Garani Avenue		
Tehran		
Electronic Elements and Instruments Procurement and Distribution Centre	Tel:	850 173
	Tlx:	214032 EIPC IR
Malek Street		
Shariati Avenue		
Tehran		
Industrial Machinery and Components Procurement and Distribution Centre	Tel:	671 310
	Fax:	385 911 & 385 2286
1 Estakhr Street, Emam Khomeini Avenue	Tlx:	213797 & 214040 IMCP IR
Tehran		
Paper and Wood Procurement and Distribution Centre	Tel:	934 777 & 933 655
	Fax:	926 326
North Kargar Avenue	Tlx:	214030 & 214033 PWPC IR
Corner of Hamadan Street		
Tehran		
Machinery Spare Parts Procurement and Distribution Centre	Tel:	658 073-4
	Fax:	652 181
11 Naderi Street, Keshavarz Boulevard	Tlx:	214024 MSPP IR
Tehran		

Textile Procurement and Distribution Centre Bokharest Avenue Tehran	Tel: Fax: Tlx:	872 9232 872 492 214037 TPDC IR
Chemical Procurement and Distribution Centre 43 Fatemi Square Tehran	Tel: Tlx:	656 117 214031 CPDC IR
Food Stuff Procurement and Distribution Centre 57 N. Palestine Avenue Tehran	Tel: Fax: Tlx:	898 023-5 897 921 212253 CSDC IR

Others

Mostazafan and Janbazan Foundation 1 3rd Street, Keshavarz Boulevard Tehran	Tel: Fax: Tlx:	658 191-9 416 1727 212549 MFCD IR
Industrial Managers Association of the Islamic Republic of Iran 248 Ostad Motahhari Avenue Tehran	Tel: Fax:	834 070 & 882 5385 883 9641

INDUSTRIAL MAP



Map prepared for UNIDO by the School of Geography, University of Oxford. February 1995. East Azerbaijan was divided into East Azerbaijan and Ardebil in 1993.

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