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The role of oil exports in the economic  
development of Iran 1960-1992

Mahmood Haerian Ardakani  
University of Wollongong

Haerian Ardakani, Mahmood, The role of oil exports in the economic development of Iran 1960-1992, Doctor of Philosophy thesis, Department of Economics - Faculty of Commerce, University of Wollongong, 1996. <http://ro.uow.edu.au/theses/1327>

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# **THE ROLE OF OIL EXPORTS IN THE ECONOMIC DEVELOPMENT OF IRAN 1960-1992**

A thesis submitted in fulfilment of the requirement  
for the award of the degree

**Doctor of Philosophy**

from



**University of Wollongong**

New South Wales  
Australia

by



**Mahmood Haerian Ardakani**

BS in Economics (Iran)  
MS in Industrial Management (USA)

Department of Economics  
February, 1996

## DECLARATION

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I hereby certify that this thesis has not been submitted previously as part of the requirements of another degree and that it is the result of my own independent research.

Mahmood Haerian Ardakani

# DEDICATION

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To my parents, my wife, and my daughters, Maryam, Samar and Sara Haerian for the devotion and support given during the research project.

# **THE ROLE OF OIL EXPORTS IN THE ECONOMIC DEVELOPMENT OF IRAN 1960-1992**

## **ABSTRACT**

The main purpose of this thesis is to investigate the impact of oil exports on the process of the economic growth in Iran during the period 1960-1992. The study uses single and simultaneous equation regression models to test export-led-growth models in the context of the Iranian economy.

The results would seem to suggest that the Iranian economy has been financed with large amounts of oil revenues in the past three decades, especially after the jump in oil prices in 1973. However, the regression analysis suggests that the Iranian economy did not gain as much from these price rises as the other oil producers because of the negative effects of the political turmoil during the last year of the Shah's rule in 1978, the transition of power to the Islamic government and, most of all, because of the heavy damages of the Iraqi-Iranian war.

Despite these negative effects the oil sector has played the role of the "leading sector" in the last three decades. The results of the simultaneous equation models suggest that Iranian exports to its major trading partners had a significant impact on the growth of the Iranian economy. The simultaneous regression results also suggest the absence of the feedback effect between the Iranian economy and other economies under study except Brazil, Romania, Singapore and Turkey.

The study predicts that the oil sector will continue to play a leading role in future Iranian economic development.

## ACKNOWLEDGMENTS

Praise be to God Who taught man what he knew not (The Holy Quran, 96-5).

This thesis was completed under the supervision of Associate Professor Mokhtar Mohammad Metwally. I would like to express my special appreciation to Professor Metwally whose knowledge, experience, and continuous and sincere supervision made this project possible. His guidance throughout the dissertation process was necessary for its progress.

A thesis such as this relies on many people for its successful completion. In this regard, my sincere thanks go to Ms Diana Kelly for her useful advice, encouragement and, support, not to mention the extensive time she gave to reading and evaluating my prose. Many thanks are also extended to Professor Robert Castle, Head of the Department of Economic at the University of Wollongong, for the friendly working environment he created.

I am also deeply indebted to the Ministry of Culture and Higher Education of Iran for its sponsorship.

Thanks as well go to the academic and administrative staff of the Department for their valuable advice and assistance, while the support of Mr. Bizhan Latif made it possible for me to collect necessary data from Iranian sources.

Last, but not least, deepest and most profound thanks go to my parents and other members of my family whose sacrifices, love, patience and understanding provided the necessary stimulus to completing this endeavour.



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# Chapter 1

## Introduction

### 1.1. Background of the Study

Two basic concepts can describe the transformation of an economy over time, namely, "economic growth" and "economic development". Economic growth may be defined as the increase in aggregate product, either as total or per capita, but without reference to structural changes, such as a shift from a subsistence economy to a market economy, or the growth of one economic sector relative to others, or changes in the social and cultural value systems. On the other hand, "economic development" includes not only growth but also social and cultural changes which occur in the transformation process. Since this study does not deal with the social or cultural changes and values, the discussion will be centred around economic growth.

As far as economic growth is concerned we notice that there is a wide gap between the income and output of the rich and poor nations in the world. Thus, in 1985, 16 per cent of the population of the world accounted for 67.5 per cent of world income and produced 88 per cent of the world manufacturing output (Cameron, 1989, p.9). A historical review of the growth of developed and developing countries over the 150 years from 1800 to 1950 offers a good picture of the size of the gap between the poor and rich countries. The average GNP per capita in developed and developing countries on the eve of the nineteenth century, were \$198 and \$188 respectively. By 1950, the average GNP for developed countries had risen to \$1054, (a growth of 532 per cent) while the comparative variable for developing countries only increased by 8 per cent to reach \$203 in the same year. The difference between poor and rich countries has increased to over 560 per cent in 150 years (Adriaansen and Waardenburg, 1989, p.9).

Developed market economies make up about one-sixth of all countries, whereas the majority of the countries in the world are categorised as underdeveloped. These latter countries have a large part of their population working in the agricultural sector and suffer all the symptoms of underdevelopment. These symptoms include (1) lack of well-developed financial, goods and services markets, (2) low per capita income, (3) high population growth, (4) high mortality rate, (5) very few different decentralised privately-owned industries, (6) insufficient infrastructure, such as communications, educational services, electricity, gas, and water supply (7) conventional technology, (8) low efficiency in both industry and agriculture, (9) relatively uneven distribution of income, (10) less democratic political systems than those in developed countries, (11) high levels of illiteracy. Moreover, a dual economy<sup>1</sup> usually exists in these countries.

Many writers assume underdevelopment as an original state and deny the historical process of the exploitation and plundering of the third world countries by European colonialism and imperialism. History strongly testifies that the record of the underdeveloped countries in the last five hundred years is one of the consequences of European expansion (Berberoğlu, 1992).

GDP is still the main measurement of economic growth, despite its apparent shortcomings. There is for example the question of whether an increase in GDP per capita truly represents increased well-being for the majority of the people. Fell and Greenfield (1983) believe that this measure does not show the real living standard of the people. They argue that a substantial increase in GDP does not necessarily mean development, since the main part of this increase may go to a rich minority (Alavi, 1986). Thus, although not covered in this thesis the question of how evenly any increase in GDP will be distributed among the people needs to be explored.

---

<sup>1</sup> An economy divided between traditional and modern sectors, in terms of both production and organisation

There is no doubt that primary commodities are the main source of export earnings of the developing world, despite the fact that "manufactured" exports of a small group of rapidly developing countries such as Taiwan, South Korea, Singapore and Hong Kong have grown spectacularly in the past two decades. More generally, primary commodity exports (including oil) accounted for almost 80 per cent of total export earnings of the developing countries in the 1970s (Adams and Behrman, 1982, p.3; Keddie and Hooglund, 1986, pp.38-41).

Moreover, many developing countries depend on the exports of a few primary commodities. This is particularly true in the case of the oil producers. Thus, oil exports ranged from 43 per cent in the case of Ecuador to 99 per cent in the case of Saudi Arabia. The number of leading commodities<sup>2</sup> varies from 1 to 4 for these oil exporting countries. In the non-oil developing countries, the single leading commodity export as a percentage of total exports ranges from 5 per cent in case of China to 94 per cent in the case of the Bahamas. The variation of the number of leading commodities in these countries ranges from 1 to 9; with an average of 3 commodities (Adams and Behrman, 1982).

Oil exporting countries share many characteristics of developing countries, including a low level of industrialisation, large rural populations, insufficient infrastructure facilities, rapid population growth and a shortage of skilled labour. There are two features that distinguish the developing oil exporting countries from other developing countries. First, oil enjoys a distinguished place in the world market. Secondly, oil is an exhaustible resource, and so can not be considered as a permanent source of income. In this sense, oil exporting countries face the common problem of how to transform their valuable oil reserves into a permanent source of income capable of

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<sup>2</sup> The commodities which have high weights in exports

meeting their long term development objectives. Nankani (1980), Katouzian (1978) and Gelb (1981 and 1988) believe that an assessment of the economic performance of the oil exporting countries following the oil booms of 1973 and 1979, indicates that these countries have not been successful in changing to viable non-oil economies, despite the impressive growth in their GDP after the jump in oil prices in early 1970s. Rather, their development records show a failure to diversify, a decline in the share of non-oil exports, an increase in share of services, and a decline in agriculture output.

## **1.2. The Problem**

It has been claimed that increasing oil revenues did little, if anything, to accelerate economic development in the oil producing countries including Iran. To address this problem, it is necessary to analyse the effect of oil exports on economic growth in Iran and in particular to ascertain whether the oil sector played the role of "a leading sector " in Iranian economic development, and whether other sectors responded to the expansion in oil revenue in a manner which helped to achieve the main goal of economic diversification.

## **1.3. Objectives of the Study**

The main purpose of this study is to investigate the impact of oil exports on the process of the economic growth in Iran during the period 1960-1992 by testing the relevance of the export-led theory of growth to the Iranian economy. In other words the study attempts to find out whether the oil industry has promoted economic growth in Iran by accelerating a major transformation of the economy from a traditional agricultural economy to a modern productive industrialised economy. This investigation is of great significance, given that oil is not a renewable asset, and its revenue is subject to considerable fluctuations. More specifically, the objectives of this study may be summarised in the following:

(1) To assess the role played by the fluctuations in oil prices on Iranian oil revenue.

(2) To test the hypothesis that the Iranian oil sector acted as a leading sector during the past three decades.

(3) To examine the interaction between the Iranian economy and the economies of its major trading partners, and test for feedback effects.

(4) To project the future impact of the oil sector on Iranian economic development.

#### **1.4. Hypothesis of the Study**

This study is based on a number of hypotheses:

(1) Oil is not only an exhaustible asset but also a commodity which has been subject to sharp price fluctuations over the past three decades.

(2) Exports contribute to economic growth directly through their contribution to GDP, and indirectly through their contributions per medium of spread or carry over effects. These contributions enhance the chances of economic growth.

(3) Indirect contributors or spread effects can continue to accrue long after export stimulus has occurred.

(4) The overall impact of an export stimulus on the economy has many determinants including technology, the propensity to import, the extent to which investment opportunities generated are accepted domestically, and the ability to attract foreign factors. Provided that investment opportunities are accepted, economic growth will be a process of diversification about an export base.

(5) The interaction between the Iranian economy and the rest of the world could result in significant feedback effects which would help accelerate economic growth in Iran.



### **1.5. The Methodology**

This thesis uses single and simultaneous equation regression models to test export-led-growth models in the context of the Iranian economy. The determination of the time lags between export growth and economic growth is essential in identifying the mechanisms responsible for Iran's economic expansion. For this purpose, a lagged regression relationship utilising annual data was developed. The single equation model will use Koyck-type lags to test for spread (carry over) effects. The test will apply to both aggregated and disaggregated sectoral output.

The single equation models will also use dummy variables to test for structural shifts in the functional relationships over the period of study. These shifts are likely to affect both the slope and the intercept. A simultaneous equations model will be developed to test for feedback effects. The model will incorporate determinants of GDP, imports, exports and the resources balance.

### **1.6. Previous Studies on the Role of Oil Exports in Iranian Economic Development**

Various aspects of the oil industry and its vital place in the Iranian economy have been explored both in the Iranian and international literature. However, a majority of the studies are either on the economic history of Iran or its oil industry, while others are related to the political aspects. The studies which have some bearing on the present topic hold varying views on the role of oil in the growth of the Iranian economy. Although the present study may not put an end to this disagreement, it is hoped that it would throw further light on the issue and suggest valuable policy recommendations.

There is general consensus among the scholars that since the discovery of oil in Iran up to nationalisation of the oil industry in 1951, oil revenues have had very little

impact on the Iranian economy. According to Farmanfarmaian (1956), Amuzegar and Fekrat (1971), Fesharaki, (1976), and Looney (1977), Iranian oil exports stimulated the British economy, rather than the Iranian economy, during the period 1908-1950 through higher profits<sup>3</sup> and increased demand for its ancillary industries. For example, Farmanfarmaian (1954) concluded that the main secondary multiplier effects of investment in the Iranian oil industry took place not in Iran where the oil industry was physically located, but rather in Britain, the source of investment. Looney (1977) concurs with this conclusion and adds that it is difficult to conceive of an alternative conclusion when the Iranian oil industry was completely controlled by the British Government. Rubin (1980) argues that, since the Iranian oil industry before nationalisation was fully exploited by a foreign company, it did not help Iranian economic development, because the company was more antagonistic than supportive towards any lasting economic progress of the country.<sup>4</sup> In addition to its negative economic effects, there were also questions of political and domestic interference by the company (Nirumand, 1969).

According to Fesharaki (1976), it is curious that Iranian oil revenue did not increase rapidly during the pre-nationalisation period, given that production growth was considerable, ranging from 376,000 tons in 1910, to 31.8 million tons in 1950. The problematic conclusions that can be drawn from these amounts are reinforced by the developments during the nationalisation period (1951-54). At the time when the British government (and its allies) boycotted Iran and oil exports declined drastically, Iran's balance of payments actually improved and agriculture expanded (Nirumand, 1969). The 1951-54 period was one of industrial recovery, good crops and increased non-oil exports.

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<sup>3</sup> The earning of Iran from oil income in this period, is estimated to be \$450 million. By contrast, the British Government received \$1680 million and the British stockholders received \$670 million; all from an initial investment of \$4.2 million.

<sup>4</sup> The Anglo Iranian Oil Company

The studies related to the post-nationalisation period (since 1954) are more ambiguous. One group of researchers believes that oil exports made a major contribution to Iranian economic development. Asrari (1973), Fesharaki (1976), Vakil (1976), Amuzegar (1977), and Milani (1988) are among this group. Asrari (1973) for example argues that the oil sector was extremely stimulating for Iranian economic development in the post nationalisation period.

Fesharaki (1976) argues that the oil sector acted as a leading sector in the Iranian economy in that it had both direct and indirect effects on the economic growth of the country in the post-nationalisation era (after 1954). He also claims that the country's spectacular growth rate in the 1960s and 1970s came about through full utilisation of the oil revenues.

The importance of oil revenues in the development of Iranian economy may also be measured by its relative importance in the government's development budget. The share of oil revenues in development expenditure in Iran increased from 50% in 1963 to 80% in 1972 (Fesharaki, 1976, p. 34).

Fesharaki concludes that, in the case of Iran, it is fair to say that forward linkages in the post-nationalisation period led to some integration between the national economy and the oil sector. He argues that, since the national economy was unable to provide the sophisticated and automatic machinery required by the oil industry, the backward linkage, with regard to capital expenditure, was particularly weak. The most important backward linkage was the current expenditure of the oil industry on the purchase of goods and services from national economy. The oil industry's demand for labour was another backward linkage which was highly insignificant since it was a capital intensive industry. This is in direct contrast with the Asrari's conclusion. However, Fesharaki noted in his study, that there was one gain, wherein technical and

managerial skills from the oil industry were transferred to the national economy. (Fesharaki, 1976, p.142)

Vakil (1976), in his study of the role of oil revenues in Iran's development during the period 1960-75, supports the notion of significant influence of the oil sector on the economic progress of the country. In his words this relationship is very obvious:

There is no question that the oil sector has played a major role in the growth performance of the Iranian economy over the last 20 years. Indeed, on the aggregate supply side of national accounts, the growth in the value added of the oil and gas sector has been a main contributor to the growth of GDP and GNP. Indeed, it must be pointed out that much of the successful performance of the agricultural, industrial and mining and services sectors are due to the transfer of resources to them from oil sector (Vakil, 1976, p.85)

Vakil, however, warns against too much dependence on oil revenues. According to him, the risks involved in this dependency include the slow down of economic growth if the oil revenues decline, and the failure to develop an appropriate tax system. As well, the easy derivation of oil income may encourage national industries to produce for local markets rather than being competitive on the international scene. (Vakil, 1976, p.95)

Amuzegar (1977) claims that Iran's oil policy in the post-1946 period was at the heart of the country's development strategy. The oil revenues accruing to the government treasury supported both regular public expenditures and, more importantly, public development spending on infrastructure and productive projects. These expenditures in turn, exerted strong multiplier effects on private consumption and fixed capital formation. The mounting oil revenues also removed the unfavourable balance of payments strains and relieved the usual inflationary pressure of growth. He agrees with the views on the paucity of backward linkages of the oil industry and the

improvement of the forward linkages. He describes the role of the oil industry in the growth of the Iranian economy in the following words:

Oil and gas have been a *deus ex machina* for Iran's economic prosperity and growth. By providing an assured and steady inflow of foreign exchange, the oil and gas sector has supplied the lifeblood and driving force of the economy. It has promoted the growth and expansion of another giant industry, petrochemicals. (Amuzegar, 1977, p.50)

Looney (1977), suggests that Iranian oil has contributed to the economic development of Iran in the post-nationalisation period. This was done, he argues,

By contributing a large share of the capital needed for the growth of the rest of the economy, however, the oil sector obviated the most pressing constraint on growth faced by the developing countries. (Looney, 1977)

Milani (1988) expressed his ideas about the role of oil revenues in the Iranian economy during at least part of the post nationalisation period along the following lines:

As a result of higher oil revenues, Iran experienced a stupendous economic expansion during the 1972-1976 period: Non-oil GDP, at constant prices, increased from \$16.3 billion to \$30.5 billion and per capita income rose from \$550 to \$1,600. The state was placed in a strong financial standing as the previous deficits gave way to an impressive \$2 billion surplus in 1975.(Milani, 1988)

Another group views the matter with less enthusiasm and argues that there were few contributions to the economy. Among these are Fardi (1972), Ertefai (1974), Shahshahani (1976), Halliday (1979), Emami (1981), Pesaran (1985), and Mofid (1987). Fardi (1972) looked at the linkages, through an input-output model, and found an unusually poor backward linkage, due to the relatively small aggregate domestic demand for petroleum products.

Ertefai (1974) tested the hypothesis that the magnitude of the forward and backward linkages of the oil industry during the period 1954-74 were almost nil and that the oil industry could have been more effectively integrated into the Iranian economy, if a more appropriate government policy had been undertaken. He reached the conclusion that backward linkages of the Iranian oil have been either totally insignificant, or very weak, or, in some cases, deteriorating. Provision for duty-free imports, in the Consortium agreement (formed from 14 major international oil companies after the fall of Mossaddegh in 1954), have led the Iranian oil industry towards a weaker backward linkage with the rest of the economy. The Consortium, taking full advantage of this agreement, chose to purchase almost all of its needs abroad.

Shahshahani (1976) employed an econometric model to examine the multiplier effects, and found very poor backward linkage. This finding is confirmed by Hirschman's general conclusion that primary products from underdeveloped countries slip out of a country without leaving much of a trace in the rest of economy (Hirschman, 1958).

According to Shahshahani:

The structural characteristics of the Iranian economy are somewhat different from those in existing literature. Here, the problem is "of disseminating the growth-stimulating effects of the dynamic sector throughout the traditional sector by transforming the dynamic sector into an engine of growth," since the spill over effects from the dynamically growing enclave sector on the Iranian economy have been of very little significance. In other words, the linkage effects of the oil sector have shown no sign of improvement and, indeed, they have actually deteriorated. (Shahshahani, 1976, p. 62)

Shahshahani pointed out that the direct contact between the oil and agricultural sectors is the weakest, while that of the oil and the foreign sector is the strongest of all. Besides, both the forward and backward linkages of the oil sector with the industrial sector are insignificant. Moreover, the indirect effect of the oil sector on government

funds and on the domestic economy is the most important link between the oil sector and the indigenous sectors.

Halliday (1979) believes that oil provided the government only with an income and a source of energy, and did not have any development effects of its own. In other words, the oil sector had not actually established any significant linkages with the rest of the economy. It had no backward linkages since it employed a very small labour force, and acquired its capital and technology from abroad. Even the food for the oil company was brought in from outside Iran. The oil industry also did not establish any forward linkages, because most of its product is exported. Nevertheless, Halliday recognises not only the limitations, but also importance of oil revenues on the growth of the economy.

The basis of this expansion has, of course, been oil and it is the peculiar features of this resource that have provided the opportunities and at the same time shaped the limitations of Iranian economic development. One effect of the boom has been that the economy's dependence on oil has in fact increased: from representing 17 per cent of GNP in 1967-8 oil rose to 38 per cent in 1977-8. In 1977 it accounted for 77 per cent of government revenue and 87 per cent of foreign exchange earnings. Iran's growth, past and prospective, would be unthinkable without it (Halliday, 1979, p.138).

Emami (1981) argues that, a large part of investment in Iran has to take place through the import of capital goods, and that such imports are paid for with foreign exchange receipts from exports of crude oil. To measure the extent of the oil industry's backward and forward linkages with the whole economy, the input /output table of 1973 was used. Emami concluded that, the direct effect of the oil sector on the economy of Iran was insignificant. This does not mean that oil exports have little or no positive effect on the Iranian economy. However, the major part of the gain from these exports comes through their indirect effect and the opportunity they give to the government to allocate these funds to development projects.

Pesaran (1985) criticises the heavy dependence of Iranian industrialisation on oil revenues. According to him:

Iran joined the ranks of many other developing countries which had embarked upon the first stage of an import-substitution industrialisation strategy, but with one major difference: while most other developing countries, apart from relying on primary exports and foreign loans, also promoted their manufacturing exports to pay for a proportion of their imports of capital and intermediate goods, Iran continued instead to rely heavily and almost exclusively upon oil exports. (Pesaran, 1985, p.23)

Mofid (1987) concludes that industrialisation in Iran failed during the period 1962-77. One of the reasons for this failure was an inappropriate import substitution strategy adopted by Iran in the early 1960s which was facilitated by the availability of the necessary foreign exchange requirement of the developments.

Razzaghi (1992) described the Iranian economic growth as a dependent growth and argued that under the dependence of Iranian capitalism before the revolution, the country's economic growth established an agricultural and industrial sector both of which were unbalanced and non-dynamic. Thus, the oil sector contributed to a dependent economic growth rather than to an independent one. The government concealed the most important negative effects of dependent growth, namely, unbalanced domestic production and consumption, and retarded the occurrence of the late 1970s economic crisis, through importing goods and services. Razzaghi argued that, since the structure of the Iranian economy has not significantly changed after the revolution, the oil revenues are still paying for the shortages relative to the dependent consumption patterns. However, oil revenues could be utilised for investing in the country's key projects to achieve economic independence and growth. (Razzaghi, 1992, p. 522)



According to most recent researchers, Katousian (1989), Rahnema and Nomani (1990), Amirahmadi (1990), Karshenas, (1990), Pesaran (1992), and Yaghmaian (1992) the fluctuations in Iran's oil revenues have always been the cause of changes in the rate of economic growth during the years after the revolution. Katousian (1989) divided the factors affecting the economic change since the Islamic Revolution into three categories: the revolution, Iran-Iraq war, and the fall in oil prices in 1986. He argues that, the fall in oil prices, combined with the rise in the imports of military equipment, reduced the country's foreign exchange reserves and assets.

Rahnema and Nomani (1990) point to the oil revenue fluctuations for changes in the rate of growth of the economy during the last years of the Shah's rule and early years of Islamic Republic. They argue that:

The decline in real GDP during 1977-80 was basically due to the decline in oil revenues and then to declines in industry and mining, utilities, construction, trade, transportation and financial services. The increase in real GDP during 1981-83 was again mainly due to rising oil revenues linked to fluctuations in the price crude, although there was some growth in trade and industry. In 1985, a further drop in the price of oil on the international market reduced oil revenues. The impact of fluctuating oil revenues on the volume of imports of capital and intermediate goods which are necessary to industry was such that the value of GDP declined by 1.1 per cent. The drop in the level of aggregate demand led to a slowdown in the growth of inflation and to a decline in the level of output. (Rahnema and Nomani, 1990)

Amirahmadi (1990) states that the key to understanding the Iranian economy lies with comprehending the nature of various constraints on the country's oil revenue. This is so because the modern sectors of the Iranian economy are all dependent on the earnings from oil. Some 90 per cent of the state's foreign exchange earnings come from oil exports which pay for various kinds of Iran's ever-increasing industrial and food imports. Oil is, in short, the economy's real life line.

Karshenas (1990) argues that the immediate contribution of oil to growth within the structuralist framework is related to the nature of the constraints which it helps to alleviate. Oil revenues, being predominantly in the form of foreign exchange, could help to alleviate imbalances between the structure of domestic supply and demand which could arise during the growth process. In other words, they could allow a higher rate of growth of investment and growth in an economy constrained by the need to maintain a healthy balance of payments. At the same time oil revenues amount to a net addition to the disposable resources in the national economy which could allow a higher rate of growth of investment, and an acceleration in the overall rate of growth of the economy achievable without the need to decrease consumption expenditure in short run.

Pesaran (1992) argues that ever since the Second World War, the oil revenues have played a significant role in the development of the Iranian economy. The share of oil exports in total exports of Iran for most of the years after the Second World War has been more than 85 per cent, except during the years of the Anglo-Iranian conflict (1951-54) over the nationalisation of the oil industry. This share drastically increased after the sharp rises in the price of oil in 1970s, and for most of the years between 1974 and 1985, oil exports counted for over 97 per cent of the total exports. The doubling of the price of oil immediately after the Islamic Revolution was responsible for maintaining the dominance of oil exports in Iran's foreign trade. This role was upset after the collapse of oil prices in 1986. The downward trend in the share of the oil exports over the period 1986-88 should not be treated as a permanent change in the structure of the Iran's exports. The overall picture for Karshenas therefore is one of continuing dependence on oil export revenues. In his view, oil revenues have also played an important role in the government budget.

Yaghmaian (1992) argues that the oil crisis during the 1980s was responsible for failures in the Iranian economy. He states that accumulation of capital in Iran has been heavily dependent upon oil export earnings, particularly after the Second World War. The oil sector has been the central nervous system of the Iranian economy and was the main source of financing Iran's import-substituting industrialisation in the 1960s and the 1970s. The instability of foreign exchange earnings in the 1980s was a central problem in the Iranian economy. He concludes that the continuation, or the reappearance, of the oil crisis on the international level will therefore have a substantial effect on the Iranian economy in the future.

### **1.7. Plan of the Study**

This thesis differs from previous studies in that it uses econometric analysis to examine the impact of oil exports on economic growth in Iran during the period 1960-1992. The thesis is divided into nine Chapters. After this introduction, the next Chapter offers a brief discussion of the historical and political background of the Iranian economy. Chapter three is designed to draw a picture of the economy during the period of study. The economic performance of the Iranian economy is discussed over the three decades in some detail in Chapter four. It presents the path of major economic variables, both at the macro and the sectoral levels. Chapter five is concerned with the long-term fluctuations in the world oil prices and the impact of these fluctuations on the economic development of oil exporting LDCs. Chapter six offers some theoretical discussion on export-led growth models. Chapter seven is an econometric study of the effects of oil exports on GDP and sectoral development during the period. Chapter eight analyses the interaction between the Iranian economy and the economies of its major trade partners. Chapter nine examines the future trends of economic growth in Iran. Finally Chapter ten summarises the main conclusion of the thesis and offers certain policy recommendations.

## **1.8 Summary and Conclusion**

The main source of export earnings of most developing countries is primary commodities. Iran, among these countries, is blessed with a vast deposit of fossil fuels. Oil revenues have been injected into the Iranian economy for many decades. There is a debate over the role of oil exports in the economic development of Iran. While there is a general consensus among scholars that since the discovery of oil in Iran up to nationalisation of the oil industry in 1951, oil revenues had very little impact on the Iranian economy, the picture after that is not clear. One group of writers believes that after the oil nationalisation (since 1954), oil exports were a major contributor to the Iranian economic development. The other group concludes that, during the same period, oil revenues had a significant indirect effect on the Iranian economy by providing the economy with the necessary foreign exchange required for the implementation of development plans.

## CHAPTER 2

### Iran

#### 2.1. The Geographical Position

The name of 'Iran' means the land of Aryans, referring to those who settled some four thousand years ago. Iran is located at the intersection of the three continents of Asia, Europe and Africa. Its area is 1.648 million square kilometres, which is larger than the combination of eight European countries, namely, Italy, France, Switzerland, Germany, the Netherlands, Belgium, Denmark and Britain. To the north and north west Iran has 1740 kilometres of common borders with the new republics of Armenia, Nakhchevan, Azerbaijan and Turkmenistan and 470 kilometres with Turkey. To the east Iran shares 840 kilometres of border with Afghanistan and 850 kilometres with Pakistan, while there are 1280 kilometres bordering with Iraq to the west. The Persian Gulf, and the Oman Sea extend along the 1880 kilometres of the southern coasts.<sup>1</sup> Two rugged mountain ranges stretching across the western and the northern part of the country entrap the central plain (Figure 2.1).

#### 2.2. The Climate

The geography of Iran is such that different climate conditions can be identified in its various regions. A humid type prevails in the coastal area of the Caspian Sea. A second type of climate is encountered in the mountainous regions, while a different kind of climate is found in the desert belt of the country. Annual rainfall is abundant in the mountain ranges and on the Caspian coasts, but the central plateau is generally dry. The average rainfall varies from over 2,000 millimetres (mm) in the northern coast of the Caspian sea to about 25 mm in the central desert, with an annual average of 250-300 mm in the whole country. The considerable annual rainfall of the Caspian

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<sup>1</sup> The Persian Gulf is the most important waterway of the world energy flow. The surrounding countries produce approximately 31 per cent of the world's total oil production and have 63 per cent of the world's proven oil reserves.

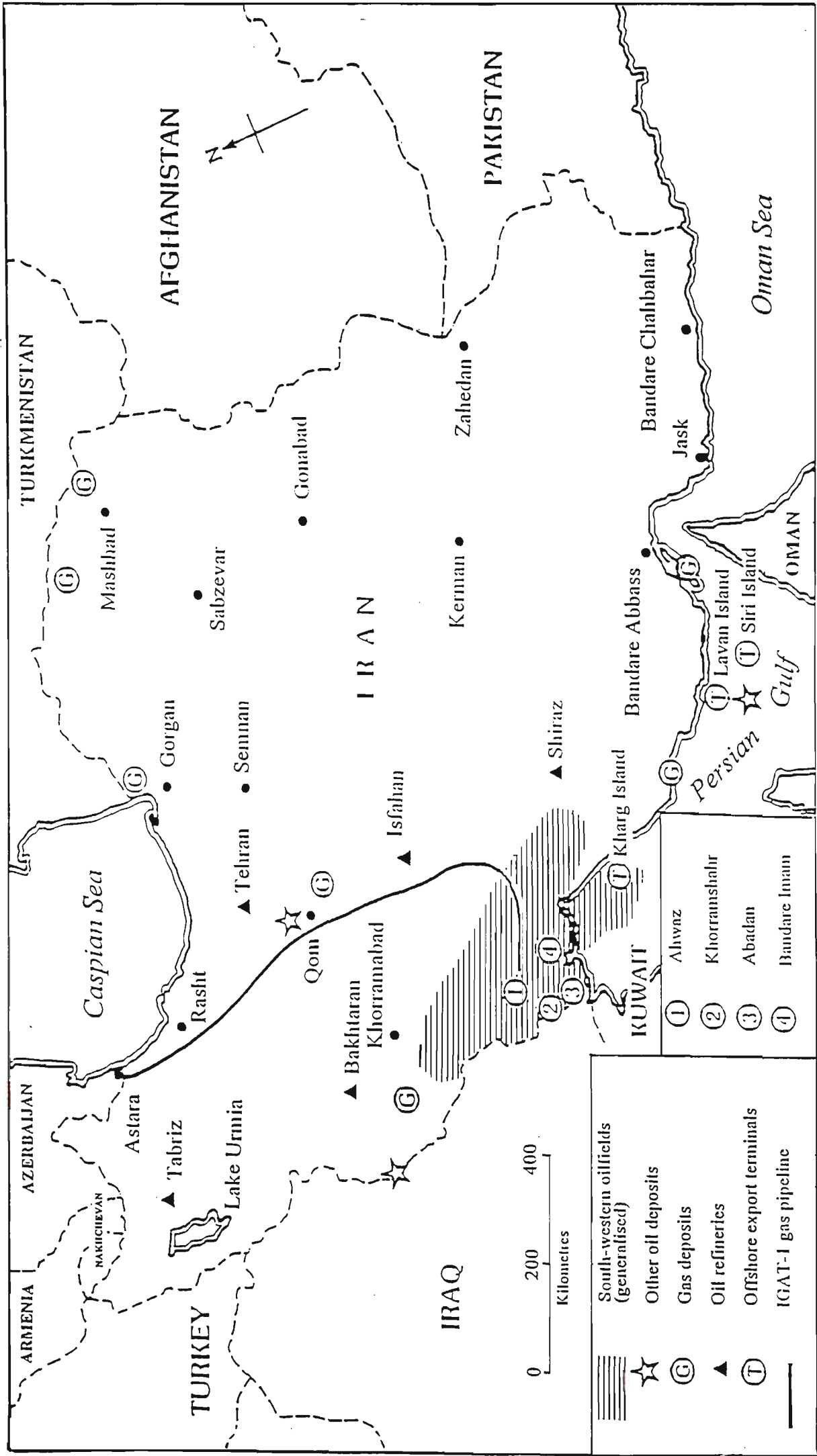


Figure 2.1 Iranian hydrocarbon resources and installations

coast has brought vast forests and woodlands into being, whereas the central and desert regions of the country have a negligible annual precipitation. More than 51 million hectares of arable land, which is a little less than one third of the total area of the country, is available for the expansion of agriculture. At present, no more than one third of the arable land is being cultivated. One quarter of this cultivated land is irrigated. In addition to the huge reserves of oil, Iran also has the second largest reserves of natural gas after Russia. Moreover, Iran is extremely rich in some other minerals including lead, tin, zinc, coal, iron, chromite, uranium, and copper. From the exploration of the first oil well in 1908 until the nationalisation of the oil industry in 1951, the main explored oil fields in Iran were in Masjid-e Sulaiman, Haftgel, Aghajari, and Ghachsaran. Currently the main centres of oil production in Iran are:

- The Khusistan region in the south-western Iran which consists of: (1) Masjid-e Sulaiman (2) Haftgel (3) Ghachsaran (4) Naft-e Sefid (5) Paznan (6) Lali (7) Ahwaz (8) Bibi Hakimeh centers
- The Persian Gulf region in the south which consists of: (1) Dorood (2) Soroosh (3) Foroozan (4) Behrgansar (5) Khark Island (6) Salman (7) Reshadat centres
- The Bakhtaran region in the west which contains the Naft Shahr centre
- The central province region in north which contains the Sarache Qum centre
- The Lorestan Province region in the west which covers Bala Kooh

There are also huge reserves of natural gas in the north-east and the south, in addition to the gas exploited from the oil wells currently in production (Rahnemaie, 1991).

### **2.3. The Demography**

Standing at one of the main crossroads of successive waves of ancient migrations, Iran has accepted and assimilated many ethnic groups. The immigrants contributed to the cultural and ethnic diversity and richness of the basic elements of Iran's political and cultural identity which is essentially a synthesis of various cultures. The main constituents of the Iranian population may be categorised into three groups: (1) The

old Asians who are completely assimilated in the general racial blend and are difficult to distinguish from the other races. (2) The Aryans who have been, for the past four thousand years, recognised as the main component of the Iranian population from demographic, political and cultural points of view. (3) The descendants of different conquerors, such as the Arabs, Turks and Mongols.

The population thus consists of nine ethnic groups. The biggest group is the Persian which accounts for 50 per cent of the total population, while the second largest group comprising Azari amounts to 17 per cent of total population. The official language of Iran is Modern Persian or Farsi, which emerged from Middle Persian after the country embraced Islam in the seventh century. Farsi characters are based on Arabic script and Farsi uses many Arabic words. Over 80 per cent of the Iranians can speak and understand Farsi. While the vast majority (99 per cent) of the population is Muslim, there are four other identifiable religious minorities. These are Armenian and Assyrians which are both Christian, Jews, and Zoroastrians who are the believers of the ancient Iranian religion (Iran Yearbook, 1993).

Iran became one of the main centres of Islamic civilisation in medieval times, and extended its cultural influence into India. The culture of Iran is heavily influenced by Islam, as evident in the art, literature, and social structure of the country. The emphasis on religion, rather than on language, as the basis for unity within Iran may allow linguistic minorities to be more easily integrated and better assimilated into the Islamic republic than they were into the Pahlavi state<sup>2</sup>. According to the first census in 1956, the Iranian population was 18.9 million, which by 1986 had increased to 49.4 million. The most recent estimate indicates that Iran had a population of 57 million in 1992. Approximately 52 percent of the population live in urban areas and 42 percent in the rural areas, with the remaining 6 percent still nomadic. The level of

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<sup>2</sup> The Pahlavi regime was brought to power by Britain in 1921 and was ousted from the country by Islamic Revolution in 1979.



literacy reported in the first census in 1956 was 15.4 per cent. which had nearly doubled to 29.4 per cent in 1966, then improved to 48 per cent in 1976, and 61.6 per cent in 1986. About 40 percent of the urban population live in Tehran province out of which 20 per cent are the inhabitants of Tehran, the capital city. The country has ten other large cities with populations ranging between 500 thousand and six million.

According to the census conducted in 1986, the Iranian population is very young with more than 45.8 percent of the population under 15 years of age and only 3 percent over 65 years. The rate of growth in population has increased extremely rapidly in recent decades from less than 2 percent in the early 1940s to 3.2 percent in recent years so that the doubling period of population is 21 years. The youthfulness of the population has exacerbated the shortage of skilled personnel and managerial talents which has been a major development bottleneck in recent decades. The structure of the population in 1991 suggests that 51.4% were economically active, (16 to 65 years old). Thus, more than half of the population provides the livelihood of the total population.<sup>3</sup>

#### **2.4. The History**

Iran has a very old civilisation. The ancient Iranians were innovative in numerous arts and crafts as attested, for example, by a unique bronze masterpiece from 6000 years ago. The discovery of a piece of carpet indicates that this industry has been carried out in Iran for over 4500 years. Moreover, by embracing Islam in the seventh century, a great transformation took place in Iranian intellectual, industrial and artistic attitudes as they became the initiators of the arts which were not in conflict with the Islamic ideology (ICCIM Weekly, 1992).

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<sup>3</sup> The Iranian Census Center, the 1986 general census and the census yearbook, different years

The devastating invasions of Mongols and Tartars in the thirteenth and fourteenth centuries with the plundering of the cities and villages, destruction of industries, irrigation systems and agriculture and loss of millions of lives was a major setback to Iranian economic development. The economy recovered during the Safavid rule in the sixteenth and the seventeenth centuries. However, Iranian economic development during this era was very slow in comparison with the leading economies of the time in Europe. Nevertheless it was, in a sense, a self sufficient economy with balanced agriculture, industrial and service sectors, which met the domestic demand and left a surplus for exports. The external sector, however, was not very significant and contributed only marginally to the economy.

After the fall of Safavid dynasty in the seventeenth century, civil and foreign wars, which were not only encouraged but even initiated by the great powers of that time, namely Britain and Russia, paved the way for the penetration of foreign merchandise to the country. These 'super' powers gradually took control of the Iranian economy by orienting production towards the supply of foreign markets on the one hand, and by selling cheap machine-made foreign products in Iran on the other hand. This resulted in a chronic food shortage and forced many Iranian craftsmen who were not able to compete with the foreign products to go bankrupt.

However, by the mid-nineteenth century the trade with Russia tripled in less than two decades and increased 10.5 fold in 40 years. The consequence of this unbalanced trend was a huge deficit in the Iranian trade balance and a flow of capital from the country. The deficit in the balance of trade forced the government to levy more taxes and the landlords to ask for a bigger share of production from the peasants. There was thus little domestic saving to be invested in the industrial sector. At the same time, England and Russia invested their excess capital in Iran. The north part of the country was the scene of Russian investment while the south part attracted English investment, mainly in the

oil industry. The investment in the Iranian oil industry and the two coups which took place in 1925 and 1954 in support of this investment formed the structure of the Iranian economy in the twentieth century before the Islamic revolution in 1979 (Razzaghi, 1992).

## 2.5. The Politics

Iran in the nineteenth century, like all other underdeveloped countries, was economically poor and politically weak. Although Iran has never been a colony of any country, in the nineteenth and early twentieth century, it was virtually taken over by Britain and Russia. Many concessions were awarded to the British and Russians during this period. Nasser al-Din Shah granted a multitude of rights to Baron de Reuter (founder of the famous news agency) for a small sum of money in 1872. These concessions allowed almost complete surrender of the entire resources of the kingdom into foreign hands (Hiro, 1985, p.294).

Britain and Russia controlled Iran to the extent of guarding the main roads and garrisoning cities in their respective sectors of influence. These two powers were sometimes in conflict, while at other times very co-operative. Iran suffered most in the times of their co-operation. By the end of the First World War, the Iranian government was in such financial straits that only a British subsidy of £225,000 a month kept it afloat. This encouraged Lord Curzon, the British Foreign Minister, to realise his dream of absorbing Iran into the British Empire. According to Keddie and Hooglund (1986):

During the past one hundred fifty years there have been the successful movement against the all-inclusive Reuter concession of 1872; the successful revolt against a British tobacco monopoly concession of 1891-92, the temporarily successful Constitutional Revolution of 1905-11, the temporarily successful Mossaddegh oil nationalisation movement of 1951-53, smaller regional revolts after both world wars, and finally the revolution of 1978-79 (Keddie and Hooglund, 1986, p. 2)

History suggests that when Iran has been politically independent, or even when the patriotic forces have had a relative weight in the management of the country, the economic conditions improved. Only three times over the past 200 years has the Iranian government been relatively free from foreign intervention, and could thus take steps towards self directed economic development. The first was during the time of chancellorships of Ghaem Magham and Amir Kabir in the first half of the nineteenth century. In particular, Amir Kabir's policies of transferring western technology, supporting domestic production, limiting imports and reducing the courts' extravagances were very successful in his three years of chancellorship in 1850s. This success was maintained, despite the fact that the effects of setting up the new industries were upset by direct and indirect intervention by the two 'super' powers.

The next occasion was after the Constitutional Revolution and the forming of the parliament. This movement was crystallised in the popular revolution of 1905 under the leadership of the clergies. They seized the political and military powers, which were lost later after a British coup and the crowning of Reza Shah by the British government in 1925. The third national movement against the foreign intervention in Iranian political and economic affairs was led by Mossaddegh and supported by the most senior religious leader, Ayatollah Kashani<sup>4</sup>. Ayatollah Kashani (speaker of the parliament at that time) stood for the nationalisation of the oil industry. He called on all 'sincere Muslims and Patriotic citizens' to join the nationalisation struggle. However, Mossaddegh lost power after three years as a result of breaking with Ayatollah Kashani and also a joint American-British coup in 1953 (Hiro, 1985, pp.32-35).

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<sup>4</sup> He and his father were involved in a religious war against Britain in 1915 in Iraq. His father was martyred in the struggle, and Kashani himself was condemned to death in his absence by British mandatory authorities (Elwell-Sutton, 1955, p.195).

### 2.5.1 The Overthrow of the Old Order

The 1953 coup laid the foundation for royal dictatorship which lasted a quarter of a century. It destroyed any chance that Iran had of developing a democracy. The Shah set out systematically to wreak vengeance on his opponents. This was to become a permanent feature of the Pahlavi regime. Milani (1988) pictures the Iranian political atmosphere in 1975 somewhat colourfully as showing:

The cultural insensitivity and political arrogance of the Rastakhiz's<sup>5</sup> leadership reached cataclysmic proportions when, in 1975, they impetuously recommended that the Shah change the Islamic calendar to an Imperial Calendar, which began over two millennia ago with the creation of the Achaemenid Empire by Cyrus the Great. The Shah in 1975 arrogantly declared: The place of those who oppose the Constitution, the monarchical system and the People-Shah Revolution is either in jail or outside of Iran. Those who do not wish to enter into this political organisation (the Rastakhiz) have two alternatives: They either belong to an illegal political party, like the Tudeh in which case they should be jailed. Or, with gratitude and without asking them to pay foreign exit visa, they may have their passport and go anywhere they would like. This was autocracy Iranian fashion, par excellence. (Milani, 1988, p. 124)

The last efforts of the Iranians to change this unbalanced political situation took place in 1979. Ayatollah Khomeini had always been critical of both the Shah and his father. The conflict between the Shah, and Ayatollah Khomeini reached a climax in June 1963, when Ayatollah Khomeini criticised the Shah's intention to include the *waqf* (religious endowments) in his land reform. Ayatollah Khomeini was arrested and 10,000 Iranians who protested the arrest were killed by the Shah's troops. The second clash between them took place fifteen years later. This time the Shah lost permanently. According to Hiro (1985):

While placing Iran under military government, the Shah made it appear as if he were backing down. "I once again repeat my oath before the Iranian nation and undertake not to tolerate the past mistakes, unlawful acts, oppression and corruption, but to make up for them" he said in a nationwide television address on 6 November 1978. I have read the revolutionary

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<sup>5</sup> Rastakhiz (resurgence) party was the single political party which was created by royal decree in 1975

message of you, the people, the Iranian nation. I guarantee that in the future the Iranian government will be divorced from tyranny and oppression, and will be run on the basis of the constitution and social justice. (Hiro, p. 82)

On February 11, 1979, the people of Iran under the leadership of Ayatollah Khomeini, after many years of restless struggle against the dictatorial regime in power, put an end to the 2,500 years of monarchical tyranny. The Khomeini movement was unique in its kind, not only in the Iran's history but also in the history of all revolutions in the world. The whole nation went on strike for almost seven months to get rid of one of the greatest military powers in the Middle East, whose regime was strongly supported by America and its strategic ally, Israel. The 73 members of the nationwide elected assembly of the experts ratified the draft of a new constitution in summer 1979. On April 1, 1980, following a referendum, which, gained a 98.2 per cent majority of positive votes, an Islamic Republic system of government was adopted.

### **2.5.2 The Islamic Republic of Iran**

According to the newly adopted Constitution, the President is directly elected by the people by a secret ballot for a four-year term, and may be re-elected for only one more term of the same duration. The Islamic Consultative Assembly is the legislative body of the country, comprising 270 representatives directly elected for a four-year term by the secret ballots of the people. The laws voted by the Assembly come into effect as soon as their conformity with the Constitution and Islamic precepts are acknowledged by the Guardian Council which comprises six expert jurists and six religious jurisprudence experts. This new Constitution requires that all civil, financial, economic, administrative, cultural, military, political, and other laws and regulations in the country are to be based on 'Islamic criteria'. According to the Constitution, the fundamental goal of the economy should be the 'satisfaction of the material needs of man in the course of his overall growth and development'. This principle may conflict with non-Islamic economic capitalist systems which lead to 'the concentration and accumulation of wealth

and the maximisation of profits'. Thus, the economic objectives of the Islamic government are:

(1) The planning of an efficient and just economic system in order to create prosperity, remove poverty, and abolish all forms of deprivation with respect to food, housing, work, health care, and the provision of universal insurance.

(2) The attainment of a higher degree of self-sufficiency in industrial, agricultural, technological, and all related matters (Amuzegar, 1993, p.27).

## **2.6. The Iranian Oil Industry: Historical Context**

Iran had little use for its oil until a British citizen, named William Knox D'arcy stepped in and obtained a concession in 1901. The Iranian government granted D'arcy a 60-year concession for exclusive rights to explore, exploit and export oil from anywhere in Iran except the five northern provinces. Exploration for oil started in western Iran in 1901. After two years, two wells were discovered, but the quantities (25 barrels a day) were not sufficient to warrant commercial production. The exploration moved later to the south-western province of Khusistan in order to get closer to export facilities in the Persian Gulf. After several failures large quantities of oil were discovered in 1908 near Masjid-e Sulaiman in southern Iran. Based on the significance of this exploration, the Anglo-Persian Oil Company (APOC) was formed in London in 1909 with an initial capital of two million English pounds (Razzaghi, 1992, p.446). Abadan refinery came into operation in 1913 and the export of crude oil commenced shortly after. An additional capital of 2.2 million pounds was provided by the British government in 1914 on the eve of World War I. As Graham has argued, APOC was significant in several ways.

The formation of Anglo-Persian Oil Company (APOC) in 1909 and first production in 1912 was a major factor in deciding the British Admiralty to switch from coal to oil on the eve of the First World War. Also, because Winston Churchill as First Lord of the Admiralty wanted Britain to own directly at least part of the nation's oil needs, this led to the purchase of a

British government stake in APOC. For the time being Iran just happened to be the country where the oil was discovered, and was treated little more than an ignorant, but important, shareholder who had to be humoured from time to time. (Graham, 1978, p.34)

However, the commercial exploration of oil resources did not take place on a large scale until after the First World War. From 1933 until the nationalisation of the oil industry in 1951 Iran received only 4 Shillings for each ton of exported oil (Alavi, 1986, p. 71). Thus APOC which sold the same oil at two pounds a ton, paid only one tenth of that to Iran. In the first forty years of the life of the Iranian oil industry, 28 per cent of the industry's income went to the British government, the Anglo-Persian Oil Company received 58 per cent, and the Iranian government only 14 per cent (Mirjalili, 1993). According to Emami:

By the end of 1950, after nearly half a century, it has been estimated that the oil industry provided Iran with 450 million dollars (9 per cent of total profit) in cash and helped to build three major ports, 2,500 kilometres of motor road, a few thousand houses and a number of hospitals. In addition the oil industry employed an average of about 25,000 Iranians (3,500 non-Iranians) for mostly unskilled jobs. By contrast, during the same period the British Government collected \$1,680 million in taxes, and British stockholders received \$670 million, limited for an initial investment of \$4,200,000 (Emami, 1981, p.12)

Given the inequitable distribution of income, the high gains to be made, and the apparent attitude of Britain to Iran, it is not surprising that:

The history of the oil industry in Iran is a fascinating chronicle of foreign intrigues, conspiracies, assassinations, and even one coup.' Oil has indeed been both a blessing and a curse for Iran. For the sybarite Qajars, oil was synonymous with extra revenues for financing their "European trips" and court extravagance. For Reza Shah, oil was a welcome source for modernisation of the armed forces. Under Reza Shah, the British continued with their domination of the oil industry. Often, the British government earned more revenues from taxation of the British oil companies in Iran than the Iranian government. (Milani, 1988, p.160)



### 2.6.1. Nationalisation of the Oil Industry

The economic exploitation, and political intervention of the British government in Iranian domestic affairs, together with the rise in nationalism, led to the nationalisation of the oil industry in March 1951. The following factors are generally held responsible for the nationalisation of the Iranian oil industry:

- (1) The expansion and importance of the oil industry after the World War II necessitated the revision of the agreement between Iranian and British governments.
- (2) The commencement of the development plans in 1949 demanded a reliable and significant source of foreign exchange, that would only come from exporting oil at that time.
- (3) The rejection of the Iranian parliament to a request to grant oil concession to Russians in North Iran.
- (4) The decreasing position of the British in world affairs.
- (5) Iran had become much more important to the British after the Indian independence in 1947. According to Asrari (1973):

Nationalisation, as outlined in the government policy, was based on four principles: First, there would be no more oil concessions. Any foreign groups interested in the Iranian oil industry could only work as agents for or in partnership with Iran. Second, any companies interested in the Iranian resources were expected to show faith by prospecting at their own risk and expense. Third, any oil found in commercial quantities would be produced with Iran participating both financially and managerially, and would in no way be or become the exclusive monopoly of any company. And, fourth, there would no longer be a 50/50 split in revenue which would be inconsistent with the spirit of nationalisation (Asrari, 1973, p. 24).

The British were not willing to give up a business which brought them US \$2,500 millions out of the initial investment of a few million English Pounds in the early years. So the British reaction to nationalisation was a very tough economic boycott on Iranian oil production and exports, which resulted in a decrease of oil revenue from

US \$400 million in 1950 to only US \$1.85 million for the following three years (Emami, 1981, p.20).

The British government used every means to defeat the nationalisation of the Iranian oil industry. These included the use of marine forces to prevent physically the exporting of Iranian oil, economic boycott, appeal to the international judiciary bodies, freezing of Iranian assets abroad, and preventing Iran from getting loans from the World Bank and the other international monetary institutions. Despite the boycott, Mossaddegh's national government was successful in managing the Iranian economy. Iran accumulated a trade surplus on its non-oil trade account. There was also some improvement in agricultural production, but the government efforts could not possibly succeed in the long run without solving the oil dispute (Nima, 1983, p. 12).

To compensate for the reduction in oil revenue, the Iranian government restricted imports and encouraged non-oil exports. In order to meet the financial requirements of the government, bonds were issued. As the result of these measures, the import bill dropped from 6.2 billion Rials in 1950 to 5.3 billion Rials in 1953, while, non-oil exports increased from 3.49 billion Rials to 8.3 billion Rials over the same period (Razzaghi, 1992, p.25). The nationalisation process, however did not last long.

The prolonged dispute between Iran and Britain finally ended in August 1953 after a British-American coup believed to have cost the parties \$19 million, and the fall of the lawful government of Iran.

#### **2.6.2. Post Nationalisation of the Oil Industry**

The three year Anglo-Persian dispute went in favour of Britain after the fall of Dr. Mossaddegh. The new government was formed in October 1954 and a new

agreement was reached. A twenty five year contract (renewable for three five-year periods thereafter) was given to an international consortium to exploit and refine oil in the south-western part of the country. The consortium consisted of several major and some independent oil companies. The Anglo-Iranian Oil Company turned its shares over to the newly formed consortium in return for \$1000 million to be paid in instalments by the members of the consortium and 25 million Pounds by the Iranian government within ten years. The Anglo-Iranian Oil Company which renamed itself British Petroleum at this stage, held the largest share of 40 per cent in the consortium. The five major American companies which participated in the consortium held 35 per cent share, and 9 minor American companies held 5 per cent. Royal Dutch Shell obtained 14 per cent of the share, and The Compagnie Francaise des Petroles acquired 6 per cent of the share (Asrari, 1973, p. 28). Mikdashi (1966) states that the terms of the concession were not in any way better than those existing in other Middle Eastern countries and may even have been less favourable than the conditions of an agreement in Iraq three years earlier. The new Iranian agreement is described by Nirumand along the following lines:

The fraudulent nature of this contract was disclosed by the fact that the income tax of fifty per cent, which would have to be paid to the state at above this level by any domestic or foreign company, is equated with the Iranian state's participation in its own oil industry. (The matter of ownership had been settled by the contract's recognition of Iranian rights and its settlement of compensation payable to the British company) The contract makes no provision at all for a genuine participation by Iran or by the Iranian state oil company as a partner in the business. (Nirumand, 1969, p.104).

According to Nima (1983) the establishment of the consortium shattered the illusion of economic independence which the oil nationalisation had brought, although the full extent of the intrigue did not become apparent until 1974 when a previously secret agreement showed a formula by which the revenue of Iranian government was controlled by the consortium.

The formation of the consortium was the start of American intervention in Iranian affairs. The previously dominant role of Britain in Iran was replaced by that of the United States. By the spring of 1959 America was involved in every aspect of Iranian life except religion. The United States embassy in Tehran with more than 1,000 employees (Hiro, 1985, p. 317) was as important a power centre as the Shah's palace. The extent of American influence over the Pahlavi regime could be judged by an unsigned memorandum found in the archives of the Shah's palace, which enumerated guidelines to the Shah on his rule.

The three pillars of the American strategy in the Middle East were Israel, Iran and Saudi Arabia. Iran was the central pillar (Hiro, 1985, pp. 303-307). Between 1953 and 1969 Iran received significant military assistance from the USA. During his visit to Tehran in May 1972, President Nixon of the USA promised the Shah that he could buy any quantity and type of non-nuclear weapons he wanted. As a consequence, Iran increased its military purchase from \$519 million in 1972 to \$4,373 million in 1974.

One of the major changes in the structure of the oil industry in the post-nationalisation period, compared with the pre-nationalisation era was the decline in the ratio of refined products to crude oil production which dropped from 70 per cent in 1953 to less than 5 per cent by 1978. This change *inter alia* implies less domestic economic activity despite the greater production of oil. The other major change during this period was in price levels of crude oil, which after being stable before 1970, gradually rose to US \$11.7 per barrel in 1973; reached \$25 in 1978; \$35 in 1983, and then collapsed to less than \$10 in 1986, despite the efforts at cartel price setting.<sup>6</sup>

The domination of the Iranian oil industry by international oil companies was finally terminated by the Islamic revolution in 1979. On 5 March 1979, the National Iranian

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<sup>6</sup> See chapter 5

Oil Company took over all the activities of the oil and gas industries, and on 20 March of the same year, the anniversary of nationalisation of the oil industry in 1951, the government cancelled its agreements with the international consortium. The National Iranian Oil Company (NIOC) now took complete responsibility for the affairs of the oil industry. The oil policy after the revolution was based on keeping the oil reserves for the coming generations, and rationalising utilisation. Following this policy, the export of oil dropped from 4.9 million barrels per day (b/pd) in 1978 to 2.9 million b/pd in 1979. As well as being a consequence of the new oil policy, the reduction in exports occurred because not only did the United States boycott the Iranian oil exports with the support of other major industrial countries, but also Iraq physically invaded Iran in September 1980 and destroyed a large part of the oil industry installations. As a result, the average oil exports decreased further to 911 thousand b/pd. This level of exports was not large enough to meet the needs of a dependent economy engaged in a devastating war (Razzaghi, 1992, p.466).

The oil sector suffered a loss of US\$160.6 billion during the war. The direct damage to the oil sector had been 20 per cent of annual value added in the same sector. The damage to the capital stock of the oil sector had been 145 per cent of the sector's investment during 1981-86 (Amirahmadi, 1992). The oil industry suffered most because of the war. Besides, the war almost totally destroyed Khorramshahr, Iran's largest port, and caused enormous damage to the Abadan oil refinery which was the largest in the Middle East at that time.

### **2.6.3. Oil Sector Contribution to the financing of Economic Development in Iran**

Since World War II Iran has been trying to develop the economy by use of a planning strategy. Concerted development planning in Iran began in 1946. Oil revenue affected the economy in two different ways. First, it provided a source of income for the usual government functions, and second, it was the single largest source of income for the

Plan and Budget Organisation to implement various plans for economic development. The Plan and Budget Organisation was the official body responsible for carrying out the development plans in Iran from 1949, when the parliament passed a Plan Organisation Act establishing the Plan Organisation for this task. Five development plans were executed in Iran between 1949 and 1978, and the export earnings and oil incomes have been the major source of finance for these development plans. The share of the oil income in the development budget increased from 37 per cent in the First Development Plan (1949-55) to 82 per cent over the period of the Fifth Development Plan (1973-78), and dropped to 69 per cent during the First Five Year Development Plan under the Islamic Republic.

The expenditure of the First Development Plan (1949-1955) was funded from three main sources, oil revenues, loans and other sources. While loan sources funded over 53 per cent of the plan expenditures, oil revenues accounted for about 37 per cent of the plan expenditures. The remaining 10 per cent was funded by liquidation of government assets and participation of private organisations. The emphasis on oil revenues brought the Plan to a standstill in 1951 when oil exports halted following the oil nationalisation. Actual investment outlays of the First Development Plan amounted to over 4 billion Rials, or less than 20 per cent of originally planned expenditures. (Amuzegar and Fekrat, 1971, p. 42)

In the Second Plan (1955-1962) 75 per cent of cost was projected to be financed by oil revenues. However, the increasing current public expenditures and the reduction of foreign financial assistance forced the government to reduce the share of Plan Organisation from the oil revenues, first to 60 per cent and later to 55 per cent. It is evident that without oil income the Second Plan, too, could not have been managed effectively. Oil revenues also contributed 66.1 per cent to the finance of the Third Plan (1963-67). This share increased to 80 per cent in the last year of the plan. The increase

was due to higher oil revenues during this period. This system of revenue distribution continued in the Fourth Plan (1968-73) when oil revenues accounted for more than 63 per cent of the plan expenditures. A new source of income from petrochemicals and gas exports also contributed to the financial sources of this plan by 3.4 per cent. The Fifth Plan covered the years 1973 to 1978. Oil revenues were responsible for about 82 per cent of the plan expenditures (Razzaghi, 1992, p. 184). According to Amuzegar:

This final five-year plan, implemented during the Shah's reign, turned out to be the most ambitious, and least successful, of all post-1954 planning endeavours. The plan turned out to be highly unrealistic in its revenue projections<sup>7</sup>, and unduly confident over the feasibility of its goals. While planned public and private investment outlays were nearly seven times the size of the just-completed Fourth Plan (1968-73), the planners still believed them to be within the country's absorptive capacity. By the end of 1976 the economy was out of balance (Amuzegar, 1993, p.7-8).

There were no development plans during the entire period beginning with the revolution in 1979 and ending with cease fire with Iraq in 1988. A total of \$120 billion in foreign exchange was allocated to be spent on the First Five Year Economic, Social and Cultural Plan (1989-93). The Plan represented the declaration of the country's reconstruction of the economy and was a framework for government to implement its reform and liberalisation policies. The primary aim of the Plan was to regenerate the economy, reconstruct the war damaged areas, promote private investment and initiate reform and liberalisation programs primarily aimed at foreign exchange and trade policies. The overall target of the First Plan was to achieve an annual average growth rates of 8.1 per cent, 11.6 per cent and 5.7 per cent in real GDP, real investment and real private consumption respectively. The average annual growth of real output was slightly below the target (7.1 per cent). The annual average rate of real private consumption growth over the course of the plan was 7.9 per cent which was well in excess of the plan target. A similar pattern can also be seen in investment growth.

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<sup>7</sup> Iranian oil revenues dropped sharply in 1975 as a result of fall in world demand for oil

The average annual real investment growth over the period of the plan was 13.8 per cent which is higher than the plan's target. Oil and gas revenues were forecast to be about \$83 billion (69 per cent of the budget). The rest of expenditures were to be financed by non-oil exports and foreign borrowing (each 15.5 per cent of the budget).

The Second Five Year Plan covers the period 1995-2000. This plan is a kind of a continuation of the economic and social policies of the First Plan. Two different scenarios were considered for the availability of foreign exchange from oil and gas exports. It was assumed that the oil and gas income under these scenarios would be \$69.3 billion and \$73.6 billion, and that GDP growth targets would be 5.4 per cent and 5.9 per cent. Foreign exchange revenues from oil and non-oil exports are projected to be \$100.185 billion, of which 73 per cent would be obtained from oil and gas exports over the plan period. The imports of goods and services during the same period are projected to be about \$92 billion. Annual average real growth rates of private consumption and investment under the Second Plan are set at 4 per cent and 6.2 per cent respectively (Pesaran, 1995).

## **2.7. Conclusion**

The abundance of oil in Iran and the strong national commitment to Islam have been the major features of Iran's recent politico-economic history. These features, together with the efforts of Britain and the United States to acquire Iran's oil have had major effects on the country's economic development. The next chapter examines the structure of the Iranian economy.



## **Chapter 3**

### **Structure of the Iranian Economy**

#### **3.1 Introduction**

The purpose of this chapter is to present an up-to-date picture of the Iranian economy. The present economic structure and its institutions provide the framework within which the economic units operate. This structure is the end product of many years' evolution and, to some extent, of the institutional changes since the revolution. The chapter is divided into seven sections. The second section discusses the population characteristics of Iran. The components of aggregate demand are outlined in the third section, followed by the composition of total output in section four. Section five reviews the Iranian external sector. The structure of government revenue and expenditure is discussed in section six. Finally, the social indicators of the economy are presented in section seven.

#### **3.2. Population Characteristics**

The Iranian population in 1992 was estimated at 56,964,000, including 4.15 million refugees from neighbouring countries (United Nations Human Development Report, 1994). According to a study carried out by UNIDO in 1991, 45.9 per cent of the Iranian population were 0-14 years of age (Amuzegar, 1993, p.62). Of the total population, 57 per cent were urban inhabitants. Males and females comprised 51.5 per cent and 48.5 per cent respectively. There were 496 cities and towns with a total population of 26,844,561 in 1986. These cities and towns ranged from less than 5000 to 6 million. Tehran, the capital, housed more than 6 million people. The second largest city is Mashhad with about 1.5 million inhabitants. There were also 15 other cities with a population greater than 250,000. Some 53 per cent of the population were living in this category of larger cities while only 1 per cent were in 84 towns.

which had fewer than 5,000 inhabitants. The number of cities reached 512 by 1991, and in 1992 the total population density was 34.5 persons per square kilometre (Report of Minister of Housing to the Parliament, reported in *Kayhan Havai*, November 11, 1992). The demographic characteristics of the Iranian cities are given in Table 3.1.

**Table 3.1: The demographic characteristics of Iranian towns and cities in 1986**

Population category	No. of cities	Population	% of urban population
250,000 and more	16	14,221,866	53
100,000-249,999	25	3,756,587	14
50,000-99,999	46	3,154,943	11.8
25,000-49,999	67	2,320,499	8.6
10,000-24,999	145	2,299,836	8.68
5,000-9,999	113	832,766	3.1
5,000 and less	84	258,064	1
Total	496	26,844,561	100

Source: Iran Statistical Yearbook 1372 (1993)

### The Labour Force

There are two main features of the Iranian working population. First, it is based on migration, especially migration to Tehran province from other cities and villages. Secondly, most employed persons are young. According the last general census conducted in 1986 the active population was 26 per cent of the whole population which is lower than the world average of 44 per cent. The distribution of male and female active population in different sectors of the economy is given in Table 3.2. The ratio of active female population to the same sex population was 5.5 per cent, while the same figure for the male population was 45.6 per cent. The ratio of active

male and female population to total active population was 89.7 per cent and 10.3 per cent respectively. This significant difference in the participation rate of males versus females in the labour force is due to the continuing traditional responsibilities of the man in providing sole financial support to the family. Out of the 10.3 per cent of the female active population, the largest part (3.2 per cent) was engaged in community social and personal services, 2 per cent working in the agriculture sector, 1.7 per cent in manufacturing, 2.6 per cent unemployed and the remaining 0.4 per cent distributed among other sectors. The largest proportion of active male population was working in the agricultural sector (22.9 per cent) followed by community, social and personal services (20.5 per cent). The distribution of the active male population among other sectors were, manufacturing (9.7%), construction (9.3%), wholesale and retail trade and restaurants and hotels (6.7%), and transport, storage and communication (4.8%) (ILO, Yearbook of Labour Statistics, 1993).

**Table 3.2: Distribution of males and females active population among sectors in 1986**

Sector	Males % of population	Females % population
Agriculture	22.9	2
Mining	0.2	-
Manufacturing	9.7	1.7
Water, gas and electricity	0.7	-
Construction	9.3	0.1
Services	32.8	3.5
Others	2.5	0.4
Unemployed	11.6	2.6
Total	89.7	10.3

Source: ILO Yearbook of Labour Statistics, 1993

### 3.3. Aggregate Demand

Table 3.3 gives the decomposition of aggregate demand in Iran in 1992. The Iranian GDP in that year was approximately 64,400 billion Iranian Rials (equivalent to US\$125,320 million). If the net direct taxes are added and the net income from abroad is deducted from this amount, the remainder would give a Gross National Product of 66,395 billion Rials (equivalent to US\$129.200). GDP per head in Iran was only \$2,200 in 1992. This is less than the average for relatively thinly populated oil exporting states but higher than that of medium populated and over-populated oil producing economies.

**Table 3.3: Basic Economic Indicators in 1992**

Variable	Billion Rials current values	Share in GDP	Billion rials 1982 prices	Share in real GDP
Gross Domestic Expenditure	64,400	100	14049	100
Government consumption	6,926	10.7	1552	11
Private consumption	41,186	64	8725	62.15
Government investment	6003	9.3	934	6.65
Private investment	8637	13.4	1143	8.15
Exports	9,864	15.3	2718	19.35
Change in inventory	6441	10	733	5.2
Statistical discrepancy	-2338	-3.60	-130	-0.9
Imports	12,319	19.1	1627	11.6

Source: The Iranian Budget and Plan Organisation data, 1994

#### 3.3.1. The Patterns of Consumption

Over 70 per cent of GDP (both in current and constant prices) in 1992 was spent on public and private consumption. About 74.6 per cent of the private consumption was spent in urban areas and the rest in the rural areas. Table 3.4 gives the composition of private consumption in 1992. It can be seen that the largest percentage of

consumption relates to food, housing and clothing, while the least percentage was devoted to educational, cultural and recreation services.

**Table 3.4 Composition of private consumption expenditure (current prices)**

	Billion Iranian Rials	%
Food, beverage and tobacco	144,92.6	35.2
Clothing and footwear	5,274.6	12.8
Housing, fuel and power	12,026.8	29.2
Furniture	2,744.1	6.67
Medical care and health expenses	2,025.6	4.92
Transport and communication	2,333.7	5.67
Educational, cultural and recreational services	1,022.9	2.48
Other goods and services	1,220.9	2.97
Total	41,186	100

Source: Iran's National Accounts, 1372 (1993)

### 3.3.2. Government Expenditure and Investment

The largest share of the government spending in current prices was on education (25.1), followed by national defence (19.1%) and economic services (17.5%) (Iran's National Accounts, 1993). About 69.5 per cent of the government budget relates current spending and the rest was spent on development projects (Budget and Plan Organisation, 1994). The share of total investment in GDP was 22 per cent in 1992. Construction formed 47.9 per cent of private capital formation, and 67.5 per cent of public capital formation. Table 3.5 gives the composition of capital formation in different sectors. The largest part of the investment (66%) was made in the services sector; followed by the industrial sector (26%), while the oil sector used only 3.45% of total investment.

**Table 3.5: Capital formation of different sectors in 1992 billion rials (current prices)**

Sector	Construction	Machinery	Total	%
Agriculture	445.6	264	709.7	4.8
Oil and Gas	468.7	36.9	505.7	3.45
Industrial	848.1	2912.2	3760.3	25.7
Services	6427.5	3237	9664.6	66
Total	8189.9	6450.1	14640	100

Source: Iran's National Accounts, 1372 (1993)

### 3.4. Sectoral Output and Employment

The pattern of production in real prices and employment in different sectors of the Iranian economy are shown in Table 3.6. The data suggest that the services sector produced more than 47 per cent of the GDP and employed more than 46 per cent of the employed work force in 1992. The agricultural sector recorded the second largest contribution to GDP (23.7%) and employment (27.6%). The industrial sector is the third biggest contributor to GDP and employment. The contribution of the oil sector to GDP was approximately 9 per cent, although this sector only employed 0.85 per cent of the employed labour, reflecting capital intensive nature of the oil industry.

**Table 3.6 Sectoral contribution to income (in real terms) and employment in Iran 1992**

Sector	Contribution to GDP		Contribution to employment	
	Rials	%	No.	%
Agriculture	3,320.5	23.6	3,580,000	27.6
Oil	2,530	18	110,000	0.85
Industrial	2,905	20.7	3,240,000	25.0
Services	5,294	37.7	6,020,000	46.55
Total	14049	100	12,950,000	100

Source: Iran's National Accounts 1372 (1993) and Amuzegar, 1993

The data for employment is for 1991

### 3.4.1 The Agricultural Sector

The agricultural sector is the second largest sector in terms of both output and employment after the services sector. It can be seen (Table 3.6) that the agricultural sector produced over 23 percent of the GDP in 1992 and employed 27.6 of the Iranian labour force. The greatest part of the arable lands is under wheat cultivation, followed by barley, pulses and cotton. Pistachio, which is a major Iranian traditional export, is in the sixth place. The government aims to achieve food sufficiency by implementing different forms of supportive policies such as subsidising agricultural equipment and tools, fertilisers and seeds, in addition to buying the farm products at a guaranteed prices.

### 3.4.2. The Oil Sector

It is estimated that Iran has proven oil reserves of over 92.86 billion barrels, which could be extracted at the rate of 4 million barrels per day (mb/d) for a period of 60 years (OPEC Annual Statistical Bulletin, 1992). These oil reserves are about 11.9 of OPEC member countries and 9 per cent of world reserves of oil. Not included in this estimate are the new discoveries in the south of the country which could increase oil reserves by a further 25 to 30 percent. The share of the oil sector in GDP in 1992 was 18 per cent. This share reached a peak of 34.1 per cent in 1977. This shift was mostly due to a sharp drop in the volume of oil exports from nearly 5 mb/d before the revolution to 3.4 mb/d in 1992, as well as major decline in oil prices from \$36.00 a barrel to \$17.00 a barrel. Iran also has the second largest reserves of natural gas after Russia, with some 20000 billion cubic meters.

There were at least 800 free-flowing wells in 1992 producing oil in more than 40 of Iran's 60 known fields (Amuzegar, 1993, p. 229). Table 3.7 shows the level of oil production during the period under study. The level of oil production in Iran has always been affected by two major factors - the needs of development plans for

foreign exchange on the one hand, and the price of oil on the other. During the 1962-72 period, Iran had large amounts of investment in infrastructure under the Third and Fourth Development Plans. However, with the stagnant price of oil in this period, it had to increase the rate of production to meet the financial demands of development. Thus, while, the rate of growth of oil production during the period 1960-1973 (before the oil boom) was 13.6% per annum, this rate of growth dropped during the period 1974-1978 to approximately -11%. This drop was due to the fall in OPEC's share in the market for oil.

There was a sharp decline in the production of oil in 1979 (65%), partly because of the disorders caused by the revolution itself, and partly due to the effect of the government's new oil policy of slowing down the depletion of the natural resources. This trend intensified over the next few years, but the financial needs of the war led to an increase of over 80 per cent in the oil production in 1982. The production of natural gas gradually increased from 6,000 million cubic metres (cu/m) in 1981 to 25,000 million cu/m in 1992 (OPEC Annual Statistical Bulletin, 1992). Domestic consumption was about 22 billion and is projected to be around 29.5 billion cu/m in 1994. Iran currently exports about 3 billion cum/year and is looking for new markets (OPEC, 1992).

### **3.4.3. Industrial Sector**

The industrial sector is composed of manufacturing, mining, construction, water, gas and electricity. This sector employed 25 per cent of the labour force and produced 20.7 per cent of GDP in 1992. Approximately 68 per cent of the value added of this sector in 1992 was related to manufacturing activities. A major part of the manufacturing is assembling production. The performance of the manufacturing sector is highly dependent on the availability of foreign exchange. The government continued the



policy of nationalisation of the state affiliated companies in 1992 (Amuzegar, 1993; Iran's National Accounts, 1993).

**Table 3.7 The oil production during 1960-1992**

Year	Oil production in million barrels/day	Year	Oil production in million barrels/day
1960	1,020	1977	5,662.8
1961	1,137	1978	5,241.7
1962	1,270	1979	3,167.9
1963	1,420	1980	1,467.4
1964	1,637	1981	1,315.9
1965	1,770	1982	2,391.3
1966	1,997	1983	2,441.7
1967	2,452	1984	2,032.4
1968	2,614	1985	2,192.3
1969	3,044	1986	2,037.1
1970	3,845	1987	2,297.6
1971	4,566	1988	2,305.4
1972	5,023.1	1989	2,814.1
1973	5,860.9	1990	3,182.6
1974	6,021.6	1991	3,432.5
1975	5,350.1	1992	3,431.6
1976	5,882.9		

Source: National Iranian Oil Company Annual Reports, different issues and OPEC Annual Statistical Bulletin, 1992

#### **3.4.4. The Services Sector**

The share of the services sector's output rose from 26.5 per cent in 1971 to 52.6 per cent in 1980 before falling to about 38 per cent in 1992. The rise and fall in the

contribution of the sector in the 1970s and late 1980s were due largely to the relative decline and increase in the shares of the oil and industrial sectors. The services sector employed 46.55 per cent of the labour force in 1992, while the share of the sector in GDP at the same time was 37.7 per cent (Amuzegar, 1993; Iran's National Accounts, 1993).

### 3.5. International Economic Relations

Iran's exports and imports in 1992 (valued at current prices) were 15.3 per cent and 19.1 per cent of GDP respectively. The pattern of exports of Iran in 1992 is shown in Table 3.8 . While oil and gas exports contributed over 84 per cent of total commodity exports in that year, the major proportion of non-oil Iranian exports in 1992 went to Europe (49%) and Asia (46%). The most significant non-oil exports are carpets, fresh and dried fruits, pistachio and copper bars. About 69 per cent of the total non-oil exports in 1992 were agricultural products and the rest were industrial goods and metal ores. The major exporting countries to Iran in 1992 were Germany (24.5%), Japan (12%), Italy (9.4%), United Kingdom (5.5%) and United Arab Emirates (5.2%). The major part of Iranian non-oil exports in the same year went to Germany (25.1%), Turkey (12%), United Arab Emirates (11.3%), Italy (7.4%), and Switzerland (5.4%).

Table 3.9 shows the value and the composition of imports in 1992. The share of consumer goods in total imports dropped from about 18 per cent in two years following the cease fire in 1988 to 11.6 per cent in 1992. The average share of raw materials and intermediate goods in imports during this period was 58 per cent. Over 50 per cent of imports in 1992 were transportation, vehicles, machinery and tools. Goods such as paper, cardboard and derivatives, various textile yarns, and related products, non-metal mineral goods, and iron and steel contributed to only 24 per cent

of the imports. Finally, about 7 per cent and 10 per cent of the import bill were related respectively to food stuff and chemical products.

**Table 3.8: The value of oil and non-oil exports of Iran in 1992 (US \$ 1000)**

Goods	Value	% of total exports
Carpets	1,133,303	6.1
Fresh and dried fruits	503,498	2.7
Skins and leathers	74,187	0.4
Inorganic chemical products	69,088	0.38
Copper bar	157,097	0.85
Clothes, knitwear, fabrics, stones, tiles	77,650	0.42
Transportation vehicles	72,339	0.39
Others	849,327	4.56
Sub-total	2,936,489	15.8
Oil and gas exports	15,700,000	84.2
Total exports	18,636,489	100

Sources: Central Bank of Iran, 1992, (Based on official exchange rate of US\$1=70 Rials) and OPEC Annual Statistical Bulletin, 1992

**Table 3.9: Import classification according to international classification of goods in 1991 (billion US\$)**

Goods	Value	% of total imports
Transportation vehicles, machinery and tools	14.924	50.3
Goods classified according to their composition *	7.075	23.8
Food and live animal	2.124	7.2
Chemical products	2.892	9.7
Others	2.662	9
Total	29.677	100

Source: Bank Markazi Economic Report 1371 (1992)

\* paper; cardboard and derivatives; various textile yarns; and related products; non-metal mineral goods and iron and steel

### 3.6. Government Revenue

The government total revenue is derived from three main sources - oil and gas, taxation and special revenues. The Iranian government received 51.6 per cent of its income in 1992 from oil revenues and 37.9 per cent from taxes, and the rest from special revenues (Iran's National Accounts, 1992). Taxes are levied on income and wealth; on production and consumption; and on international trade. The share of tax receipts to GDP was a little less than 6 per cent in 1992. The share of direct and indirect taxes in total taxes were 52.7 and 47.3 per cent respectively. Income taxes extend to public and private corporations, individual wage and salary earners, and the self employed. About 65 per cent of the whole direct taxes came from corporate tax, 27.5 per cent from income tax and 7.5 per cent from tax on wealth (Iran's National Accounts, 1992). Table 3.10 gives the composition of the government income.

**Table 3.10: Sources of government revenues in 1992 (million rials)**

Revenues	Million Rials	%
Total revenue	9,959,600	100
Oil and gas	5,141,300	51.6
Taxes	3,773,400	37.9
Others	1,044,900	10.5

Source: Plan and Budget Organisation data, 1994

The taxes comprise corporate tax (34.3%), income tax (14.5%), wealth tax (4%), custom duties (14.3%) and consumption and sales tax (Iran's National Accounts, 1992). The base of income taxes consisted of wages, salaries and real estate with respective shares of 38.7, 53.8 and 7.5 per cent. Out of the whole corporate taxes, 34 per cent came from government companies and the rest from private enterprises. Taxes on consumption and production are in the form of moderate excise taxes on some items such as, cigarettes, beverages, oil products, and domestically produced

automobiles. There are also high taxes on luxury items to limit the demand. The composition of the taxes are given in

**Table 3.11: Sources of government taxes in 1992 (million Rials)**

Revenues	Million Rials	%
Corporate tax	1,295,200	34.0
Income tax	546,698	14.5
Custom duties	1,245,350	33.0
Consumption and sales tax	538,870	14.3
Wealth tax	147,290	4.0
<b>Taxes</b>	<b>3,773,400</b>	<b>100.0</b>

Source: Plan and Budget Organisation data, 1994

### 3.7. Government Expenditures

Generally, the biggest part of the government budget goes to the current expenditures. This category of expenditures was 71 per cent of total budget in 1992. The government expenditure falls under four major categories: social, economic, defence and general affairs. The social affairs expenditures are related to health, education, social welfare, and vocational training. The share of this category of expenditure in government budget in 1992 was 51.6 per cent. The economic affairs expenditures are the spendings on different sectors of the economy, which was 24.7 per cent of the budget in 1992. The distribution of the government budget among the sub-sectors of this category in 1992 are shown in Table 3.12. The general affairs include spending on establishing domestic law and order, governmental buildings and installations and information and communications. The share of this activities in total budget was 11.8 per cent.

**Table 3.12 Structure Government Expenditures (1992)**

	Billion rials	Per cent
General Affairs	964	11.8
Social Affairs	4206	51.6
Education	(1776)	(21.8)
Health	(741)	(9.1)
Vocational training	(233)	(2.8)
Social Welfare	(784)	(9.6)
Others	(672)	(8.2)
Economic Affairs	2013	24.7
Defence	970	11.9
Total	8153	100

Source: Iranian Budget and Plan Organisation Data, 1993

### 3.8. The Social Indicators

A number of major social indicators of development is presented in Table 3.13. The life expectancy of the Iranian population in 1992 was 66.6 years. More than 87 per cent of the population during 1985-91 had access to health services. Iran had 1.5 hospital beds per 1,000 people during 1985-91. There was one doctor per 3140 people and one nurse to 8,570 people. Generally, hospital facilities and doctors are mostly concentrated in big cities, especially in Tehran. Iran spent 2.6 per cent of its GDP in 1990 on providing health services. The share of health expenditures in the government budget in 1991 amounted to 7.9 per cent.

The enrolment of the population in education for the age group 6-23 in 1990 was 61 per cent. The ratio of teacher to pupil in primary and secondary education in 1990 were 28 and 24 respectively, while the number of pupils and teachers in first and second levels of education in 1989 were 13.6 million and 625,277 respectively (United Nations Human Development Report, 1994). The same figures for vocational schools at secondary education level were 212,100 pupils and 23,297 teachers. Total

students enrolled in tertiary education were 315,657 along with 20,515 teachers and professors. The similar figure for the universities were 215,898 and 14,380 (United Nations Statistical Yearbook, 1990/91). Public expenditure on education in 1990 was 4.5 per cent of Iranian GDP. This share from the government budget in 1991 was 20.9 per cent. Only 8 book titles per 100 persons were published during the period 1988-91, and 6.5 copies of newspapers were published per 100 people during the same period. The number of scientists and technicians per 1,000 population during 1986-91 was 7.6 persons, while the scientists and technicians working in R&D projects were 1.1 persons per 1,000 population.

A social security scheme was put into effect in the mid-1970s. This scheme covers accidents and sickness, disability, retirement, and death, pregnancy and family allowances. There are various religious organisations which help the needy, orphans, the old and disabled to some extent. The foundation for the refugees of the Imposed War takes care of the Iran-Iraq war refugees. Unemployment benefits did not exist in Iran before 1987. The most recent labour law passed by the Parliament (Majles) in 1991 is claimed to be fairly liberal towards labour. It recognises workers' rights to collective bargaining and strike, and offers labour generous benefit provisions (Amuzegar, 1993).

**Table 3.13 The major social indicators**

Social indicators	Year	
Life expectancy at birth	1992	66.60
Adult literacy rate	1992	56%
Population with access to health service	1985-91	87%
Population with access to safe water	1988-91	61%
Enrolment rate for all levels 6-23 age	1990	61%
Daily newspaper copies per 100 population	1990	6.5
Scientists and technicians/1000 population	1986-91	7.6
R&D Scientists and technicians/1000 population	1986-91	1.1
Population per doctor	1990	3140
Population per nurse	1990	8570
Nurse/doctor	1990	0.4
Teacher/pupil ratio in primary education	1990	28%
Teacher/pupil ratio in secondary education	1990	24%
Book titles published/1000 pop.	1988-91	8.1
Public expenditure on education	1990	4.50%
Military expenditure as % of GDP	1990-91	2.1
Hospital beds/1000 pop.	1985-90	1.5
Public expenditure/GDP on health	1990	2.60%
Human development index	1992	0.672
Share of defence expenditures in government budget	1991	9.60%
Share of education expenditures in government. budget	1991	20.90%
Share of health expenditures in government budget	1991	7.90%
Share of housing expenditures in government budget	1991	15.50%
Share of economic services expenditures in government. budget	1991	16.10%
Share of other expenditures in government budget	1991	29.90%

Sources: United Nations Human Development Report, 1994 and World Bank Social Indicators of Development, 1994.



### **3.9. Summary and Conclusions**

Iran has a population of about 57 million, 57 per cent of whom were living in urban areas. More than 46 per cent of the active population in 1991 were engaged in the services sector and about 28 per cent were employed in agriculture. The Iranian GDP and per capita GDP were US\$125,320 and US\$2,200 in 1992. The biggest share of GDP goes to private consumption (62%), from which over 35 per cent is spent on food. The largest capital formation in 1992 was in the services sector (66%) followed by the industrial sector (26%). The services sector had the highest contribution to GDP (less than 38%) and to employment (over 46%) in 1992. Oil production in 1992 was 3.4 mb/d of which 2.5 mb/d was exported. Iranian exports were dominated by oil in 1992 (over 84%) with a contribution of 15.3 per cent to GDP in the same year. A significant part of government revenues in 1992 (over 51%) was from oil and gas exports, with 37.9 per cent from taxes and the rest financed through other sources.

## Chapter 4

### Performance of the Iranian Economy 1960-1992

#### 4.1. Introduction

An examination of the major macroeconomic trends and main sectoral developments provides a reasonable basis for an objective assessment of the economy's performance. The aim of this chapter is to carry out such an examination of the Iranian economy.

Three time periods have been selected for the purpose of the analysis: 1960 to 1970, 1971 to 1982 and 1983 to 1992. The first period is distinguished by relative stagnation in oil prices. The sharp rise in these prices took place at the end of 1973. However, the Iranian economy did not gain as much from these price rises as the other oil producers. Most of the effects of the increase in oil prices on the economy during this period were obscured by the negative effects of the political turmoil during the last year of the Shah's rule (1978), by the transition of power to the Islamic government and, particularly, by the heavy damages of the Iraqi-Iranian war. The third period witnessed a sharp decline in oil prices. Table 4.1 gives an estimation of the rates of growth of the main economic variables. These rates were calculated using the regression:

$$\ln Z_{it} = \alpha + \beta_t t + \mu_t$$

where  $Z_i$  refers to the  $i$ th economic variable, 't' refers to time and  $\mu_t$  is the error term. The coefficient  $\beta$  represents the constant proportional rate of growth.

**Table 4.1: Rates of growth of the main Iranian economic variables in constant prices, 1960-1992**

Variable	1960-70	1971-82	1983-92	1960-92
Population	2.9	3.2	2.9	3.14
Oil production	12.7	-11.2	5.8	*
Price of oil	*	25.3	-4.6	10
Real GDP	9.5	*	1.7	4.9
Real NOGDP	8.1	*	*	4.2
Exports	13	-14.7	6.3	*
Imports	12.5	*	*	6.6
Oil exports	13.4	-14.6	5.4	*
Private consumption	4.0	7.6	*	6.2
Government. consumption	14.7	10.7	*	7.8
Gross Fixed Capital Formation	13.2	13.8	*	5.8
Construction investment	11.3	14.5	-6.3	5.2
Machinery investment	14.7	14.7	*	6.8
Private investment	7.7	12.4	*	5.4
Government investment	17.9	12.8	*	6

Source of data: Iranian Budget and Plan Organisation and IMF

\* The rate of growth was not statistically significant

## 4.2. Population growth and employment

The Iranian population has nearly tripled in the last three decades and has imposed an additional burden upon the country's development efforts. Iran's population increased from 21.5 million in 1960 to an estimated 56.96 millions in 1992 with a net annual increase of 3.14 per cent changes. The rate of population growth during the period 1960-70 was 2.9 per cent. This growth rate accelerated to 3.2 per cent per annum during the period 1971-1982. Some factors such as the encouragement of large families in the early years of the revolution, the reduction in the legal age of marriage, rising unemployment, the distribution of ration coupons according to the

size of family during the war years, and the influx of refugees from neighbouring countries are said to be responsible for this high growth rate. The population growth rate dropped to 2.9 per cent during the period 1983-1992. The main reason for this reduction was government encouragement of birth control during the first five year development plan between 1989-1993. At the prevailing growth rate in the 1980s, Iran's population was expected to double every 22 years, which compared with 1,000 years for Germany and 630 for Austria, signifying a rapidly growing population (Amuzegar, 1993, pp.61-62).

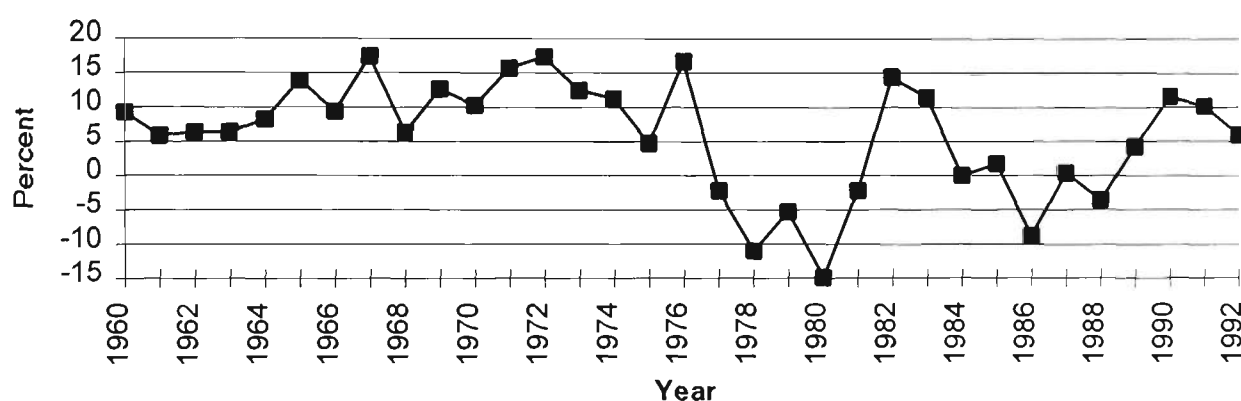
### **4.3. Growth of GDP and non-oil GDP**

Figure 4.1 shows the annual growth of Iranian GDP between 1960-1992. Clearly, changes in GDP from one year to the next are quite volatile. However, more important than the year to year variations are the cycles and trends in the growth of GDP. As can be seen from Figure 4.1, the pattern of GDP growth during the past three decades indicates that there was significant growth between 1960-1976. This pattern does not show any continuous trend after the revolution. These later fluctuations were due to changes in oil prices, the impact of the revolution and the Iraq-Iran war. The rate of economic growth from 1960 to 1970 was very high due to high annual rate of oil production (12.7%) and investment (13.2%). This was reflected in GDP growth.

The performance of the economy at constant prices was statistically insignificant during the period 1971-82. This weak performance was the result of the negative effect of the decline in oil production (-11.2% per annum) and oil export (-14.6%). Indeed, the extent to which oil production and revenues declined was much greater than anticipated. Iran, which lent to France and Britain in 1974, had to borrow \$6.5 billion in 1975 from the World Bank to finance its Fifth Development Plan (Looney, 1977, p.6). The government policy of the early years after the revolution (to preserve

the natural resources) plus the trade embargo against Iran, were the main factors responsible for the decline in oil production. This decline was also due to a fall in the OPEC share of world market.

**Figure 4.1. Annual Growth Rates of GDP in Constant Prices, 1960-1992**



Source: Iranian Budget & Plan Organisation data, 1994 and IMF, different issues

In addition, several other factors were responsible for the relative slow down in economic growth during this period. These were:

(1) Spending of large amounts of oil income on arms and ammunition. The USA alone sold \$3.3 billion worth of arms to Iran in 1974. This large sum amounted to over 60% of total Iran's imports and about 16% of Iranian exports in the same year (Motamen, 1979, p.70). Iran purchased some \$16 billion worth of military equipment from the USA over the 1972-77 period (Amirahmadi, 1990, p.17).

(2) The shelving of considerable number of investment projects because of the revolution. These investments were not effected until the end of Iran-Iraq war.

(3) Investment of some Iranian surpluses abroad following the rise in oil prices. These investments matured years later.

(4) The emergence of the newly rich middle class and the changing pattern of demand favoured imports of consumption goods. To some extent, this had a negative impact on the Iranian domestic industry.

(5) Borrowing of substantial amounts from international sources before the oil price boom (outstanding external public debt in 1972 was \$5.9 billion). The service of the debt had an adverse impact on Iranian growth.

The combined effects of these bottlenecks led to a substantial reduction in institutional efficiency and in the utilisation rate of the existing capacities over the period 1974-1982. For example, the reduction was over 50% in textile and automotive industries (Amirahmadi, 1990, p.19). The amount of private investment fell by 65% in 1977 relative to the preceding year. The GDP growth rate dropped from 17.8% in 1976 to 7.2% in 1977. In general, all economic sectors experienced a significant decline, but the hardest hit were the oil and industrial sectors. By January 1979 most major economic sectors had come to a complete halt.

The rate of growth of the economy was about 1.7 per cent per annum during the 1983-92 period. Oil exports grew 5.4 per cent per annum during this period despite the reduction in oil prices. This growth had a positive effect on the growth of GDP (1.7%). The high growth of non-oil GDP during the period 1971-1982 turned to a not significant growth in the next period due to the presence of different bottlenecks in the economy. The drop in oil prices caused more oil production and higher oil revenues during this period. Iran's GDP in 1989 was almost equal to its GDP in 1974 in constant prices. Among the reasons for the low growth of the economy during this period are:

(1) Underutilisation in most economic sectors, which was mainly the effects of war, decline in oil revenue and dependency on external resources. Other important determinants of capacity underutilisation included technological, institutional, organisational, and infrastructural bottlenecks. These bottlenecks have been deeply influenced, if not primarily created, by inappropriate use of the oil revenues

(2) There was a long list of war related expenditures which could have been spent on development projects. Some examples of the war damage to the economy

are: (a) the cost of oil given to Syria as gift or at discount (some US\$11.3 billion), (b) additional shipping charges for oil exports (about US\$3 billion), (c) the cost of imports of oil by-products (some US\$14 billion), (d) the cost of shipping oil to ports outside the war zone for exports, and the related insurance surcharge (some US\$3 billion), (e) the cost of re-orienting imports to ports outside the war zone (US\$3.5 billion), (f) the cost for reversing an early policy of maintaining lower defence spending (US\$84 billion) (Amirahmadi, 1990).

(3) A total of US\$17.5 billion worth of arms was purchased during the war with Iraq (Amirahmadi, 1990, p.49).

(4) The total damage inflicted on the economy for eight years of war was about \$592 billion (well over 4.5 times Iranian GDP in 1992), of which \$210 billion related to damage inflicted on the country's machinery, buildings, equipment, materials, goods, and similar national wealth.

(5) A devastating earthquake in 1990 may have cost Iran about \$10 to \$15 billion (Amirahmadi, 1990, p. 67).

(6) The burden of the war damage affected different sectors in different ways. The oil sector has suffered a loss of \$160.6 billion, followed by agriculture, \$43.7 billion, revolutionary foundations<sup>1</sup> \$39.5 billion, industries \$36.8 billion and \$28.5 billion for others, all at current prices (Amirahmadi, 1988).

(7) Over the 1979-1989 period, Iran made less than \$145 billion from oil exports, as compared with \$410 billion that it lost in direct economic damage from the war, plus its huge military expenditures which amounted to some \$105 to \$110 billion. The damage of the war ranged from 12.4 to 47.94 per cent of the GDP in every year from 1980 to 1988. (Iran Chamber of Commerce, Industries and Mines (ICCIM) weekly, 02.02.1371(1992).

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<sup>1</sup> After the victory of the revolution different revolutionary foundations emerged in different activities, such as, defence, business, industry and other social affairs

After the ceasefire in 1988, the economy began to recover from recession and high inflation. Substantial resources were released from war affairs, which improved oil production and exports. With the launching of a new five-year plan in 1989, and the changes in the government priorities and policies, a broad based expansion in all productive sectors helped the real GDP growth to rise to 4.2 per cent in 1989. This trend accelerated in 1990 when the oil industry took the lead and pushed up GDP by an 11.5 per cent, as was apparent in the noticeable increase in all the economic sectors. This increase was sustained with an overall annual rate of growth of GDP of 5 per cent during the period 1986-1992.

#### **4.4. Private and Government Consumption**

Private consumption increased at an annual average rate of about 4 per cent during the period 1960-1970, while public expenditure during the same period increased at an annual average rate of 14.7 per cent. Private consumption grew at a much higher rate (7.6 per cent) during the 1971-1982 period, whereas the rate of growth of public consumption, on the other hand, decreased to 10.7 per cent. Both private and public expenditure during the period of oil price recession (1983-1992) declined sharply. Part of the decline in private consumption was due to a shortage of basic products during the war years (Amuzegar, 1993, p.53).

#### **4.5. Gross Fixed Capital Formation**

The Gross Fixed Capital Formation (GFCF) grew at an annual average rate of 13.2 per cent during the period 1960-70, with a peak of 34 per cent in 1965. Gross Fixed Capital Formation in construction, during this period, grew at 11.3 per cent annually. The annual growth rate of private GFCF was 7.7 per cent as against 17.9 per cent for government GFCF. Both government and private investment in this period was largely confined to infrastructure and light manufacturing industries.



Total investment grew at an average annual rate of 13.8% during the period 1971-82. The growth of investment in both construction and machinery was about 14.5%. Public investment grew at an average annual rate of 12.8%. Government investment in basic and heavy industries such as steel, machine making, chemicals and petrochemicals accelerated during this period. There was also a change in the structure of private investment as it moved into new consumer durables and intermediate products.

Investment in machinery did not enjoy any growth during the period 1983-92, while investment in construction declined at an average annual rate of 6.3 per cent during the same period. This decline was due to a number of domestic and international factors. The fall in oil revenue was a major factor, as most investment depended on the availability of foreign currency to pay for capital goods imports. Even more devastating was the war, which not only reduced production but also destroyed a significant portion of the existing capital stocks. Private capital flight also contributed to the fall in available domestic savings during this period. In the absence of significant public investment, the private sector was unwilling to undertake major investment projects (Amirahmadi, 1990, p. 161). The average annual rate of growth of investment during 1988-92 was 16.9% in real terms.

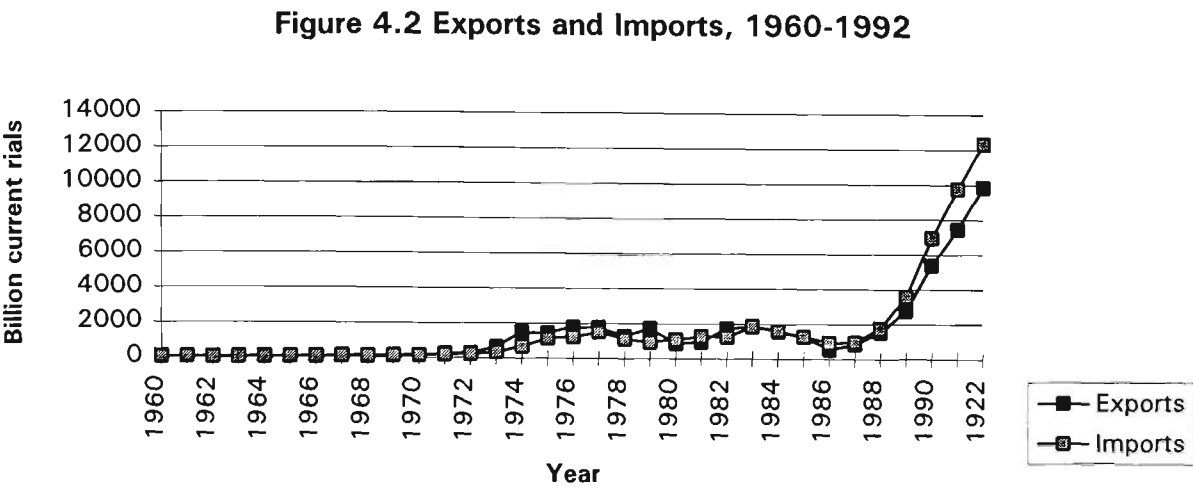
#### **4.6. Exports and Imports**

The trend of growth of the Iranian foreign sector is presented in Figure 4.2. Iran's exports consist mainly of oil. Before the discovery and export of oil in early 1910s Iran's exports were mainly traditional agricultural products. From 1959 the oil exports increased rapidly, and Iran concentrated on export of oil as a source of foreign exchange. For many years the direction of Iran's exports has been mainly towards the developed countries, with 59 per cent of the Iranian exports directed to non-socialist industrial countries in 1960. However, this proportion fluctuated from

76 per cent in 1970 to 45 per cent in 1981 and 62 per cent in 1992 (*Direction of Trade*). The changes in the share of exports in GDP has been mainly due to the changes in the price of oil. The contribution of exports to GDP in 1960 was 14 per cent, which rose to 49 per cent following the jump in the price of oil in 1974. This ratio dropped to 3.6 per cent in 1986 when oil prices fell sharply and grew again to 15.3 per cent in 1992 due to increase in volume. The data in Figure 4.2 indicate that Iranian exports have always been exceeded by Iranian imports every year since 1980 except 1982.

Iranian imports grew at 12.5 per cent annually during the period 1960-70 and the market for imported goods increased from 50 billion rials in 1960 to 158 billion rials in 1973. The increasing imports of capital and intermediate goods during this period went towards setting up import substitution industries. At the same time, imports of consumer goods were discouraged to protect the infant industries, as well as to save the foreign currency for investment (Alavi, 1986, p.78). About 80 per cent of the Iranian imports were from industrial countries in 1960. This ratio increased to 91 per cent in 1970, dropped to 58 per cent in 1982, and rose to 74 per cent in 1992.

The growth in imports of goods and services during the periods 1971-82 and 1983-92 was not statistically significant. The average annual growth rate of this variable during the whole period 1960-92 was 6.6 per cent. The share of imports in GDP was about 15.4 per cent in 1960, a share which rose to 20 per cent in 1973, declined to 14.3 per cent in 1983 and rose again to 19 per cent in 1992.



Source: Iranian Budget and Plan Organisation data, 1994, and different issues of IMF

4.7. Sectoral Growth

The data on growth of the major economic sectors during the period 1960-92 is given in Table 4.2. The rapid growth of the Iranian economy between 1960 and 1977 caused major shifts in the economy. Both government consumption and imports expanded following the increase in the oil revenues. At the same time the agricultural sector contracted when its labour force was attracted to higher paying jobs in other sectors such as construction, trade and transportation. The wave of migration from rural to urban areas led to a greater demand for housing, services and consumer goods, and stimulated manufacturing sector. The share of the agricultural sector in GDP in 1960 was about 32 per cent, while it employed more than 50 per cent of the labour force. The modern and capital intensive oil sector employed less than 1 per cent of the labour force and produced 31 per cent of the economy's output. The share of the industrial sector in GDP and employment were 9 per cent and 21 per cent respectively. Finally the services sector contributed 31 per cent of output and 26 per cent of the employment.

**Table 4.2: Growth rates of different sectors in GDP in real prices**

Sectors	1960-70	1971-82	1983-92	1960-92
Agriculture	3.4	5.3	4	4.8
Construction	10.0	6.4	-8.0	5.6
Electricity	19.7	7.8	9	12.4
Mining	13.1	7.6	*	7.7
Manufacturing	11.7	6.7	6.3	8.5
Industry	11.3	6.7	2.4	7.8
Oil	14.3	-12.6	4.7	*
Services	8.2	7.6	*	6.5

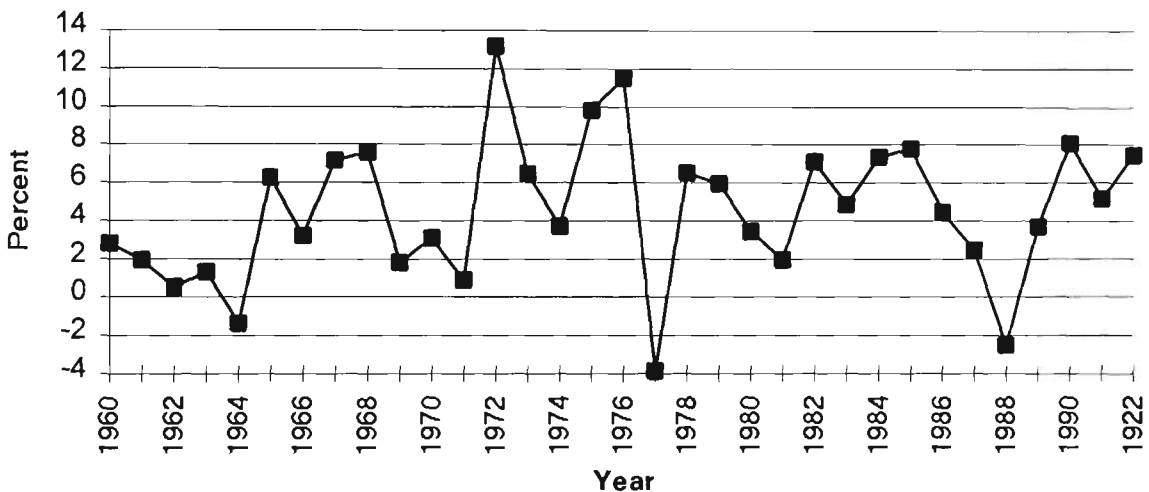
Source of Data: The Iranian Budget and Plan Organisation, 1994

#### 4.7.1: The Agricultural Sector

The trend of agricultural growth during the period 1960-92 is presented in Figure 4.3. The agricultural sector enjoyed an annual growth rate of 4.8 per cent during the whole period 1960-92. The magnitude of the output of the sector increased from about 800 billion rials in 1960 to 3,350 billion rials in 1992 in real terms. The rate of growth of the agricultural sector was about two thirds of the GDP growth rate during the period. The low performance of the agricultural sector compared with other sectors during the first decade of the period was the outcome of the low priority given to the sector by the government. The government believed that the national comparative advantage was not in agriculture, but in promoting industrial exports. From the government's point of view, the inexpensive agricultural products could easily be imported. The sector suffered not only from the loss of its most skilled labour which was absorbed by the manufacturing and construction sectors which offered higher payments, but also from insufficient credit, limited transportation networks and poor services. In addition, the terms of trade turned against this sector in order to keep agricultural products cheap in urban areas for political reasons. As

well as the above factors, the land reform which was initiated in the early 1960s adversely affected agricultural production by disrupting the traditional economic organisation in the countryside and offering no adequate replacement for it. The annual growth rate of the sector ranged from negative rates in some years (1964) to as high as 13.2 per cent in other years (1972). The sector accounted for 32 per cent of GDP in 1960. This share continuously declined to reach 17.5 per cent in 1970.

**Figure 4.3 Annual Growth Rates of the Agricultural Sector in Constant Prices, 1960-1992**



Source: Iranian Budget and Plan Organisation data, 1994, and IMF different issues

The average annual growth of the agricultural sector over the period 1971 to 1982 was 5.3 per cent, with the highest rate of growth of 13.2 per cent being achieved in 1972. This was the second highest sectoral growth after the water, gas and electricity sector. The share of agriculture in GDP improved continuously from 13 per cent in 1974 to 21.6 per cent in 1985. The government gave top priority to this sector, aiming at improving the quality of life in the rural areas, and enhancing the likelihood of achieving self sufficiency in food. An organisation was set up to mobilise the skilled and dedicated labour force for rural development. This organisation undertook a vast range of development activities including agricultural extension, veterinary and

animal husbandry, health care and hygiene, building irrigation systems, roads and schools, and electrification of the rural areas. This popular movement was quite successful in the early years of the revolution, and the agricultural sector achieved a high rate of growth between 1982-85 despite the difficulties imposed by the war and sanctions. The annual rate of growth of this sector during the period 1983-92 was about 4 per cent. The average growth of the sector during the first five year development plan (1989-1993) was 6 per cent, while the average share of the sector in GDP during this period was about 24 per cent.

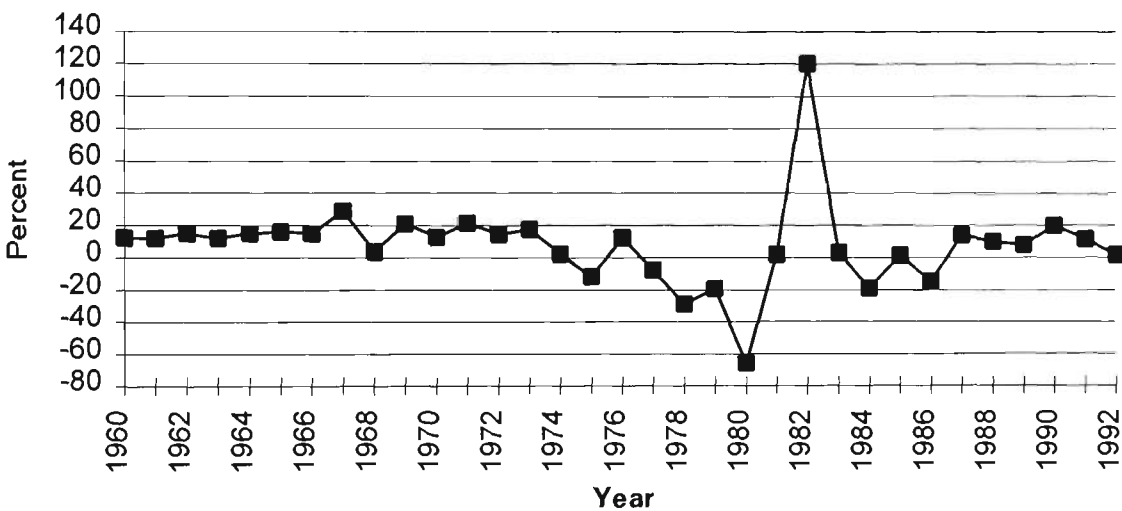
#### 4.7.2. The Oil Sector

Generally the oil industry in oil exporting countries is an enclave sector, which is primarily export and import-oriented with limited linkages to the rest of economy. The oil sector provides the country with a large flow of capital, and generates externalities which benefit the rest of the economy. Such externalities may include technology transfers, the formation of a skilled workforce, and demonstration effects (Zind, 1992).

The oil industry is the largest and most modern industry in Iran. The trend of growth in the oil sector during the period 1960-92 is given in Figure 4.4. The magnitude of the output of the sector increased 3.5 times from 720 billion rials in 1960 to 2550 rials in 1992. This sector had an annual average growth rate of 14.3 per cent during the period 1960-70, while the output of the sector during the period 1971-82 declined at an average rate of 12.6 per cent annually. The largest drop in the sector's value-added was in 1980 (65%). This was the result of the Islamic government policy to preserve the oil wealth for future generations. The output of the sector did not change in the next year, but sharply increased in 1982 (120%) as a result of the financial needs of the war. The main reasons for the low performance of the oil sector between 1978 and 1981 were:

- (1) The general strike of the oil industry workers in 1978 which resulted in stoppage in oil export for three months in the same year.
- (2) The reduced activity in oil production and export shortly after the revolution.
- (3) The heavy damages of the war to the oil installations. (Amuzegar, 1993, p.55).

**Figure 4.4 Annual Growth Rates of the Oil Sector in Constant Prices, 1960-1992**



Source: Iranian Budget and Plan Organisation data, 1994 and IMF (different issues)

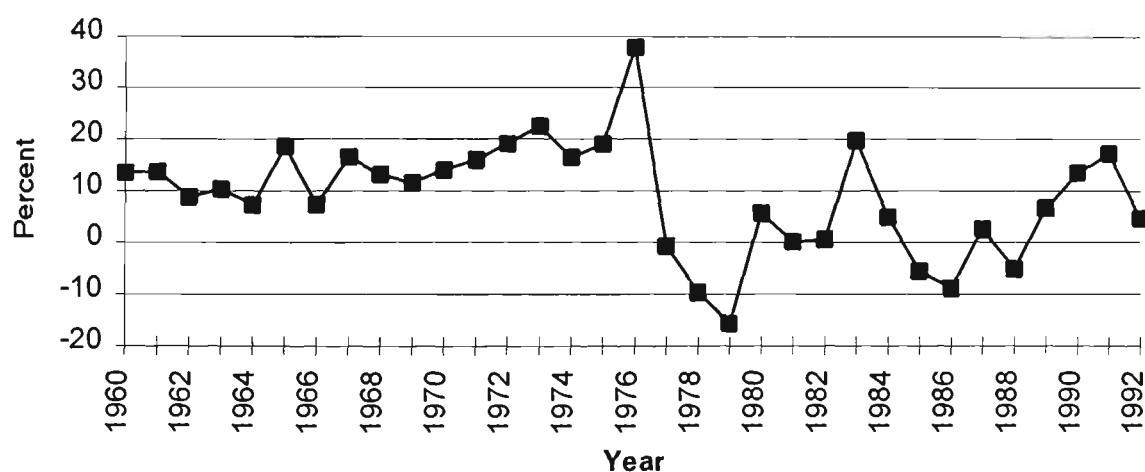
Following the ceasefire in 1988, the production and export of oil improved. The average annual rate of growth of the sector was 4.7 per cent and 10.5 per cent during the periods 1983-92 and 1986-92 respectively. In terms of share in GDP, the oil industry reached its peak of 45 percent in 1970; declined to about 9 per cent in 1980-81 and rose again to 14 per cent in 1985. There was a wide range of factors responsible for the swing in the significance of this share. The calculation of oil export revenues at the official exchange rate in the national accounts is one major factor, but other factors include the early decision of the government to save oil by cutting down the output; foreign economic sanctions; reluctance to deal with major

international oil companies; wild fluctuations in world oil prices and poor maintenance of oil wells. The performance of the oil industry and its growth were also severely hampered by the damages to oil refineries and transportation facilities at the height of the war.

#### 4.7.3. The Industrial Sector

The Iranian industrial sector is composed of construction, utilities (water, gas and electricity), non-oil mining and manufacturing. Figure 4.5 shows the growth of the industrial sector during the period 1960-92. The value of the sector's output rose from 23 billion rials in 1960 to 2,802 billion rials in 1992 in real terms. The average annual rate of growth of the sector during the whole period was 7.8 per cent. This sector grew during the period 1960-70 at an annual average rate of 11.3 per cent. The disaggregated figures for the sub-sectors were: 9.9 per cent for construction, 19.7 per cent for water, gas and electricity and 13.2 and 11.7 per cent for mining and manufacturing respectively. The share of this sector in GDP rose from 8.8 per cent in 1960 to 11.5 per cent in 1970.

**Figure 4.5. Annual Growth Rates of Industrial Sector in Constant Prices, 1960-1992**



Source of Data: The Iranian Budget and Plan Organisation, 1994



The sector grew steadily from 1971 to 1975 and reached its peak in 1976. With social and political unrest during 1977-1979 the growth of the sector decreased markedly and registered its lowest point in 1979, but recovered during the next three years. Among the reasons for this decline in the growth rate during the period 1971-1982 were:

- (1) The mass exodus of top owner/managers, with tensions between the remaining executives and the revolutionary workers' councils,
- (2) A shortage of foreign exchange
- (3) A severe shortage of raw materials both from internal and external sources.

Most Iranian industries depended on foreign markets for between 65 per cent and 85 per cent or more of their inputs. The dependence of domestic industries on scarce raw materials and spare parts resulted in a drastic drop in capacity utilisation. Due to the economic embargo, shortages of raw and intermediate materials, and the departure of owners and management, the Iranian industry, in the first year of political independence, was in a deep stagnation. These factors led to nationalisation of about 500 industrial units in 1979 (Eftekhari and Deeni, 1992). The analysis of the industrial sector after the revolution shows that the fluctuations in the level of foreign exchange receipts in this period was a major factor responsible for the changes of the performance of this sector. This is mainly due to the high dependence of the industries on imports in terms of raw materials, technology and equipment (Bank Markazi Islamic Republic of Iran, *The studies of the economic transformations of the country after the Revolution*, Tehran: Department of Economic Studies ). The average annual growth rate of sub-sectors during the period 1971-1982 were: mining 7.6 per cent, manufacturing 6.7 per cent, construction 6.4 per cent, and electricity, gas and water 7.8 per cent. Construction activities witnessed a decline every year between 1978-1982 except for residential housing and defence-related buildings. A temporary revival took

place in this sector in 1983 due to allocation of 4.5 million square metres of land to individuals at regulated prices.

The industrial sector's growth during the third period was much lower than the two previous periods (2.4%). This lower rate of growth was first due to decline in rate of growth construction sector (-8%), and the stagnant position of the mining sector during this period. The highest rate of growth of the industrial sector was in 1983 (20%) which steadily declined to -10 per cent in 1986. The growth of the sector regained its upward trend through the first three years of the First Five Year Development Plan (1989-1991). The sector's output surpassed the 1976 level in 1984, but output declined in the following years when war damages and the sanctions affected production. Despite the cuts in the budget allocation made after the revolution, the industry's share in the development budget was consistently higher than it had been before the revolution. The continued emphasis on the industries reflects the government's stress on self-sufficiency (Keddie and Hooglund, 1986).

Construction activities witnessed a decline every year between 1978-1982 except for residential housing and defence-related buildings. A temporary revival took place in this sector in 1983 due to allocation of 4.5 million square metres of land to individuals at regulated prices. However, in the second half of 1980s the construction industry declined at a much higher rate than the average for the industrial sector as a whole. The rebuilding of the destroyed and damaged cities in the war from 1990, and the availability of construction materials resulted in a second revival of the sector.

#### **4.7.4. The Services Sector**

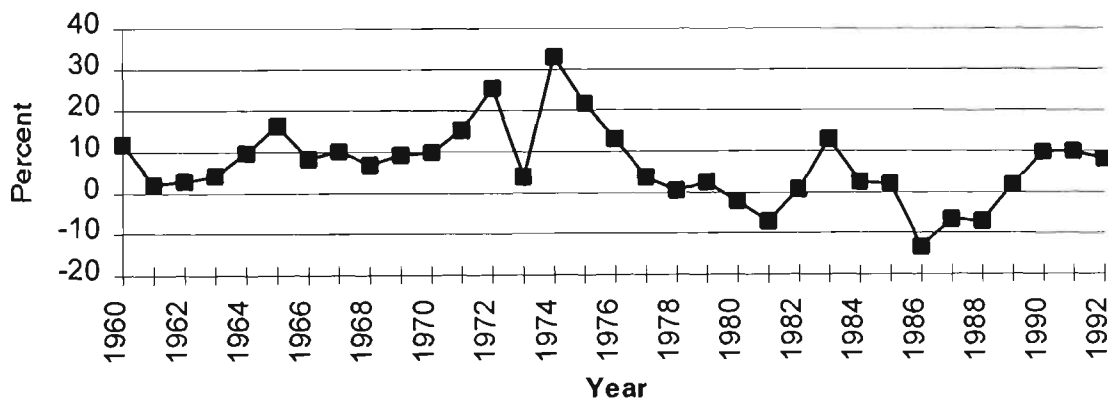
The growth of the services sector is shown in Figure 4.6. The output of this sector grew from 788 billion Rials in 1960 to 5,343 billion in 1992. The rate of growth of the sector during the whole period was 6.5 per cent. However, the rate of growth of

the sector fell sharply after 1974. The sector also showed negative growth between 1986 and 1988, but achieved a positive annual growth rate of about 8.5 per cent from 1990 to 1992.

The services sector contributed 31 per cent of the economy's output in 1960, which declined to 26.2 per cent in 1973. It reached a peak of 52 per cent in 1980. This trend was reversed and the share declined to 43 per cent in 1985. It averaged 38 per cent during the last four years of the period under study (Amuzegar, 1993, p.55).

The rapid expansion of the services sector is a mixed blessing, and it is generally difficult to analyse. On the one hand the sector includes social overhead capital in transportation, communications, health and education sub-sectors, the growth of which is essential to any economic development process. On the other hand, the sub-

Figure 4.6. Annual Growth Rates of the Services Sector in Constant Prices, 1960-1992



Sources: Iranian Budget and Plan Organisation data, 1994 and IMF (different issues)

sectors such as public services and trade that may or may not contribute to economic development, are also part of the services sector. A close look at the components of the services sector may help in understanding the importance of the growth of the sector. These components are domestic trade, hotels and restaurants, transportation, communication and warehouses, financial services, real estate, vocational and

professional services, public services and finally social and private services which include health and education. The growth of public sector prior to the revolution was significant and, in particular was faster than any other socio-economic activity following the sharp increase in oil prices of 1973. This was largely due to expansion of the bureaucracy, armed forces and internal police apparatus and intelligence services. After the revolution, domestic trade demonstrated an extraordinary growth largely because of the steep decline in profitability in other sectors of the economy. The economic sanctions and rapid decline in oil revenues in 1980s and consequent decline in imports, seriously hampered the industrial activities that were dependent on imports of intermediate inputs. As a result a large amount of domestic capital was diverted to unproductive domestic trade activities, which in turn exacerbated the problems of the already troubled economy by increasing domestic prices, not to mention the increase in hoarding and other illegal speculative activities. However, the high growth of domestic trade during the period 1983-1992 was offset by the negative growth of the other sub-sectors.

The experience of advanced economies suggests that the services sector grows rapidly only after industrial maturity has been achieved. In the case of Iran, it seems that, the fluctuations in oil revenue and not the industrial maturity, have had a profound impact on the growth of the services sector. The slowdown of economic activity in manufacturing, construction and other directly productive sectors in the mid-1980s did not affect many of the services. The relative ease of entry into small business and trade, comparative immunity from government supervision and regulation, and the prospect of making quick profits undetectable to the taxation authorities were some of the reasons for the better performance of this sector in most years.

#### **4.8. Summary and Conclusions**

The performance of the Iranian economy was evaluated over three different periods of time in this chapter. These periods are characterised by stagnation (1960-70), sharp rises (1971-82), and decline of oil prices (1983-92). The Iranian economy unfortunately, did not benefit substantially from the oil boom due to the decline in oil production (11.2% per annum) because of the Iran-Iraq War. After the ceasefire in 1988 and with the launching of a new five-year plan in 1989, real GDP rose to 4.2 per cent in 1989, and recorded 11.5 per cent growth in 1990.

The Gross Fixed Capital Formation (GFCF) grew at an annual average rate of 13.2 per cent during the period 1960-70, while total investment grew at an average annual rate of 13.8% during the period 1971-82. Government investment in basic and heavy industries such as steel, machine making, chemicals and petrochemicals accelerated during this period. There was little growth in investment during the period 1983-92 due to a number of domestic and international factors, such as the fall in oil revenue, the Iran-Iraq war, and private capital flight. With the removal of the heavy cost of the war, the average annual rate of growth of investment during 1988-92 was 16.9% in real terms.

The rapid growth of the Iranian economy between 1960 and 1977 along with change in the government, a prolonged devastating war with Iraq, and the Western economic sanctions caused major shifts in the economy. The share of the agricultural sector in GDP in 1960 was about 32 per cent, while it employed more than 50 per cent of the labour force. These shares were 23.6 per cent and 27.6 per cent in 1992 respectively. The modern and capital intensive oil sector employed less than 1 per cent of the labour force and produced 31 per cent of the economy's output in 1960. The share of oil reduced to 18 per cent in 1992 with about the same level of employment. The share of the industrial sector in GDP and employment were 9 per cent and 21 per cent

respectively in 1960, while these shares changed to 20.7 per cent and 25 per cent over three decades. Finally the services sector contributed 31 per cent of output and 26 per cent of the employment in 1960. This sector in 1992 employed more than 46 per cent of the labour force and contributed to about 38 per cent of GDP.

# CHAPTER 5

## Long Term Fluctuations in World Oil Prices

### 5.1 Introduction

The fortunes of developing countries are associated with the prospects for primary commodity exports (Thoburn, 1977). This is so since developing countries are generally dependent on primary commodities for up to three-quarters of their export earnings, compared to approximately one fifth in the case of developed Western economies. For example, among 14 oil exporting countries the percentage of leading single commodity exports to total exports in 1980 range from 43 per cent in case of Ecuador to 100 per cent in case of Saudi Arabia. The number of leading commodities varies from 1 to 4 for these countries, with an average of 2. As far as the 70 non-oil exporter countries are concerned, single commodity exports as a percentage of total exports ranges from 5 per cent in case of China to 94 per cent in the case of Bahamas. The variation of the number of leading commodities in this case ranges from 1 to 9, with an average of 3 commodities (Adams and Behrman, 1982).

The prices of most, if not all, primary commodities suffer substantial fluctuations, particularly over the long run. There is little doubt that primary commodity markets exhibit considerably greater instability than those of manufactured commodities (Thoburn, 1977). The fluctuations in international primary markets may limit the pursuit of economic development. The case of oil seems to be rather peculiar, in that its cyclical behaviour differs greatly from those of most other primary commodities.

Three crises form the history of the oil industry. These were a shortage of energy in the latter years of World War II, a drastic rise in oil prices after the oil embargo in 1973, and a decline in oil prices since late 1982.

The significance of the oil market is apparent when compared with other natural resources. For example the price of phosphate rock increase in January 1974 by more than 200 per cent (Rybczynski, 1976). However, this increase passed almost unnoticed by the world at large, yet stands in sharp contrast with the reaction to the rise in oil prices in late 1973, when the oil embargo caused major international disruption. The major reasons for this are:

- (1) Oil is one of the most important commodities in the world, accounting for more than 50 per cent of the weight in international trade.
- (2) Oil is the main source of energy consumption.
- (3) Generally there is no perfect substitute for oil in transport.
- (4) Oil accounts for a large part of the import bill of developed countries (Rybczynski, 1976).

Furthermore, many developing countries ran into heavy debt as a consequence of rising oil prices. In 1973-74 the oil import bill of non-OPEC developing countries increased by US\$17.3 billion (Schneider, 1983), and then more than doubled after the second price rise in 1979. Overall, the debt of the oil importing developing countries rose from about US\$100 billion in 1973 to over US\$700 billion in 1984 (Adelman, 1987). India's excess oil payments alone probably reached US\$1 billion in 1974, compared with its reserves of some US\$1.4 billion and exports of about US\$2.5 billion in 1972 (Rybczynski, 1976).

The aim of this chapter is to examine whether the price changes of oil over the period, 1955 to 1992 were significantly different from those of other primary commodities. The chapter is divided into five sections. Section two examines the behaviour of oil prices during the period 1955-1992. Section three compares fluctuations in oil prices with those of 28 other primary commodities during the same period. Section four analyses the structure of the international oil market.



Section five assesses the implications of fluctuations in oil prices on the development prospects of the exporting countries.

## **5.2. Behaviour of Oil Prices During 1955-92**

The main reason for selecting the period of study is availability of data. Also 1955 is a highly appropriate starting point because the price of oil started declining in that year, a price change which was the impetus for OPEC's reactions in the early 1960s (Schneider, 1983).

The overall period of 1955-92 has been divided into three sub-periods. The first period from 1955 to 1969 was characterised by a decline in oil prices following a high degree of stability. Oil prices had been relatively stable until the mid-1950s, having shifted only from about US\$1.8 a barrel in 1949 to just over US\$2 in 1955. From 1955 until 1970 the price declined, reaching a low of about US\$1.3 per barrel. There were three major reasons responsible for this decline:

(1) A large number of firms entered the market during this period. The new entrants' share of non-US, non-communist oil production increased from 8 per cent to 16 per cent between 1955-60 (Schneider, 1983).

(2) The Soviet Union substantially increased its oil production.

(3) The decline in oil prices may also be attributed to market dominance by oligopolistic multinational firms and their reluctance to change the price at frequent intervals (Radetzki, 1990).

In the 1950s when some of the oil exporting developing countries realised the significance of oil for their future economic development, they began to co-operate at an informal level to raise the price of oil. In September 1960, Iraq, Iran, Kuwait, Saudi Arabia, and Venezuela joined together and formed the Organisation of Petroleum Exporting Countries (OPEC). The founding members accounted for 67 per

cent of the world's oil reserves, 38 per cent of its production, and 90 per cent of the world oil in international trade at that time (Schneider, 1983). The establishment of OPEC came in response to an outrage by the host governments when cuts in the price of oil, were made unilaterally by the oil companies first in February 1959 (about 8 per cent), and then in August 1960 (about 6 per cent). Eight other developing countries namely Qatar, Libya, Indonesia, Algeria, Nigeria, the United Arab Emirates, Ecuador, and Gabon joined OPEC after 1960. Membership of OPEC has not increased since 1975. Indeed OPEC membership has declined to 12 since January 1, 1993, when Ecuador withdrew.

During the second period, 1970-83, oil prices rose sharply, particularly after the oil embargo in 1973 and after the Iranian revolution in 1979. The third period from 1983 to 1992, was one in which oil prices initially dropped sharply, then stabilised at approximately half the level of that in 1982. In the early 1980s the oil industry was faced with stagnant demand from one side and abundant surplus from the other side. The industry decreased the price to a level which would balance the supply and demand. As well, fundamental changes were taking place in the energy economy itself. Firstly many non-OPEC producers began production in the early 1980s. Secondly, the massive twentieth century march toward higher and higher dependence on oil within the total energy-mix was reversed by higher oil prices. As a result, the oil share of the market for total energy in the industrial countries declined from 53 per cent in 1978 to 43 per cent by 1985. Efficiency measures employed in industrial nations were also working to depress the demand for oil. By 1985, the United States was 32 per cent more oil efficient than it had been in 1973, and saved 2 million barrels per day (mb/d) as a result. Japan became 51 per cent "oil-efficient" over the same period. By 1983, the oil consumption in the non-communist world had dropped by 6 mb/d below their 1979 level. On the other hand, there was a 4 mb/d increase in the supply of non-OPEC producers in the same period. Besides that, there were

tremendous inventory build-ups by the oil companies. Altogether, these trends resulted in a fall of 43 per cent in OPEC's production from its 1979 level, that is the equivalence of 13 mb/d (Yergin, 1992).

Table 5.1 and Figure 5.1 exhibit the main story of oil price fluctuations during the period 1955-1992 and 1960-1992 respectively. Inspection of the oil price developments reveals a downward slope beginning from 1955, and ending in 1970, with prices starting to rise in 1970 and then rising sharply in 1974 following the oil embargo.

### **5.3. A Comparison Between the Degree of Fluctuation in Oil Prices and in Prices of Other Primary Commodities**

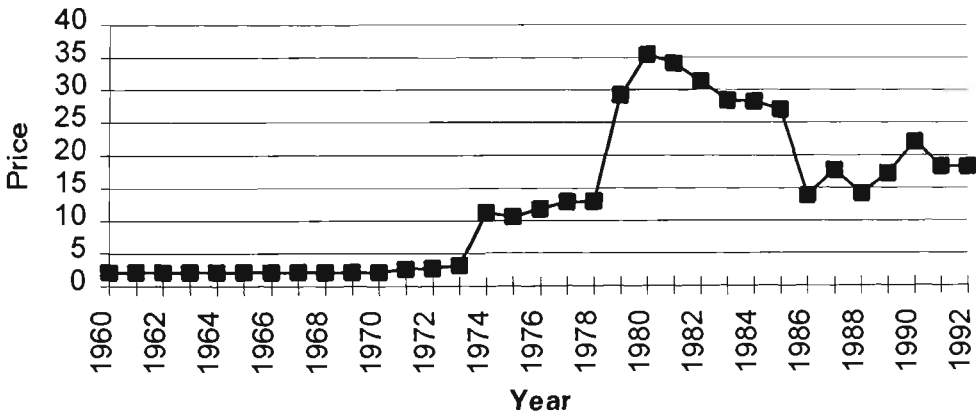
To study the variations in the price of commodities, the coefficients of variation for each commodity have been calculated (Table 5.2). Regression analysis has also been used to compare the proportionate changes in oil prices with those of other primary commodities (Table 5.3). During the period 1955-69, the greatest variation was in the price of soybeans. The price variations of oil in the same period was ranked 13th among 28 selected commodities. This picture was completely upset during 1970-82, the period of high oil price rises, when the coefficient of variation in oil prices ranked first. The price variations of oil during 1983-92, a period of oil recession, was 9th among other commodities. However, during the entire period 1955-92, oil prices suffered more fluctuations than any other primary commodity as can be seen from the size of its coefficient of variation.

**Table 5.1 Average Annual Price of Oil 1955-1992**

Year	US\$/Barrel	Year	US\$/Barrel	Year	US\$/Barrel
1955	1.93	1968	1.30	1981	32.50
1956	1.93	1969	1.28	1982	33.47
1957	1.86	1970	1.30	1983	29.31
1958	1.83	1971	1.65	1984	28.27
1959	1.56	1972	1.90	1985	26.98
1960	1.50	1973	2.70	1986	13.82
1961	1.45	1974	9.76	1987	17.79
1962	1.40	1975	10.72	1988	14.15
1963	1.40	1976	11.51	1989	17.19
1964	1.33	1977	12.42	1990	22.05
1965	1.33	1978	12.70	1991	18.30
1966	1.33	1979	17.26	1992	18.22
1967	1.33	1980	28.67		

Source: (IMF) International Financial Statistics Year-book 1984-1992

**Figure 5.1: Average Annual Prices of Oil 1960-1992**



**Table 5.2 Price Variation of Commodities 1955-92 (Coefficients of variation)**

Commodity	1955-69	1970-82	1983-92	1955-92
Aluminium *	0.05077	0.39299	0.30289	0.53661
Beef *	0.23462	0.29780	0.08158	0.45929
Coal **	-	0.48034	0.10624	0.35581
Coconut	0.13132	0.41123	0.46229	0.47309
Coffee Brazil	0.19856	0.54928	0.37051	0.67522
Copper UK	0.35899	0.23706	0.30449	0.42777
Cotton US	0.19789	0.31109	0.10227	0.33723
Iron Ore	0.18692	0.23031	0.11979	0.26328
Jute ***	0.21175	0.13568	0.25781	0.25495
Lamb *	0.10117	0.40277	0.12389	0.53381
Lead UK London	0.22353	0.46771	0.26401	0.54423
Maize	0.06562	0.30995	0.16559	0.41310
Nickel	0.12561	0.27315	0.51384	0.73138
Oil	0.16029	0.84281	0.28805	1.02773
Phosphate Rock	0.08888	0.54383	0.10095	0.59274
Polywood **	-	0.37294	0.23531	0.41430
Rice	0.10548	0.33640	0.08906	0.39559
Rubber	0.21031	0.41992	0.09794	0.35523
Sorghum **	-	0.27694	0.16392	0.23149
Soybeans *	1.54024	0.28249	0.13303	0.41801
Sugar Caribbean	0.49841	0.66981	0.37333	0.83946
Superphosphate **	-	0.56830	0.08505	0.42565
Tea	0.11490	0.33102	0.24434	0.31764
Tin All Origins	0.24065	0.50965	0.32830	0.68060
Tobacco	0.13880	0.29546	0.06460	0.45543
Wheat *	0.05512	0.33931	0.13588	0.41978
Wool	0.15460	0.34082	0.18743	0.38706

Source: Data from (IMF) International Financial Statistics Yearbook 1992,

\* 1957-92

\*\* 1970-92

\*\*\* 1957-90

The proportionate changes in oil prices and those of other primary commodities were estimated using the model

$$\ln P_{it} = b_0 + b_1 t + \mu_t$$

The regression results (Table 5.3) suggest that during 1955-69, oil prices were ranked in terms of percentage decline (3.2 per cent) as fourth after cotton, rubber, and jute.

The results in Table 5.3 also suggest that the prices of all commodities under study

increased during the period 1970-82. However, oil prices enjoyed the highest rate of increase (28.29 per cent). The rate of increase in oil prices was at least double that of any other commodity.

Table 5.4 gives the ranking of the rate of change in oil prices from 1955 to 1992 compared with that of the other 28 commodities. During the periods 1955-69, oil ranked 24th in terms of the rate of change in its prices compared with other commodities under study. However, oil ranked first in terms of the rate of increase in its prices during the period 1970-82. The ranking was reversed once again during the period 1983-1992. As for the whole period, 1955-92, oil enjoyed the highest rate of increase in prices (10.27 per cent).

The overall results suggest that oil prices experienced the highest degree of fluctuation amongst primary commodities during the period 1974-92. After the sharp increase in the price of oil in the mid 1970s and early 1980s, economists and policy makers predicted a 2-3 per cent annual increase in real term towards the end of century or beyond. However the sharp decline in oil prices since 1983 came as a surprise to the oil experts, although, theoretically, it clearly supports the cartel dominance model, discussed in the next section.

**Table 5.3 Proportional Rates of Changes in Commodity Prices 1955-92****Model:**  $\ln P_{it} = b_0 + b_1t + \mu_t$  .

Commodity	1955-69	1970-82	1983-92	1955-92
Aluminium *	0.87	8.30	4.14	4.36
Beef *	5.38	6.03	2.07	4.73
Coal **	-	4.55	-0.28	5.48
Coconut	0.05	5.0	-9.03	2.07
Coffee, Brazil	-2.43	13.17	-9.82	-1.08
Copper UK	5.26	2.79	9.23	3.46
Cotton US	-4.24	7.84	0.43	2.24
Iron Ore	-3.83	5.62	2.81	1.62
Jute ***	0.49	0.12	1.56	1.86
Lamb NZ *	1.32	0.86	3.84	5.22
Lead UK	0.21	9.27	7.44	3.71
Maize	0.37	4.30	0.61	3.26
Nickel	2.43	6.60	12.28	5.53
Oil	-3.20	28.29	-5.85	10.27
Phosphate Rock	-1.50	11.95	1.94	4.33
Polywood **	-	8.93	7.59	6.56
Rice	-0.49	6.94	0.93	2.92
Rubber	-3.94	10.18	-0.24	1.98
Sorghum **	-	6.34	1.59	1.93
Soybeans *	1.42	6.50	-0.43	3.79
Sugar	-3.20	7.24	9.52	3.96
Superphosphate **	-	8.62	1.00	3.10
Tea	-2.24	7.35	-4.22	1.66
Tin	4.67	13.93	-9.76	5.20
Tobacco	2.79	7.25	-0.41	4.10
Wheat US *	0.20	8.04	-0.8	3.52
Wool ANZ	-1.69	8.92	0.79	2.77
Zinc UK	1.77	6.19	8.35	5.60

Source: Data base provided by (IMF) International Financial Statistics Year-book 1993

\* 1957-92

\*\* 1970-92

\*\*\* 1957-90

**Table 5.4 Rank in Terms of Proportional Changes in Commodity Prices 1955-92**

Commodity	1955-69	1970-82	1983-92	1955-92
Aluminium	10	10	7	9
Beef	1	21	10	8
Coal	2	24	20	5
Coconut	16	23	26	22
Coffee, Brazil	23	3	28	28
Copper UK	3	26	3	16
Cotton US	28	12	18	21
Iron Ore	26	22	9	27
Jute	11	28	13	25
Lamb NZ	9	27	8	6
Lead UK	13	6	6	14
Maize	12	25	17	17
Nickel	6	17	1	4
Oil	24	1	25	1
Phosphate Rock	19	4	11	10
Polywood	15	7	5	2
Rice	17	16	15	19
Rubber	27	5	19	23
Sorghum	18	19	12	24
Soybeans	8	18	22	13
Sugar	25	15	2	12
Superphosphate	22	9	14	18
Tea	21	13	24	26
Tin all origins	4	2	27	7
Tobacco	5	14	21	11
Wheat US	14	11	23	15
Wool ANZ	20	8	16	20
Zinc UK	7	20	4	3

Source: data base provided by (IMF) International Financial Statistics Year-book 1993

#### 5.4. The Structure of the Oil Market

The pre-1970s oil market was dominated by international companies, and oil trade tended to be characterised by long term contracts and low prices. The picture changed in the 1970s and 1980s when the share of the market controlled by the major oil companies declined until it vanished completely as OPEC members took full control of their oil resources. This transformation led to competition in the world oil market, and as a result, spot markets developed. The international oil market has continued to change significantly over the past ten years. Many of the changes are the



result of market forces operating on both demand and supply, which will be discussed briefly later. The latest structural movement in the world oil market is the downstream integration by some OPEC states such as Kuwait, Venezuela, and Saudi Arabia. The reasons for involvement of OPEC's in downstream activities were words summarised by Jaidah in the following words:

We in OPEC are indeed engaged in a race against time to develop our economies, and it is for this reason that the member countries have turned their attention to downstream operations. OPEC member countries have no alternative but to increase their involvement in downstream operations in order to pull themselves out of their state of underdevelopment within the lifetime of their hydrocarbon resources (Jaidah, 1982).

It is often argued that the main parameters on which industrial investment in developing countries is based can be found in one or more of the following:

- (1) To utilise an indigenous raw material and to improve the value added
- (2) To create new employment opportunities
- (3) To help in the learning process and the publication of new technologies
- (4) To substitute for imports from abroad
- (5) To encourage development of new region of the country concerned and to induce further related industrial activities
- (6) To reduce the heavy dependence on foreign supplies and to create a measure of self-reliance.

#### **5.4.1. Changes in World Demand of Oil**

The demand for oil is affected mainly by economic growth and changes in oil prices. The sharp and sudden increase in oil prices since late 1973 led to a switch to other fuels and effective conservation efforts by oil importers. Since oil prices are the major determinant of world oil demand, the relationship between demand and prices can be broken into four different periods. From 1950 to 1973, oil prices were low, so

oil demand grew rapidly. The high price during the period 1974 to 1979 resulted in a relatively stable oil demand. From 1979 to 1983 oil demand declined dramatically due to the second price shock. From 1984 to early 1990, oil demand started to rise following the price collapse in 1986.

**5.4.2. Changes in World Supply of Oil**

The price increases of the 1970s have led to a rise in non-OPEC oil output, particularly from Norway, the United Kingdom, Mexico, Egypt, Oman, Malaysia, Brazil, and Colombia. As shown in Table 5.5, the share of non-OPEC production in world supply has jumped from 44 per cent in 1973 to 71 per cent in 1985. This increment was at the expense of OPEC's market share. Although the decline in oil prices has slowed the increase, non-OPEC output still presents strains on OPEC and its ability to control the market.

**Table 5.5 Share of World Oil Production (mb/d)**

Please see print copy for image

Source: OPEC Annual Statistical Bulletin, 1992, p.15

Due to the sharp rise in oil prices since late 1973, some thirty seven non-OPEC producers either expanded output or commenced commercial production. Thus the future of non-OPEC producers is critical to both OPEC, and themselves. Their weight is increasing. Their total production and market share are now higher than that of OPEC. The non-OPEC producers can no longer afford to hold different policies in a market in which they exercise considerable influence (Parra, 1989).

The slack in the oil market and the increase in non-OPEC oil production, resulted in a sharp decline in OPEC output. The heavy burden fell more on Saudi Arabia, which officially became OPEC's "swing producer". However, when Saudi Arabia abandoned its role of swing producer in September 1985, determination of oil prices was left to the market mechanism, which led to the price collapse of 1986.

### 5.5. The Market Model

The oil market is an oligopoly, where there is a small number of producers, each of whom can affect the price. Consequently, each producer must consider the competitors' reaction when planning output and price policy. This oligopoly consists of a dominant cartel and a numbers of non-cartel producers (see Appendix 5.1).

The concept of price leadership seems to fit the oil market well. OPEC plays the role of the dominant firm. It sets its output and price in order to maximise its profit, and expects the other producers to follow this price and adjust their output accordingly. OPEC has been more often branded as a cartel, which is generally seen to have the following characteristics.

- (1) Fixing the group's output and/or price.
- (2) Redistribution of income among members of the cartel.
- (3) Enforcing audit through rewards and penalties.

However, OPEC's role as a cartel was weak for many reasons, the main ones being:

(1) Presence of radical members in the market who would not go along with OPEC. This was the case with Iran in 1983.

(2) The entry or potential entry of strong competitors into the market. Mexico, Norway, and the United Kingdom have all refused to join OPEC after discovering large amounts of oil in their territories.

(3) Frequently changing supply and demand conditions that make the cartel price structure obsolete. OPEC's struggle to maintain the cartel price in the face of world wide increase in the supply of oil and decrease in demand provides a good example. One OPEC country minister stated in 1981, that the Organisation had lacked the defined rules of the cartel. However, after 1981, OPEC was increasingly guided by the cartel model to protect the world oil price structure from a possible collapse (Mikdashi, 1986).

(4) OPEC consists of a heterogeneous group of countries. Some members have a low resource base and a large population. (e.g. Nigeria, Indonesia, Algeria, and Venezuela), while others (Saudi Arabia, Kuwait, United Arab Emirates, and Qatar) are rich under-populated countries. In 1984 the estimated population of the second group represents a mere 4% of the total population of OPEC. Yet these countries account for almost half of the organisation's oil production in 1985. Ideally, the first group would want to increase the price through OPEC and restrict the output, while the second group would try to conserve its main asset.

(5) OPEC members started with vastly different levels of oil reserves and financial needs. Thus, the price policy acceptable to some members was not necessarily acceptable to another.

### **5.5.1. The Decline in OPEC's Market Share**

A combination of forces has transformed the world oil market and underscored OPEC's lack of control over the international price setting mechanism. First, the higher price level prevalent in the 1970s made production in various high cost areas around the globe competitive. The resulting rise of non-OPEC producers has been the most important factor in diminishing OPEC's role. Oil output in the capitalist world outside OPEC rose from 16.8 mb/d in 1973 to 23.3 mb/d in 1983 and 24.1 mb/d in 1984. The new producers were charging the highest prices in the world market throughout the 1970s. In order to reduce OPEC's influence and to increase

supply security, Western oil firms and traders were inclined to purchase oil from non-OPEC rather than OPEC exporters. The second factor responsible for the reduction in OPEC's share has been the shrinkage of the world market. Oil consumption in the non-communist world dropped 13 per cent between 1979 and 1983. A third factor contributing to the destabilisation of OPEC's position and the reduction of oil price stability has been the rise of short term trading on spot and futures markets. The share of spot market trading has increased from 5 per cent in 1979 to an estimated 45-50 per cent at present. Finally, erratic build-ups and drawdowns of company owned oil stocks have had an overwhelming impact on price movements. For example, destocking in January and February 1983 (which was equivalent to 40 per cent of OPEC oil output) precipitated OPEC's March 1983 price cut (Renner, 1988).

OPEC members contributed 56 per cent of world oil production and exported about 96 per cent of that oil in international markets in 1973. This significant market share gave them a monopolistic power. To maintain this power, OPEC behaved as a cartel. However, OPEC's share in world oil production has fallen drastically over recent years and it was only 29 per cent in 1985 (Mikdashi, 1986).

The real trouble is that OPEC applied its monopoly power and set very high market prices following the oil embargo in 1973. However, the high prices induced relatively less efficient producers to start or expand production and gradually increase their market shares. As a result, the total supply has increased. Given the relatively stable demand for oil, prices went down sharply. The effect of the Iraq-Iran war checked this decline between 1981 and 1985. The incidental oil shortage due to tanker wars and continuous attacks on oil transportation from Persian Gulf, is part of this reasoning (Franssen, 1989). Many observers regarded the price decline after 1981 as a bucket of cold water. *The Petroleum Intelligence Weekly* (PIW) reported that:

companies find themselves in a position not experienced for almost twenty years: spoiled for choice ( Renner, 1988, from, PIW July 16,1990:E1).

The main problem of OPEC is that before 1973, oil prices were too low (less than US\$2 a barrel) . The marginal cost of many oil fields was too high to justify economic production. When OPEC raised the prices sharply in 1973, 1979 and 1982, production in many oil fields became economical. Hence the supply of non-OPEC producers increased, and this reduced the market share of the cartel. Thus, OPEC lost its power and oil prices declined sharply.

If we assumed market power to be given by  $\frac{P - MC}{P}$ , where  $P$  = price and  $MC$  = marginal cost, it would be possible (see appendix 5.1) to express the cartel's market power by the following relationship:

$$\frac{P - MC}{P} = \frac{C_K}{\eta_D + \eta_S(1 - C_K)}$$

This relationship states that monopoly power varies positively with the dominant cartel market share ( $C_K$ ) and negatively with the elasticity of supply of the non-cartel firms ( $\eta_S$ ) and the elasticity of market demand ( $\eta_D$ )

The sharp oil price rise in 1973 has caused a significant rise in price elasticity of demand for oil. Energy conservation, oil storage building, rising energy efficiency, development of energy alternatives in the developed countries, have also contributed to the rise in the price elasticity of the demand for oil. This rise, combined with the reduction in OPEC's market share ( $C_K$ ), have resulted in a significant decline in OPEC's market power as can be inferred from the above relationship.

Faced with a downward slide in their market share and in oil prices, OPEC members have expressed threats of price wars to persuade non-OPEC producers (particularly, the United Kingdom and Norway) to reduce their levels of production below full capacity (Mikdashi, 1986).

## **5.6. Impact of Fluctuations in Oil Prices on Development of Oil Exporting Developing Countries**

The discovery of oil in most developing countries in the 1930s and the 1940s changed the economies of these countries from ones suffering capital shortage to capital-surplus economies. Some oil exporting states became aware of the significance of this energy resource to their national development in the late 1940s and during 1950s. Oil exports became the major source of revenue and oil production dominated the GDP's of these economies, as can be seen from the data in Table 5.6. Many oil exporters were concerned about "over dependence" on oil exports as the main source of national income. This resulted in the initiation of various industrial development programs in the oil exporting countries aiming to diversify their economies. Fluctuations in the oil revenues had a serious impact on government expenditure in the oil-based economies and on their development plans. In some situations the sharp decline in oil prices after 1982 resulted in substantial domestic and external deficits and a sharp decline in the economic growth of these economies.

Adelman states the problem as follows:

The producing governments cannot wait because their economies are so dependent on oil. "Non-oil" sectors exist mostly to serve the oil sector and those who draw oil income. This was true even in Kuwait, where earnings from foreign assets became substantial. Elsewhere, there is little additional income from the hundreds of billions spent on weapons; infrastructure; subsidised industries; or subsidised agriculture depleting fossil water deposits at ever rising cost, to export wheat costing eight times the world price. Undiversified owners of oil deposits cannot easily cope with fluctuating incomes (Adelman, 1990).

**Table 5.6 Oil exports as % of total commodity exports and % of GDP**

Year	Country			
	Iran	Kuwait	Saudi	Algeria
			Arabia	
	OX/TX	OX/TX	OX/TX	OX/TX
	OX/GDP	OX/GDP	OX/GDP	X/GDP
1960	85.3	88.9	99.7	NA
	7.18	NA	NA	NA
1965	87.2	58.7	99.6	77.0
	15.8	68.7	46.4	16.0
1975	97.1	92.7	99.6	92.0
	41	80.4	74.5	30.0
1979	96.0	92.1	92.4	92.5
	27.8	79.3	79.3	26.0
1984	98.6	86.2	93.3	75.0
	13.7	59.8	35.6	19.5

Source: Data base *IMF International Financial Statistics*, different issues

Notes: OX/TX = Oil Exports as % of Total Exports

OX/GDP = Oil Exports as % of GDP

NA = Not available

Shrinking production and declining prices after 1982 have led to a considerable contraction in oil income. OPEC revenues declined 43 per cent from US\$281 billion in 1980 to about US\$159 billion in 1984. As one analyst expressed it:

Red ink splashed over the current account balance sheet of most member countries, throwing their economies and development programs into disarray (Renner, 1988).



## **5.7. Summary and Conclusions**

The findings of this chapter may be summarised as follows:

Oil prices proved to be much more volatile than the price of most other primary commodities. The analysis in this chapter has shown that oil prices were ranked 13th among 28 selected commodities in terms of variation during the period 1955-69. This picture was completely reversed during the period 1970-82. The coefficient of variation in oil prices during that period was the largest among primary commodities. The story was different once again during the period 1983-92, when variations in oil prices were dropped in rank to 9th among other commodities. The results of the analysis also showed that during the period 1955-69, oil prices were ranked in terms of percentage decline (3.2 per cent) as fourth after cotton, rubber, and jute. However, oil prices enjoyed the highest rate of increase (28.29 per cent) among all primary commodities during the period 1970-82. The analysis also showed that OPEC market power has been substantially reduced due to the increase in non-OPEC market share and the rise in the price elasticity of demand for oil.

## Appendix 5.1

The dominant cartel model indicates that, an increase in market share of the dominant cartel increases its monopoly power as measured by the price- cost margin relationship:  $\frac{P - MC}{P}$

**Proof:** Let us assume that we have an industry consisting of  $n$  firms;  $k$  of them is a dominant cartel. The reminder  $n-k$  firms are competitive firms who act as price-takers.

Let  $P$  = market price

$S(P)$  = the supply of the price taker, assumed to be upward-sloping

The dominant cartel selects a price,  $P$  to maximise its profit, given  $S(P)$ .

$Q(P)$  = total market demand

$X(P)$  cartel net demand, where  $X(P) = Q(P) - S(P)$  (1)

Differentiating this with respect to  $P$ , then

$$X'(P) = Q'(P) - S'(P) \quad (2)$$

Multiplying both sides of equation (2) by  $\frac{P}{X}$ , then

$$X'(P) \frac{P}{X} = Q'(P) \frac{P}{X} - S'(P) \frac{P}{X} \quad (3)$$

Define  $\eta_X$  as the elasticity of demand of the cartel, where

$$\eta_X = -\frac{dX}{dP} \frac{P}{X}$$

$$\eta_X = -X'(P) \frac{P}{X} \quad (4)$$

Define  $\eta_D$  as the elasticity of total demand, where

$$\eta_D = -\frac{dQ}{dP} \frac{P}{Q}$$

$$\eta_D = -Q'(P) \frac{P}{Q}$$

By multiplying through by  $\frac{Q}{X}$ , then

$$\eta_D = -\eta_D \frac{Q}{X} = Q'(P) \frac{P}{Q} \frac{Q}{X} = Q'(P) \frac{P}{X} \quad (5)$$

Define  $\eta_S$  as the supply elasticity of the competitive firms, then

$$\eta_S = \frac{dS}{dP} \frac{P}{S}$$

$$\eta_S = S'(P) \frac{P}{S} \quad \text{and multiplying through by } \frac{S}{X} :$$

$$\eta_S \frac{S}{X} = S'(P) \frac{P}{S} \frac{S}{X} = S'(P) \frac{P}{X} \quad (6)$$

Substituting (4), (5) and (6) into (3):

$$-\eta_X = -\eta_D \frac{Q}{X} - \eta_S \frac{S}{X} \quad \text{or} \quad (7)$$

$$\frac{1}{\eta_X} = \frac{1}{\eta_D \frac{Q}{X} - \eta_S \frac{S}{X}} \quad (8)$$

The objective of the dominant cartel is to maximise its profits in relation to the net demand curve  $X(P)$ .

When profit is maximised  $MR_K = MC_K$

Since,  $R = PX$ , then  $MR_K = \frac{dR}{dX}$

$$= \frac{dP}{dX} X + P$$

$\therefore \frac{dP}{dX} X + P = MC_K$  when profit is maximised

and  $MC_K - P = \frac{dP}{dX} X$

$$\frac{MC_K - P}{P} = \frac{dP}{dX} \frac{X}{P}$$

$\therefore \frac{P - MC_K}{P} = -\frac{dP}{dX} \frac{X}{P}$  or

$$\frac{P - MC_K}{P} = \frac{1}{\eta_X} \quad (9)$$

Substituting (11) and (13) and (10)

$$\frac{P - MC_K}{P} = \frac{1}{\eta_D \frac{Q}{X} + \eta_S \frac{S}{X}} \quad (10)$$

If the k-firm concentration ratio be defined as  $C_K = \frac{X}{Q}$  then

$$\frac{1}{C_K} = \frac{Q}{X} \quad (11)$$

Also,  $\frac{S}{Q} = \frac{Q - X}{Q}$   $\frac{S}{Q} = 1 - \frac{X}{Q}$

Multiplying both sides by  $\frac{Q}{X}$  then

$$\text{Substituting (11) into (12)} \quad \frac{S}{Q} \frac{Q}{X} = \frac{Q}{X} - 1 \quad (12)$$

$$\frac{S}{X} = \frac{1 - C_K}{C_K} \quad (13)$$

Substituting (8) into (9)

$$\frac{P - MC_K}{P} = \frac{1}{\eta_D \left( \frac{1}{C_K} \right) + \eta_S \left( \frac{1 - C_K}{C_K} \right)}$$

or,

$$\frac{P - MC_K}{P} = \frac{C_K}{\eta_D + \eta_S (1 - C_K)} \quad (14)$$

According to equation (14), the price-cost margin of the dominant cartel (which is an indicative of its monopoly power) varies positively with  $C_K$  and negatively with  $\eta_D$  and  $\eta_S$ . Thus any market changes which tend to increase  $C_K$  (the dominant cartel's concentration ratio) and leave  $\eta_S$  and  $\eta_D$  relatively unchanged will lead to a rise in price-cost margin. Or, conversely, increase in market share by the competitive firms outside the cartel weakens the monopoly power of the dominant cartel, which what seems to have happened in the case of OPEC.

# Chapter 6

## Exports and Growth: A Theoretical Survey

### 6.1. Introduction

The problem of the growing gap between the rich and poor countries has led to a sharp increase in the attention focused by the economists and policy makers on the question of the relationship between exports and economic growth. A considerable amount of theoretical literature, accompanied by a substantial number of empirical investigations, emphasise the role of exports in the growth of the economy.

The view that economic growth is export led has a long history and many interpretations. The term “export-led growth” was introduced by Charles Kindleberger (1962). Both Robertson (1938) and Nurske (1961) concluded that “trade was an engine of growth” in the nineteenth century. A new version of the export-led growth is the staple theory of growth (Watkins, 1963). According to this version of growth theory exports of primary products promotes the growth of the rest of the economy. These exports induce a higher rate of domestic saving, attract the inflow of factor inputs into the expanding export sector, and establish linkages with other sectors of the economy (Choi, 1983, p. 120).

### 6.2. Export-led Growth Models

There are substantial grounds for believing that exports are a key factor in promoting economic growth. The tenet of export-led growth hypothesis is in line with economists’ general conception of the nature of economic growth. Exports contribute to economic growth directly through their contributions to GDP, and indirectly, through their contributions per medium of spread or carry-over effects. The indirect contribution to growth embraces Hirschman-type linkages. These linkages embody various beneficial

aspects of exports such as greater capacity utilisation, economies of scale, incentives for technological improvements, efficient management plus various other intra-and inter-sectoral spread and spill-over effects. Those linkages can be broadly considered as operating through a sequence of multiplier-accelerator mechanisms. Theoretically, indirect contributions or spread effects can continue to accrue long after some export stimulus has occurred (Tamascke, 1980). The overall impact of a stimulus on the economy has many determinants including technology, the propensity to import, the extent to which investment opportunities generated are accepted domestically, and the ability to attract foreign factors. Provided that investment opportunities generated by the export sector are exploited, it is predicted that economic growth will be a process of diversification about an export base (Tamascke 1980, 1988; Metwally & Tamaschke 1980). There are strong logical and empirical grounds supporting the hypothesis that exports are a key factor in the growth process. The logical ground is that exports have both direct and indirect effect on the economy. As for the direct benefits it can be argued that:

(1) An increasing level of exports generally increases the level of imports. These imports include capital goods which are needed for economic growth. As well, the exporting country is able to take greater advantage of the international division of labour, procuring desired goods from abroad at considerable savings in terms of inputs of productive factors. This helps increase the efficiency of industry, which is a major factor in economic growth.

(2) Export development generally tends to concentrate investment in the most efficient sectors of the economy - those in which the country enjoys a comparative advantage. Specialisation in the products in which the country has a comparative advantage increases productivity.

(3) The exporting country also gains from economies of scale, since the international market added to the domestic market obviously permits more large-scale operations than does the domestic market alone.

(4) The necessity of remaining competitive in international markets tends to maintain pressure on the export industries to keep costs low and to strive constantly for more efficient operations. The competitive pressures also tend to lead to improvements in the quality of the export product, and in general to inhibit the establishment of inefficient export industries.

In addition to direct benefits of providing part of the capital for economic development, and stimulating more efficient use of resources, a dynamic export sector also produces substantial secondary benefits. These can be summarised as:

(1) Export growth leads to increased investment, consumption and the flow of technology. Profitable export industries tend to stimulate additional investment, both domestic and foreign. When exports of a primary product are profitable and expanding, there is a stimulus to domestic investment in both the existing industries and in the various processing industries associated with the product in its various stages of production.

(2) Expanding exports also encourages investment in ancillary industries set up to supply and service the operations of the main export industry. A rapid growth in exports also serves as an inducement to foreign investment in the country, particularly where the investment climate is advantageous from the viewpoint of foreigners.

(3) A growing export sector also encourages an increased flow of technological and market innovations, as well as managerial skills. Under the pressure of competition



and the desire to continue expanding foreign sales, foreign techniques and methods are imported to improve productivity and quality further. This is beneficial for both the domestic exporter and the foreign importer, the latter often pressing for the new techniques in order to improve his own sales and profit position.

(4) A growing export sector also serves as an indirect stimulus to increased consumption. As consumers become gradually aware of the foreign consumer products that they can obtain because of expanded export earnings, there is a kind of "demonstration effect" wherein individuals decide to increase their expenditures when they become aware of the existence of a large variety of goods or of superior goods. All of these factors tend to reinforce each other, stimulating further expansion of exports, investment and consumption. The result is a substantial rate of growth in real gross national product (Emery, 1967).

In general, the stimulation provided by exports to the domestic economy may be expected to be lower in underdeveloped countries than in developed countries due to the weakness of the institutional framework that transmits the incentives for induced growth in the first type of economies (Syron, 1968).

The relative merits of export promotion strategies have received substantial attention in the development literature. The earlier years of the post-war period were characterised by a demise of the role of exports in the development process, and import substitution was instead supposed to be essential. In 1970s, the bias appeared to be shifting, with an increasing larger role granted to exports again (Michaely, 1977).

Kindleberger is one of the first modern economists to discuss the impact of foreign trade on economic growth. Kindleberger (1962b, p.195) defines trade as a "leading sector" when, exports rise and contribute an incentive to the establishment and expansion of

other activities. The basic characteristic of Kindleberger's export-led growth model is that an increase in foreign demand for a country's exports will stimulate the country's domestic growth. When the economy is at full employment, export expansion increase income, which will further be expanded through greater saving and investment. On the other hand, if the economy is operating below the full employment level, expanded exports will allow resources to be drawn into productive uses. With or without full employment, expanded exports permit firms to take advantage of decreasing costs through economies of large-scale production. If exports increase continuously over time, they serve to raise the growth rate of the economy. The examples of export leading growth quoted by Kindleberger are Britain in nineteenth century, Sweden and Denmark after 1880, Switzerland, and Canada from 1900 to 1913, and Canada after 1945 (Choi, 1983, p.122).

The resurgence of faith in exports was in part due to a series of studies beginning with Little *et al* (1970), which concluded that countries heavily reliant on import-substitution policies grew significantly less than countries whose policies were less discriminatory toward exports. Several authors, including Michaely (1977), Michalopoulos and Jay (1973), Balassa (1978, 1985), Tyler (1981), Feder (1982), and Kavoussi (1984, 1985) among others, have empirically investigated the association between growth of exports and aggregate output (Shamra, 1991).

Part of the empirical support for export-promotion policy conclusion has been provided by the statistically significant correlation found between export expansion and output growth by the above mentioned contributors. Further, in-depth analysis of individual country's experiences has provided extensive support for export promotion as an effective development strategy. This analysis is typically generated by adding a measure of export performance to the cross country regression of GDP growth on proxy variables

for employment and capital-stock growth rates. In these studies, the estimated coefficient of the export is always found to be positive and statistically significant.

More recent tests, based on Granger's (1969) and Sims (1972) concepts of causality, do not yield such uniform support. A study by Jung and Marshall (1985), which focuses on aggregate growth and uses a Granger causality test reveals no consistent pattern. From a total of 37 countries, only four show causality from export growth to economic growth (Bahmani, 1990).

### **6.3 Previous Empirical Studies**

Results of various studies employing some form of the export-led growth model suggest that it has proved quite useful for explaining variations over time in the rate of aggregate growth of certain groups of countries or regions. Table 6.1 summarises the overwhelming empirical support for the export promotion hypothesis. These studies are cross sectional and time series. Almost all of them regress a growth variable on an export variable. The uniformity of the results appears to provide considerable evidence in favour of a relationship between exports and growth.

Emery (1967) tested the relationship between trade and economic growth for 50 countries of all types (developed and developing, low income, middle income and high income) for the period 1953-63. He regressed real GNP against deflated exports and current account earnings. GNP data were converted to a per capita basis, on the ground that, population growth itself, especially in agricultural countries, has a great impact on the growth of the economy. The results showed a significant correlation between exports and GNP, and current account and GNP. The main conclusion of this study is that higher rates of economic growth tend to be associated with higher rates of export growth.

**Table 6.1 Previous Empirical Studies of Exports and Growth**

Study	Data Set	Econometric Technique
Emery (1967)	cross country (50) (1953-63 avg.)	OLS (GNP on exports)
Maizels (1968)	cross country (9) time series (1950-62)	OLS (GDP on exports)
Voivodas (1973)	cross country (22) time series (1956-67)	OLS (GDP growth on exports share)
Michaely (1977)	cross country (41) (1950-73)	Spearman rank corr. (per capita GNP growth on growth of export share)
Balassa (1978)	cross country (10) (1960-66, 1967-73)	OLS (GNP growth on export growth or real export growth)
Williamson (1978)	cross country (22) time series (1960-74)	OLS (change in GDP on lagged exports)
Fajana (1979)	time series (1954-74) Nigeria	OLS (GDP growth on export share or export change/output)
Metwally, Tamaschke (1980)	cross country (6) time series (1960-80)	OLS (GDP growth on exports growth and lagged GDP growth)
Tamaschke (1980)	cross country (2) time series (1861-1900)	OLS (GDP growth on exports growth and lagged GDP growth)
Kavoussi (1981)	time series (73) (1960-78)	(Spearman rank corr.) (GNP growth on exports growth)
Tyler (1981)	cross country (2) time series (1861-1900)	OLS (GDP and lagged exports)
Feder (1983)	cross country (3) time series (1950-79)	OLS (GDP growth on export growth or export share)
Metwally and Abdel-Rahman (1984)	time series (1970-82) Saudi Arabia	OLS (GDP growth on export growth and export change output)
Tamaschke (1988)	time series (1955-83) Australia	OLS (GDP on exports and lagged GDP)
Moschos (1989)	cross country (71) time series (1970-80)	OLS (GDP on exports and lagged GDP)
Tamaschke (1990)	cross country (2) time series (1961-1983)	OLS (GDP growth on lagged exports)
Fosu (1990)	Cross country, time series (1960-80)	OLS (GDP, production function and exports)
Khan, Saqib (1993)	time series (1972-88), Pakistan	OLS and 3SLS (GDP, production function and exports)
Van den Berg and Schmidt (1994)	time series (1960-1987) (17) Latin American countries	OLS (GDP, I/GDP, labour, and exports growth)

In all cross-country studies the number of countries is given in parenthesis.

The number of time-series observations is also given in parenthesis.

OLS - ordinary least square

Source: Adopted from Jung and Marshall, (1985)

Voivodas (1973) performed a statistical analysis on 22 developing nations for the period 1956-1967 to determine the relationship between exports and growth. Dummy variables for each individual country were introduced to allow for inter-country differences in the trade and growth experience. Real GDP was regressed against exports which had been deflated by an index of export prices. The results suggested a positive and significant relationship between the proportion of exports to GDP and the rate of growth. The results also indicated that export-oriented countries had experienced a faster rate of growth than other countries.

Michaely (1977) tested the hypothesis that rapid growth in exports accelerated the economy's growth using the data for 41 countries during 1950-73. The study concluded that a significant relationship exist between the change in the share of exports in GNP and the rate of change of per capita income. Several other studies reached the same conclusion including. Maizels (1968) and Kravis (1970).

Heller and Porter (1977) paralleled Michaely's research separating the sample into "richer" and "poorer" Less Developed Countries (LDCs), and found that export and non-export output growth rates are only significantly correlated-for the relatively rich LDCs with a low exports share. Krueger (1978), in a study for the National Bureau of Economic Research on foreign trade regimes and economic development regressed GNP growth for each of 10 countries against the rate of export growth. A positive and significant relationship between the two variables was found.

Balassa (1978), re-estimated Michaely's equations incorporating the Michalopoulos-Jay factors. He found a strong relationship between exports and GNP growth for 11 countries, including those which have established an industrial base with both import-substitution and export-oriented tendencies. It was recognised that the effects on growth were understated. In fact, the results obtained by Balassa using Michaely's measure

(GNP per head over \$300), shows a higher rank correlation than that reached by Michaely. The difference may be due to the variation in sample countries chosen by the Balassa and Michaely. Feder (1982) not only found a positive correlation between exports and GNP growth, but also provided evidence to support the hypothesis that export-oriented policies both led the economy to an optimal allocation of resources and generally enhanced productivity. Williamson (1978), found that, increase of real GDP in Latin American countries during the 1960-74 period was found to be significantly related to exports, private direct investment inflows, and other foreign capital inflows.

Metwally and Tamaschke (1980), tested the impact of growth in oil exports on economic development in six oil producers in North Africa and the Middle East (namely Saudi Arabia, Iran, Kuwait, Iraq, Libya, and Algeria). They used aggregate and sectoral analysis level during the period 1960-75 within the framework of an export-led growth model. The study employed a Koyck distribution lag-scheme to determine the time lag between export growth and economic growth. The calculations were made from variables in natural logarithmic first difference form, which represents a percentage change.

They found a highly significant relationship between changes in GDP and changes in exports. To suppress the effect of rising prices and the component effect of GDP, they tested the relationships between changes in GDP and changes in exports using real values (both GDP and exports deflated by an index of import prices) and non-oil GDP. No evidence of spread effects of oil exports to the rest of the economy was found in any of the three countries, analysed, Iran, Iraq and Saudi Arabia. The sectoral regression analysis also indicated that exports did not have any effect on manufacturing output in all three countries, due to weak linkages.

Tyler (1981) analysed the relationship between export growth, industrial development, and GDP growth in 55 middle income developing countries. Of these countries, six were oil exporters which were also members of OPEC. Tyler's rationale for omitting the relatively poorer countries from his analysis was based on the hypothesis that some basic level of development is necessary for a country to most benefit from export oriented growth. Tyler found a strong inter-country evidence of positive associations between export promotion, industrial expansion, and economic growth. Success in attaining high rates of economic growth for the middle income countries is associated with industrial development. This statistical relationship was stronger still when the OPEC countries were excluded from the sample.

Kavoussi (1981) studied 73 developing countries including both low and middle income market economies during 1960-78. and investigated the bivariate relationship between exports and growth. The average annual real growth of merchandise exports was used as an index of export expansion, and the average real growth rate of GNP was utilised as a measure of economic performance. Spearman rank correlation coefficients between the two variables were calculated. The results revealed a highly significant positive correlation between exports and economic performance. Kavoussi found that higher rates of economic growth are associated with higher rates of export growth, even in a large and heterogenous sample of developing countries. It was also demonstrated that the positive correlation between exports and growth is not limited to middle income countries. In a later study, Kavoussi (1984) "reported that in low income countries export expansion tends to be associated with better economic performance," but that "the contribution of exports to factor productivity is greater among the more advanced developing countries" (Kavoussi, 1984).

In subsequent work, Balassa (1985) and Rana (1988) adopted Feder's (1982) specification regression equations. Balassa used cross section data for 43 developing

countries, averaged over 1973-79, and as Feder had found, the export variables were statistically and economically significant in explaining the growth of GNP.

Metwally and Abdel-Rahman (1982) tested the an export-led growth hypothesis for the case of Saudi Arabia for the period 1970-82 using different models (linear and log-linear, both with one and two period lag and Koyck-type lag). The regression results revealed a significant correlation between exports and GDP and between exports and non-oil GDP. The results of the sectoral analysis revealed conflicting evidence on the presence of spread-over effects. No strong evidence of spread effects were found in the agriculture, mining and transportation sectors, but there were some spread effects in the manufacturing sector.

Tamaschke (1988) studied the contribution of exports to Australian economic growth during the period 1955-83 using the "small open resource economy" model as a version of "exports as an engine of growth". The calculations were carried out both in constant and current prices and the models was tested in a logarithmic form. The regression results suggest the presence strong positive lagged relationship between changes in exports and changes in GDP and GDP per capita with lags up to four years.

Moschos (1989) examined the effect of export expansion on economic growth through an inter-country aggregate analysis of the sources of growth for 71 developing countries during 1970-80. The hypothesis that the relationship under consideration is significantly affected by the level of development, was tested within a switching regression framework. The evidence contradicts the view that the effect of export expansion is stronger on growth is stronger in advanced developing countries than among less advanced ones. Moschos emphasised that a substantial amount of inter-country evidence suggested the existence of a positive relationship between export expansion and economic growth.



Tamaschke (1990) also tested the export-led growth model in the context of Queensland and Alberta during the period 1961-83. The data were used both in current and constant prices. The study found that, the growth of exports in both Alberta and Queensland had a strong influence on both GDP and GDP per capita. Sectoral analysis by the same author suggested that the service sector is very responsive to changes in exports. There were also spread effects from exports to the manufacturing sector in both economies, which were confined to the simple processing of resources before export.

Fosu (1990) examined the affect of export growth on the rate of economic growth for 28 African developing countries over the 1960-80 period and compared the results with those of other developing countries. He used a model in which the growth of GDP was regressed on labour, capital formation and export growth. The results suggested that exports exert a significant effect on the performance of African developing countries, but the export impact was somewhat smaller for African countries than for other LDCs.

Khan and Saqib (1993) conducted a test to analyse the relationship between export performance and economic growth in the case of Pakistan between 1972-88. They used single and simultaneous equation models comprising equations for export and economic growth. Total exports were divided into primary and manufactured goods. The study concluded that there is a strong relationship between export performance and GDP growth. The disaggregation of exports revealed that the marginal contribution of primary goods exports on GDP growth is higher compared to manufacturing exports.

Van den Berg and Schmidt (1994) investigated the relationship between the exports and output growth in 17 American Latin countries over the period from 1960 to 1987 using time series data. They used a model in which the growth of real GDP is regressed against the ratio of investment to GDP, growth of labour and growth rate of real exports. The results of this analysis point to a positive long-run relationship between export

growth and economic growth. The growth rate of exports has a significant effect on the rate of economic growth in twelve of the seventeen countries in the sample. The not significant cases are quite possibly due to exceptional circumstances and hence do not refute the hypothesis of a positive relationship between trade and growth.

#### **6.4. Summary**

There are substantial grounds for believing that exports are a key factor in promoting economic growth. Exports contribute to economic growth directly through their contributions to GDP, and indirectly, through their contributions per medium of spread or carry-over effects. The direct effects help to increase the efficiency of the industry, to invest in the most efficient sector of the economy, to gain from economies of scale, and force the industry to be competitive in international markets. The indirect contribution to growth embraces Hirschman-type linkages. These linkages embody various beneficial aspects of exports such as greater capacity utilisation, economies of scale, incentives for technological improvements, efficient management plus various other intra-and inter-sectoral spread and spill-over effects.

## **CHAPTER 7**

### **Effect of Oil Exports on Aggregate and Sectoral Development in Iran 1960-92**

#### **7.1. Introduction**

The Iranian economy could be described as an oil-based economy, in which oil exports act as the principal source of revenue and economic growth. Due to the fluctuations in oil prices and the level of oil production, the growth of the Iranian economy has not been very stable over the three past decades. This chapter empirically investigates the effect of oil exports on Iranian GDP and on various economic sectors over the period 1960-92. This period coincides with the occurrence of major political and socio-economic changes in Iran as well as the fluctuations in the international oil market. As an example, social reforms especially land reform, were initiated in 1960 under the Shah. The period 1960-92 was also characterised by social events which led to the Iranian revolution in 1979, and the Iraq-Iran war which took place during the period 1980-88. The chapter is organised as follows. Section two presents the hypothesis of the study, while section three discusses the methodology. Section four describes the models tested and the sources of data. The econometric results are summarised in section five.

#### **7.2. The Hypothesis of the Study**

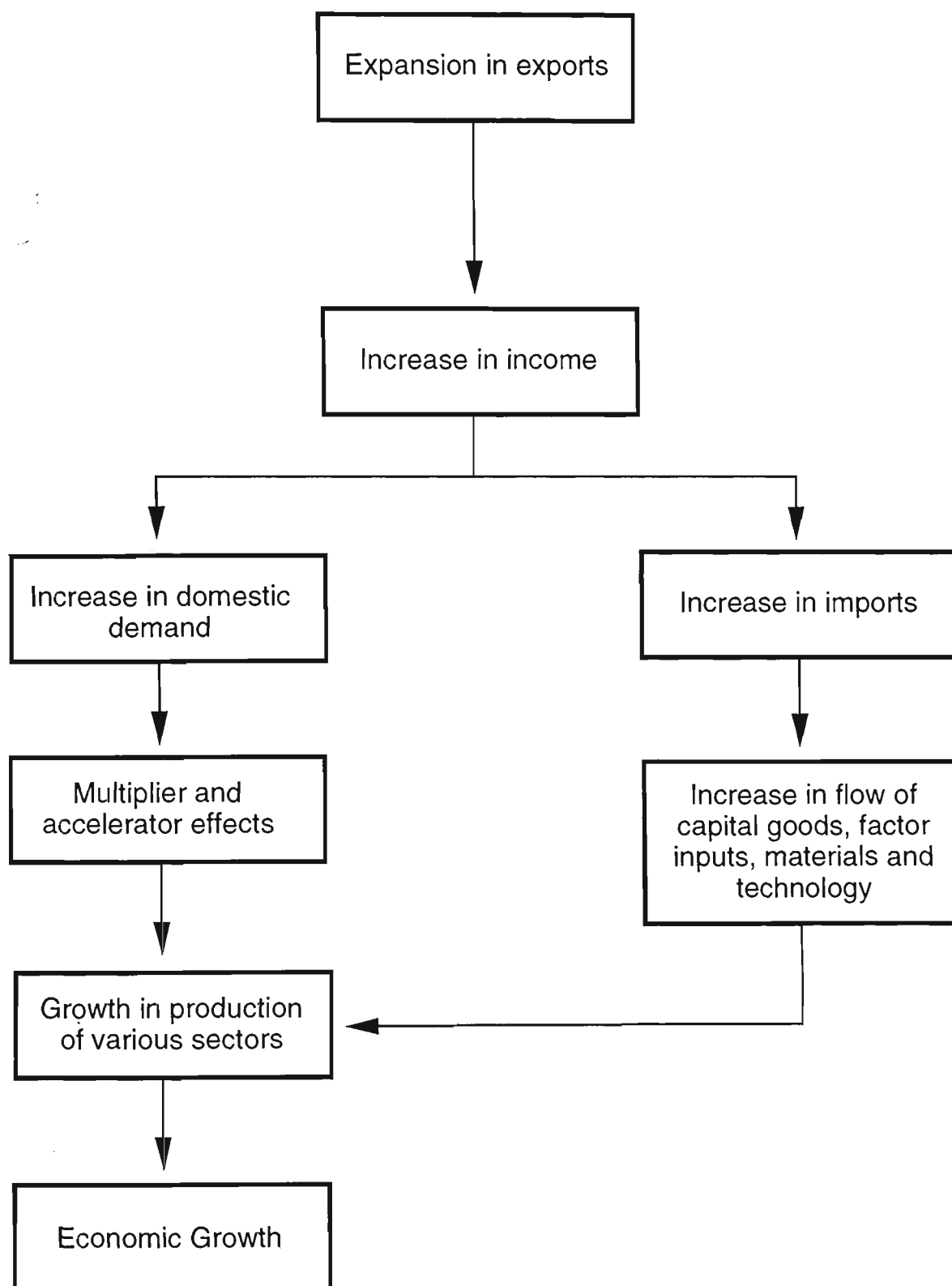
The main hypothesis tested in this study is that exports promote economic growth, directly through their contribution to GDP, and indirectly through their contributions per medium of spread or carry over effects. As was stated in chapter 6 the indirect

contribution to growth embraces Hirschmann-type linkages.<sup>1</sup> These linkages embody various beneficial aspects of exports such as greater capacity utilisation, economies of scale, incentives for technological improvements and efficient management as well as various other intra- and inter-sectoral spread and spill-over effects. The linkages can also be broadly considered as operating through a sequence of multiplier-accelerator mechanisms. Theoretically, indirect contributors or spread effects can continue to accrue long after export stimulus has occurred. The overall impact of an export stimulus on the economy has many determinants including technology, the propensity to import, the extent to which investment opportunities generated are accepted domestically, and the ability to attract foreign factors. The overall relations of the export-led growth model are presented in Figure 7.1. The figure shows that an increase in the exports of Iran will increase its income, which in turn causes imports to rise. The increase in imports will supply the country with capital goods, raw materials and technology needed for the expansion of industries and enhancing the production.<sup>2</sup> Such growth in production in turn leads to economic growth. On the other hand, a rise in income will increase the domestic demand for different goods and services, which causes the growth in production through multiplier and accelerator effects, consequently leading also to economic growth.

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<sup>1</sup> These linkages are: (a) backward linkages, i.e., the inducement to domestic investment resulting from the export sector's demand for input, (b) forward linkages, i.e., the inducement to invest in domestic industries utilising export, and (c) final demand linkages (the inducement to invest in consumer goods industries) was introduced by Watkins (1963)

<sup>2</sup> The feedback effects of expansion in imports will be examined in the next chapter.

**Figure 7.1: Export-led Growth Model**

### 7.3. The Methodology

The thesis uses regression models to test the export-led growth model in the context of the Iranian economy. The determination of the time lags between export growth and economic growth is essential in identifying the mechanisms responsible for Iran's economic expansion. For this purpose, a lagged regression relationship utilising annual data was developed. The model uses Koyck-type lags to test for spread (carry over) effects. The test is applied to both aggregate and disaggregate sectoral output. The sectors cover agriculture, industry, manufacturing, services, electricity, gas and water, oil, and construction.

### 7.4. The Models and Data

Theoretically exports can contribute to economic growth directly and indirectly. The direct effect could best be captured by a simple model

$$Y = \phi(X)$$

where, Y refers to GDP and X to exports.

To capture the constant response of exports to GDP, the linear form model of

$$Y_t = \beta_0 + \beta_1 X_t$$

could be employed, while for the non constant response of the same variable, the logarithmic model

$$Y_t = \beta_0 X_t^{\beta_1}$$

is effective.

Similarly, for estimation of indirect contribution of exports to growth, a lag mechanism could be used. The spreads and spill-over effects generally take time and may operate through sequences of multiplier-accelerator mechanisms. The theory says little or nothing about the nature of these dynamic mechanisms and the length of the time periods which might actually be involved. The linear model is represented by equations using first period and second period free lags. The models are:

$$Y_t = \beta_0 + \beta_1 X_t + \beta_2 X_{t-1} + \varepsilon_t$$

and

$$Y_t = \beta_0 + \beta_1 X_t + \beta_2 X_{t-1} + \beta_3 X_{t-2} + \varepsilon_t$$

We do not necessarily expect a constant impact on the economy over time of an export stimulus. The non-linear non-constant model is represented by the following logarithmic equations.

$$Y_t = \beta_0 X_t^{\beta_1} X_{t-1}^{\beta_2} e^{\varepsilon_t}$$

$$Y_t = \beta_0 X_t^{\beta_1} X_{t-1}^{\beta_2} X_{t-2}^{\beta_3} e^{\varepsilon_t}$$

The more general type of lag mechanism to capture the constant and linear effects of the exports to GDP is the Koyck form lag mechanism which is achieved through the imposition of a suitable partial adjustment mechanism of the type  $Y^* = \phi(X)$

$$Y^* = \phi(X)$$

where  $Y^*$  = Optimal GDP and  $\phi(.)$  may be linear or non-linear. The reason for this relationship is that, because of the presence of various institutional and sectoral bottlenecks, the Iranian economy is more likely to lie off its production possibility frontier leading to a discrepancy between the optimal output and actual output. This type of lag mechanism is preferred to the finite length free lags, since it is capable of capturing the spread effects continuously through an infinite time horizon.

The partial adjustment in the linear case

$$Y_t^* = \beta_0 + \beta_1 X_t + \mu_t$$

assumes the linear form

$$Y_t - Y_{t-1} = \delta(Y_t^* - Y_{t-1}) + \omega_t$$

where  $0 < \delta < 1$  is the adjustment parameter, the estimation equation would be

$$Y_t = Y_{t-1} + \delta(Y_t^* - Y_{t-1}) + \omega_t \quad \text{or,}$$

$$Y_t = Y_{t-1} + \delta(\beta_0 + \beta_1 X_t + \mu_t) - \delta Y_{t-1} + \omega_t$$

$$Y_t = Y_{t-1} + \delta\beta_0 + \delta\beta_1 X_t + \delta\mu_t - \delta Y_{t-1} + \omega_t$$

$$Y_t = (1 - \delta)Y_{t-1} + \delta\beta_0 + \delta\beta_1 X_t + \delta\mu_t + \omega_t$$

$$Y_t = b_0 + b_1 X_t + b_2 Y_{t-1} + e_t$$

where  $\delta_0, \delta_1 > 0$  and  $1 > \delta_2 > 0$



The lagged export effects are represented by the lagged GDP in this scheme embodying geometrically declining lags (Metwally and Abdel-Rahman, 1982).

To find the direct and indirect contribution of exports to growth in GDP, the following two geometrically-declining weights Koyck distribution lag models (with two different export and income values) have been tested:

$$(a) \ln \bar{Y} = \alpha_0 + \alpha_1 \ln X_c + \alpha_2 \ln Y_{t-1} + \mu_t \quad (1)$$

$$(b) \ln \bar{Y} = \beta_0 + \beta_1 \ln X_m + \beta_2 \ln Y_{t-1} + \varpi_t \quad (2)$$

The dependent variable  $\bar{Y}$  represents real non-oil GDP in both models. The reason for using non-oil GDP instead of GDP is to suppress the component effect of exports in GDP.  $X_c$  stands for exports at current values, and  $X_m$  is calculated by deflating the current export values by the import price index. This is done since the rise in export price relative to import prices represents an improvement in terms of trade and hence a reflection of a true gain to the economy (Tamaschke, 1980). Thus model (a) tests the relationship between real non-oil GDP and current exports, while model (b) tests the relationship between real non-oil GDP and the real exports (deflated by an import price index to retain real gains from trade).<sup>3</sup>

The sharp and sudden increases in oil prices following the embargo in late 1973 and until the recession in late 1982, suggest the existence of structural shifts in the export-income relationship. In order to test for these shifts, dummy variables were introduced into the models given above. Thus, we have:

$$\ln \bar{Y} = \alpha_0 + \alpha_1 \ln X_{ct} + \alpha_2 \ln \bar{Y}_{t-1} + \alpha_3 D_t + \mu_t \quad (3)$$

<sup>3</sup> The Koyck free mode gave much better results than the lagged model:

$$Y = \alpha_0 + \alpha_1 X_t + \alpha_2 X_{t-1} + \alpha_3 X_{t-2} + \dots + \alpha_n X_{t-n}$$

$$\ln \bar{Y} = \beta_0 + \beta_1 \ln X_{mt} + \beta_2 \ln \bar{Y}_{t-1} + \beta_3 D_t + \vartheta_t \quad (4)^4$$

where  $D=1$  during the period 1974-1985 with rising oil prices, and zero otherwise.

As can be seen, the models are non-linear. The theoretical reason for this is that we do not necessarily expect a constant impact of an export stimulus on the economy over time, and hence a logarithmic model is more appropriate. Since the significance of the statistical results when the absolute data are used is much clearer than when the rates of growth of variables are employed, the calculations are based on original data (Emery, 1967, p. 476).

Unavailability and uncertainty are the characteristics of developing countries' data. In this sense, Iran is no exception. Collection of the relevant material from reliable sources proved to be difficult. The sources were mainly the published literature on Iran, plus official Iranian publications, written both in English and Farsi. The necessary materials and data were collected from Tehran during a trip by the researcher to Iran in the summer of 1993. In addition, complementary data were collected from different issues of the IMF International Financial Statistics Yearbooks, the World Tables of the World Bank, and the (International Financial Statistics) IFS Supplement on Trade Statistics. The data were deflated using appropriate price indices. Also used is a set of national accounts data published by the Iranian Budget and Plan Organisation. The calculations in this study use annual observations covering the period 1960-1992. The annual data are recorded according to the Iranian calendar, which begins the 21st of March in one year and ends the 20th March of the following year.

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<sup>4</sup> Structural shifts related to the constant term were also tested, but the relevant dummy variable was not statistically significant.

## 7.5. The Empirical Results

### 7.5.1. The Effects of Oil Exports on Non-Oil GDP

The above two models were first tested using aggregate data. The results are given in Table 7.1. It can be seen that the value of  $R^2$  and F are high for the two models, which suggest a good fit. Exports seem to exert a significant influence on non-oil GDP in both models. This is evident from the significant 't' values of the coefficient of the export variable. The Koyck variable is also statistically significant. This suggests the presence of spread effects from the export sector to the rest of the economy. The results also suggest presence of structural shifts. The dummy variable is statistically significant and positive in both equations indicating an upward shift in the intercept of export-income relationship during the period of the study. The elasticity of the non-oil GDP with respect to the expansion of exports is low (0.141 for the first model and 0.139 for the second model). The long-term elasticity of income with respect to exports for models (a) and (b) were 0.359 and 0.553.<sup>5</sup> Moreover, the significant and positive coefficient of the intercept, suggest that Iran's non-oil GDP depend on variables other than oil exports. The adjustment coefficient for both models are 0.394 and 0.251 respectively, which are relatively low indicating the presence of possible bottlenecks hampering the quick adjustment of non-oil GDP to its optimal level in response to variations in oil exports. The expected lag lengths of the adjustments are 1.54 and 3 years for model (a) and (b) respectively.

<sup>5</sup> The long-term elasticity calculated using the coefficient of the exports variable and the lagged dependent variable. For example, the long-term elasticity of income with respect to exports for model

(a) is  $\frac{0.141}{1-0.607}=0.359$

**Table 7.1: Effects of oil exports on real non-oil GDP growth, 1960-1992**

Model	Constant	Exports	Lagged NOGDP	D	R <sup>2</sup>	F	h
(a)	2.05 (7.25)	0.141 (6.10)*	0.607 (10.77)*	0.075 (3.33)*	0.994	1712.2	1.38
(b)	1.23 (7.11)	0.139 (6.20)*	0.749 (21.82)*	0.051 (2.21)**	0.994	1743.8	0.751

\* = Significant at least at the 1 per cent level

\*\* = Significant at least at the 5 per cent level

### 7.5.2. The Effects of Exports on Agricultural Sector Output

The analysis was also carried out on disaggregated data to investigate the relationship between sectoral outputs and oil exports. The same two models were used to test the response of seven main sectors to changes in oil exports. The first sector to be studied is the agriculture sector.

Traditionally the Iranian economy was an agrarian economy, and Iran had exported agricultural products (wheat, date, carpets and handicrafts) in the past. The share of agriculture in GDP was 31.8 per cent in 1960. This share was reduced to 12.7 per cent in 1977 (Iranian Plan and Organisation, 1994). The main reasons for this reduction were rapid industrialisation, land reform (Eftekhari and Deeni, 1992), the increase in the share of oil, and to some extent, the effects of a mild Dutch disease (Majd, 1988). However, the share of agriculture in GDP rose again to reach 21 per cent in 1981 and 23.8 percent in 1992 (Iranian Plan and Organisation, 1994). This was due to government policies aimed at developing the agriculture sector and also to the decline in the share of the oil sector following the sharp reduction in oil prices. It is expected that the *a priori* growth in exports would stimulate the output of the agriculture sector through backward, forward and final demand linkages, as well as through less direct spread and transmission effects.

The regression results for this sector are given in Table 7.2. The values of R<sup>2</sup> and F suggest that the two models are good fit. The “t” values suggest that the sector's

output responded significantly to the changes in oil exports in both models. The results suggest that a 1 per cent increase in oil exports leads to approximately 0.11 per cent expansion in the agricultural sector's output in the first model and 0.092 per cent in the second model. The long-term elasticity of income to oil exports for model (a) and (b) were 0.342 and 0.498 respectively. The "t" values of the dummy variable in both models suggest a negative structural shifts which may be due to a mild "Dutch disease" effect, failure of commercial farming, a government food subsidy program for poor families, and ineffective utilisation of the oil revenues. Furthermore, imported agricultural equipment did not get through the badly congested ports fast enough, and projects were held up because of a shortage in construction materials. There was also a lack of resources for training and educating farmers in using new techniques and seeds (Looney, 1977, pp. 72-75). The low adjustment coefficient of the sector supports this idea. The adjustment coefficient in the first and second models are 0.318 and 0.184 which are relatively high values, indicating a fast response of the sector to the oil export variable. The expected lag lengths of the adjustments are 2.14 and 4.43 years for model (a) and (b) respectively.

**Table 7.2: Effects of oil exports on real agricultural output, 1960-1992**

Model	Constant	Exports	Lagged agriculture	D	R <sup>2</sup>	F	h
(a)	1.72 (4.82)	0.109 (5.41)*	0.681 (10.66)*	-0.099 (-3.51)*	0.990	1007.4	-0.281
(b)	0.805 (3.13)	0.092 (4.20)*	0.816 (15.88)*	-0.055 (-2.04)**	0.988	804.47	-0.082

\* = Significant at least at the 1 per cent level

\*\* = Significant at least at the 5 per cent level

### 7.5.3. The Effect of Oil Exports on Construction Sector

The share of the construction sector in the GDP has increased through the period of study from 3.9 percent in 1960 to 5.2 percent in 1974 and to over 8 percent in 1980. However, between 1981 and 1992 this share declined to the level of 1960. The main reason for this was the shift in government policy from construction of large residential complexes towards individual home construction. The results of the regression analysis for this sector are presented in Table 7.3. The data seem to fit both models quite well. The "t" values suggest that there are some multiplier-accelerator effects. This may be due to the investment of a large proportion of the oil revenues in the building of infrastructure, such as roads and ports, and on public and private housing. The magnitude of the coefficient of exports suggest that a 1 per cent expansion in oil exports result in approximately 0.111 and 0.245 per cent expansion in construction output in models (a) and (b) respectively. The long-term elasticity of construction output to oil exports for models (a) and (b) were 0.286 and 0.514 respectively. The adjustment coefficients for this sector are 0.388 and 0.475 for model (a) and (b) respectively, which are relatively high and reflect a speedy adjustment of the sector to variations in the oil export variable with a mean lag of estimated length of 1.58 and 1.40 years for models (a) and (b) respectively. The "t" value of the dummy variable in the models suggest that there has been an upward shift in the intercept during the period of the study.

**Table 7.3: Effects of oil exports on real construction sector output, 1960-1992**

Model	Constant	Exports	Lagged construction	D	R <sup>2</sup>	F	h
(a)	1.81 (3.94)	0.111 (2.33)**	0.612 (5.41)*	0.225 (2.66)**	0.962	245.1	1.59
(b)	1.13 (4.66)	0.245 (4.05)*	0.525 (5.78)*	0.218 (3.10)*	0.971	326.5	0.519

\* = Significant at least at the 1 per cent level

\*\* = Significant at least at the 5 per cent level

#### 7.5.4. The Effect of Exports on Electricity, Gas and Water Sector

The share of the electricity, gas and water sector in GDP increased continuously throughout the period of the study. From 0.15 percent in 1960, this sector's share reached to 2.3 percent in 1992 (Iranian Plan and Organisation, 1994). The response of the output of this sector to the growth in oil exports was significant, due to the nature of the investments in the sector. These investments are mostly undertaken by the government, and thus have a direct relation with the state income, which in turn depends on the oil revenue. Another characteristic of these investments is that, they are capital intensive and depend on imported technology. The results for this sector are given in Table 7.4. There seems to be current and spill-over effects. The coefficients of oil exports suggest that 1 per cent increase in oil exports results in about 0.37 and 0.296 per cent increase in the level of the sector's output in models (a) and (b) respectively. The long-term elasticity of income to oil exports for model (a) and (b) were 0.790 and 1.09, which may be due to the policy of subsidisation of public utilities in Iran following the increase in oil prices. The adjustment coefficient of this sector are 0.468 and 0.272 for model (a) and (b) respectively, which reflects the relatively speedy adjustment of the sector to variations in the oil export variable with a mean lag of estimated length of 1.09 and 2.68 years. However, there seem to be negative structural shifts

**Table 7.4: Effects of oil exports on real electricity, gas, and water sector output, 1960-1992**

Model	Constant	Exports	Lagged output	D	R <sup>2</sup>	F	h
(a)	-0.216 (-1.23)	0.370 (4.48)*	0.532 (6.00)*	-0.29 (-3.65)*	0.988	816.09	1.55
(b)	-0.739 (-1.58)	0.296 (2.68)**	0.728 (9.68)*	-0.203 (-2.27)**	0.984	599.5	0.495

\* = Significant at least at the 1 per cent level

\*\* = Significant at least at the 5 per cent level

### 7.5.5. The Effect of Exports on the Manufacturing Sector

The share of the manufacturing sector in GDP has increased from 4.6 per cent in 1960 to 13.7 per cent in 1992. The regression results for this sector are given in Table 7.5. These results reveal that the output of the sector responded significantly to the growth in oil export earnings. This may portray the dependent nature of the manufacturing sector. A large proportion of oil revenues was spent on importation of machines and equipment for the rapid industrialisation of the 1960s and 1970s which was carried out as a consequence of import substitution policies. The results also suggest the presence of significant multiplier-accelerator effects. A one per cent increase in oil exports results in a rise in the level of manufacturing output of about 0.17 per cent in both models. The long-term elasticity of income to oil exports for model (a) and (b) were 0.552 and 0.868. The response of this sector to the variation of oil exports was relatively high in both models, with long mean lags of about 2.15 and 4 years for models (a) and (b) respectively. The regression results show that the manufacturing sector experienced a backward structural shift during this period in both models. This may be explained by the tendency to purchase foreign-made products during the oil boom and the shift to armament production during the Iran-Iraq war.

**Table 7.5: Effects of oil exports on real manufacturing sector output, 1960-1992**

Model	Constant	Exports	Lagged manufacturing	D	R <sup>2</sup>	F	h
(a)	1.04 (4.04)	0.176 (3.34)*	0.683 (7.66)*	-0.120 (-3.06)*	0.993	1491.4	1.78
(b)	0.201 (2.11)	0.171 (3.95)*	0.803 (17.24)*	-0.111 (-3.26)*	0.994	1656.6	0.979

\* = Significant at least at the 1 per cent level



### 7.5.6. The Effect of Exports on the Mining Sector

The regression results of the mining sector are given in Table 7.6. The mining sector (excluding the oil sector) has increased its share from 0.23 per cent in 1960 to 0.61 per cent in 1982. This share decreased steadily to 0.52 in 1992. The regression results of the two equations for this sector (Table 7.6) show that during the period of the study, oil exports had a significant effect on the output of the mining sector. These effects were both current and lagged. The results also suggest that a one per cent increase in oil exports would increase the output of the sector by less than a quarter of a per cent in both models. The long-term elasticity of income to oil exports for model (a) and (b) were 0.433 and 0.697. The regression results suggest the absence of structural shifts in the intercept term.<sup>6</sup> The adjustment parameter in the Koyck accelerator mechanism is estimated at 0.318 and 0.290 for model (a) and (b) respectively. This gives the adjustments occurring over an expected period of 2.14 and 2.44 years for both models respectively which are relatively high speed adjustments rates. The regression results suggest the absence of structural shifts.

**Table 7.6: Effects of oil exports on real mining sector output, 1960-1992**

Model	Constant	Exports	Lagged mining	D	R <sup>2</sup>	F	h
(a)	0.301 (3.24)	0.138 (2.12)**	0.682 (5.79)*	0.004 (0.754)	0.979	445.5	-1.69
(b)	-0.310 (-1.18)	0.203 (2.53)**	0.709 (7.92)*	-0.041 (-0.675)	0.980	471.4	-1.76

\* = Significant at least at the 1 per cent level

\*\* = Significant at least at the 5 per cent level

### 7.5.7. The Effect of Oil Exports on the Services Sector

The share of the services sector in GDP was 31 per cent in 1960. It increased continually and reached to over 52 per cent in 1980, and then dropped to about 38 per cent by 1992. The regression calculations for the services sector are summarised in Table 7.7. The oil exports had a strong effect on the level of the services sector, and

<sup>6</sup> See footnote (5) above.

the results suggest the existence of both multiplier and accelerator effects. The coefficient of the oil exports suggest that a one per cent increase in oil exports lead to approximately 0.12 per cent rise in the sector's output in both models. The long-term elasticity of income to oil exports for model (a) and (b) were, respectively 0.318 and 0.408. The adjustment coefficients of this sector were 0.380 and 0.304. This gives the adjustments occurring over an expected period of 1.63 and 2.29 years for both models respectively which are relatively high speed adjustments rates. The results also suggest the presence of structural shifts

**Table 7.7: Effects of oil exports on real services sector output, 1960-1992**

Model	Constant	Exports	Lagged services	D	R <sup>2</sup>	F	h
(a)	2.19 (5.79)	0.121 (4.03)*	0.620 (8.87)*	0.217 (5.14)*	0.987	711.3	1.29
(b)	1.54 (6.11)	0.124 (4.21)*	0.696 (13.59)*	0.203 (4.93)*	0.987	734.6	1.05

\* = Significant at least at the 1 per cent level

## 7.6. Summary and Conclusions:

This chapter examined the validity of the widely held view that oil exports in Iran contributed to the growth of aggregate non-oil GDP and to sectoral output. Lagged models incorporating dummy variables were tested. The regression results suggest that oil exports did contribute directly, through a multiplier effect, and indirectly through the accelerator mechanism, to the growth of aggregate non-oil GDP and sectoral output. Moreover, the results suggest the presence of structural shifts in all sectors except the mining sector. Although the evidence presented in this chapter indicates that the impact of oil exports on economic and sectoral growth may have been stronger than that of agricultural exports, trade expansion of the exports of manufactures and agricultural products should be given more emphasis in Iran's trade policy. This would help to lessen the high degree of dependence on an exhaustive resource for which suffers from continuous fluctuations.

## **CHAPTER 8**

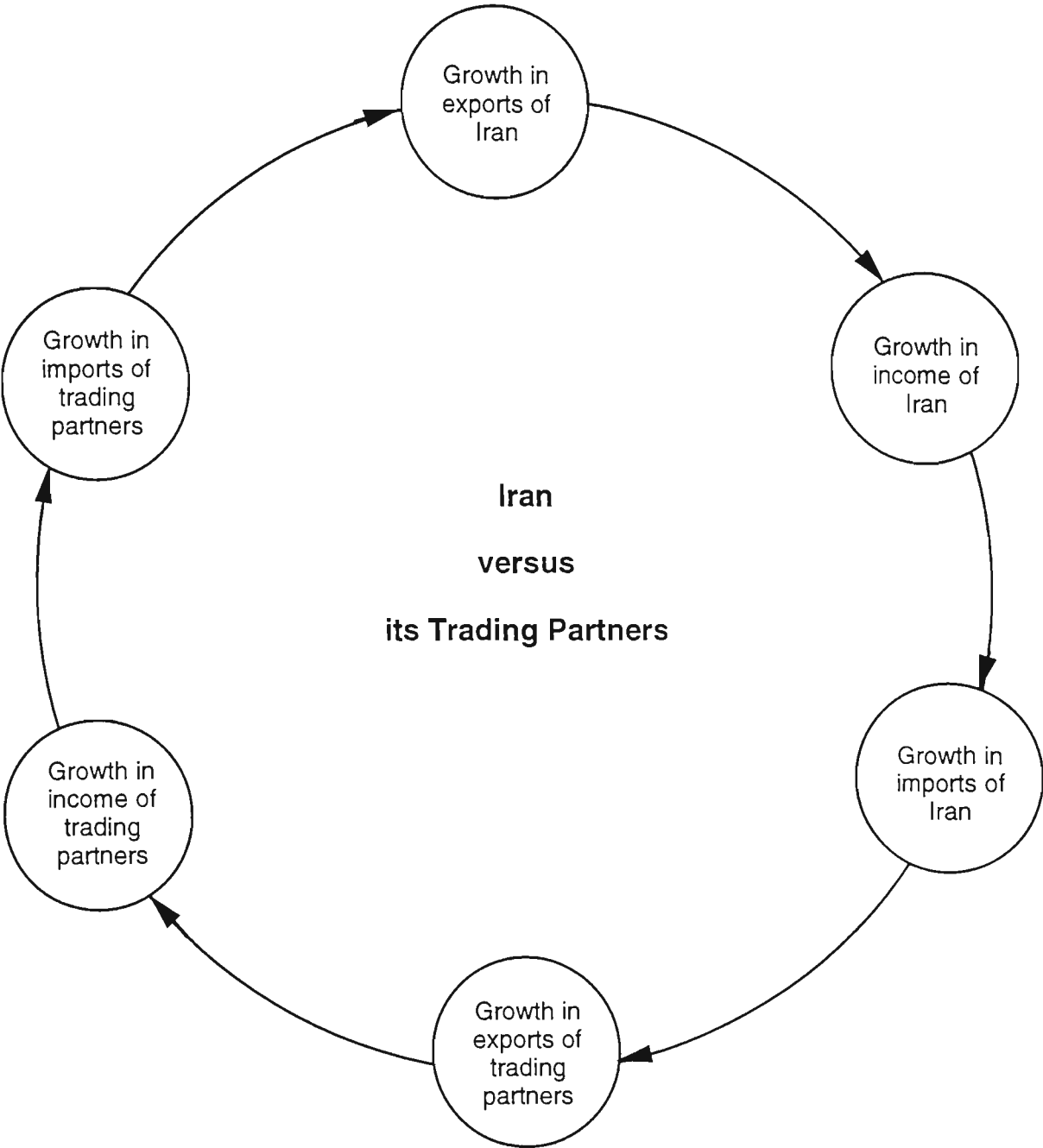
### **Trade Relationship Between Iran and its Major Trading Partners: A Simultaneous Equations Model**

#### **8.1: Introduction**

The analysis in the last chapter tested the relationship between oil exports and non-oil GDP using single equation models. It is commonly accepted that development in any one country may be transmitted rapidly to other countries, depending on the relative size and the degree of openness of the economy. Current account transactions in goods and services can serve as the channel for the transmission of economic fluctuations across countries. Econometric tests of the relationship between international trade and economic growth help to shed light on these transmissions. The export-led growth model will be tested in this chapter within the framework of international trade interdependence. Thus, the structure and performance of trade between Iran and its eleven major trading partners during the period 1960-1992 will be analysed. The present researcher is not aware of any previous study which analyses the interrelationship between the Iranian economy and the rest of the world.

Iran is an open economy and is very dependent on international trade. This dependence suggests the existence of an interaction between the Iranian economy and the rest of the world. This interaction could be observed in two different ways. First, an increase in Iranian exports will increase Iran's income, which in turn causes imports to rise. The increase in Iranian imports will raise the income of the exporters to Iran which in turn results in an increase in their incomes and hence their imports including their imports from Iran. On the other hand, the rise in the export price of oil will increase the cost of production in the oil importing countries, and causes their growth to slow down. This may reduce their level of imports from Iran and hence the Iranian income. The process may be explained using figure 8.1.

Figure 8.1: Trade-Interaction Model



This chapter is divided into five sections. Section two reviews briefly relevant previous studies. Section three discusses the methodology and describes the model. Section four studies the magnitude of trade between Iran and eleven major trading partners. Finally, section five discusses the regression results of the simultaneous equations model.

## **8.2.: Previous Studies**

Metwally and Tamaschke (1980) studied the interrelationship between oil exports and income of three oil exporting Middle Eastern countries, namely, Iran, Iraq and Saudi Arabia. This interrelationship was examined using a simultaneous equations model consisting of three equations. These equations tested the relationship between income and exports, exports and imports and finally between imports and income. Their model consisted of three endogenous variables (change in income, exports, and imports) and four exogenous variables (lagged of endogenous variables plus change in export prices). They found no feedback effects in all three cases.

Salvatore (1983) applied a simultaneous equations model to test the dynamic relationship between international trade and growth for 52 developing countries during the period 1961-78. His model consisted of four endogenous variables (growth of per capita income, fixed capital formation as a percentage of GDP, industrial output as a percentage of GDP and exports as percentage of GDP) and five exogenous variables (changes in the percentage of exports to GDP, real per capita income, capital inflow as a percentage of GDP, the ratio of the domestic consumer price index relative to the consumer price index of all market economies, and the index of real GDP of all market economies.) The model was estimated by the method of Full Information Maximum Likelihood. Salvatore found that the relationship between trade and growth was clearly positive. His conclusions were not as pessimistic as the views of Myrdal (1957), Prebisch (1959) and Singer, (1950) who

regard trade as a retarding force for development, but not as optimistic as those views which regard trade as an engine of growth.

Tamaschke (1988) tested the same interaction for the Australian economy during the period 1955-83 using three endogenous variables (GDP, exports and imports) and nine exogenous variables (lag of endogenous variables including four year lag for exports, plus, an export price index, an index of import prices relative to domestic prices and an index of export prices relative to rest of the world prices). In addition, a dummy variable was introduced in all equations to capture change in the intercept. The results suggested that exports had a strong effect on Australian income while imports had a negligible effect on Australian exports.

Metwally (1988) later studied the impact of growth in trade between Saudi Arabia and Japan during 1963-83 using a simultaneous equations model. The model used four endogenous and seven exogenous variables, all measured at constant prices. The result of this study suggested the existence of feedback effects.

Lee (1989) studied the trade interdependence between Taiwan, the USA and Japan for the period 1952-85 using a simultaneous equations model. His model consisted of three endogenous variables, namely: GNP, exports and imports. There were also eight endogenous variables involved in the model. These variables were: Gross Domestic Investment as a percentage of GNP, labour force, USA GNP, Japanese GNP, foreign capital inflow, rate of change in the ratio of consumer price index of Taiwan to the consumer price index of the US, rate of change in the ratio of consumer price index of Taiwan to the consumer price index of the Japan, and lagged exports. Lee utilised the above variables in two different forms, the growth rate form and logarithmic form. He concluded that, in the logarithmic form of the GNP equation, the coefficient of labour force, in addition to that of exports, is statistically

significant. He also concluded that imports and GNP of USA are the two significant determinants of the Taiwan's exports in both models, whereas these exports do not depend on Japanese economic conditions. Imports are significantly determined by GNP and lagged imports or lagged exports.

Tamaschke (1990) tested the relationship between exports and income of Queensland and Alberta during 1961-83. The simultaneous equations model used in this study consisted of five endogenous variables including changes in manufacturing and services output, and nine exogenous variables including an export price index and an index of import prices relative to domestic prices. The results suggest a strong relationship between exports and income. It was also found that growth in services is very sensitive to exports growth, but, there was no evidence of feedback effects in other case.

Salehi Esfahani (1991) tested the interdependence of exports, GDP and imports during the periods: 1960-73, 1973-81 and 1980-86 for 31 semi-industrialised countries excluding the major oil exporters. He constructed a simultaneous equation model consisting of three endogenous variables (per capita export growth, per capita growth and per capita import growth) and nine exogenous variables. It was found that most semi-industrialised countries have on average suffered from import shortage and their exports have mainly provided foreign exchange for relieving this input constraint.

Metwally and Vadlamudi (1992) analysed the trade relationship between Australia and 15 Middle Eastern countries during the period 1971-88. They used a simultaneous equations model consisting of seven endogenous and four exogenous variables. The endogenous variables included GDP, exports and imports. The exogenous variables were lagged GDP, exports, and imports, non-oil GDP of the Middle Eastern countries, OPEC share in world supply of oil, and exports from Australia to other

countries. They found that the Australian income was not affected by its imports from Middle Eastern countries, and there was no feedback effect due to the small share of Middle Eastern countries in Australian market.

Sprout and Weaver (1993) also performed a study to test the export-growth relationship by using a simultaneous equations model. Their model consisted of three simultaneous equations, which contain three endogenous variables and eight exogenous variables. Their study covered 72 LDCs over a 15-year period (1970-84), and the model was estimated using the two stage least squares (2SLS) technique. The authors grouped the countries by the level of income, geographic region, export composition and size. They found that the effect of export growth varies widely among different LDC countries and that LDCs with the more processed exports benefit the most from trade. They also found that the structure of the export sector plays an important role in the growth of the economy; the larger the export sector the greater the growth. The authors concluded that primary exporters who fail to diversify, experience less economic growth from export expansion than those exporters which have diversified exports.

Metwally (1993) studied the interdependence of trade and economic development in ten Asian countries for the period 1974-88. His simultaneous equations model contained four endogenous and four exogenous variables. The endogenous variables were: real GDP, real exports and imports of the *i*th Asian country, and real rate of growth of GDP of its major importers. The exogenous variables included, export price index of the *i*th Asian country and total exports of major importers to countries other than the specific Asian country. The regression results suggest that there is a degree of interdependence between each of the economies under study and the rest of the world.



Perdikis and Asseery (1994) analysed the trade relationship between Cyprus, United Kingdom, the rest of the European Union (EU) and the Middle Eastern countries between 1965 and 1987 using a simultaneous equations model similar to Metwally's 1988 model developed in his study on the trade relationship between Saudi Arabia and Japan. The model of Perdikis and Asseery consisted of four endogenous variables (GDP, Cyprus' exports to the *i*th trade partner, the *i*th trading partner GDP, and Cyprus imports from the *i*th trading partner) and five exogenous variables which were: Cyprus' non-industrial production, Cyprus lagged GDP, lagged exports of Cyprus to its *i*th trading partner, the trading partner's exports to countries other than Cyprus and lagged imports of Cyprus from its *i*th trading partner. They found that Cyprus' exports to the United Kingdom and other EU members and the Middle Eastern countries are important determinants of its income and that, Cyprus' exports to the United Kingdom, other EU members, and the Middle East are significantly influenced by its trading partner's income. They also found that the incomes of Cyprus' trading partners are significantly affected by exports of these countries to the world, excluding Cyprus, while imports of Cyprus from its trading partners are affected by its income.

### **8.3: The Methodology and the Model**

To study the relationship between the Iranian economy and its major trading partners, a simultaneous equations model similar to that developed by Metwally in his study of the interdependence of trade and economic development in Asian economies (1993) will be utilised to test the feedback effect. The model incorporates determinants of GDP, imports, exports and the resources balance. The structural equations of the model consist of four endogenous variables and six predetermined variables as following:

$$Y_{It} = \alpha_0 + \alpha_1 X_{Ij,t} + \alpha_2 X_{Io,t} + \alpha_3 Y_{I,t-1} + e_{1t}^1$$

$$X_{Ij,t} = \beta_0 + \beta_1 Z_{j,t} + \beta_2 P_t + e_{2t}$$

$$Z_{j,t} = \delta_0 + \delta_1 E_{j,t} + \delta_2 M_{Ij,t} + \delta_3 Z_{j,t-1} + e_{3t}$$

$$M_{Ij,t} = \gamma_0 + \gamma_1 Y_{It} + \gamma_2 M_{Ij,t-1} + e_{4t}$$

### Endogenous Variables:

$Y_{It}$  = GDP of Iran in period  $t$

$X_{Ij,t}$  = Exports of Iran to the  $j$ th major trading partner in period  $t$

$Z_{j,t}$  = GDP of the  $j$ th trading partner in period  $t$

$M_{Ij,t}$  = Imports of Iran from the  $j$ th major trading partners in period  $t$

### Predetermined variables

$Y_{I,t-1}$  = Lagged GDP of Iran

$P_t$  = Oil export prices in period  $t$

$E_{j,t}$  = Total exports of Iran's  $j$ th major trading partner to the rest of the world in period  $t$

$M_{Ij,t-1}$  = Lagged imports of Iran from its  $j$ th major trading partner

$Z_{j,t-1}$  = Lagged GDP of the  $j$ th trading partner

$X_{Io,t}$  = Exports of Iran to countries other than individual major importer country  $j$

The first equation tests the relationship between Iranian income and its exports to each of its major trading partners as well as the rest of the world. It is assumed that Iranian GDP depends on these exports. It is also assumed that there is a partial adjustment mechanism in the income-export relationship. The second equation examines the relationship between exports of Iran to its major trading partners, and the level of GDP of these partners as well as export prices. It is expected that the

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<sup>1</sup> Dummy variables were also included to test for structural shifts, but the results were not statistically significant.

growth in the economies of these partners, that is a rise in their GDP, would have an impact on their imports from Iran.

The third equation examines the interaction between the Iranian economy and its major trading partners. It is assumed that the level of GDP of each trading partner depends on its exports to Iran and to the rest of the world. This equation is also dynamic. If there is a feedback effect with Iran we would expect the coefficient  $\delta_2$  to be statistically significant. The last equation is an import function. This function tests the hypothesis that Iran's imports from its major trading partners depend on Iranian GDP, with a partial adjustment mechanism.

The model has as many equations as endogenous variables and in this sense is mathematically complete. Applying the order and rank conditions for identification it was found that all four equations are over-identified.<sup>2</sup> It is appropriate, therefore, to use the method of two-stage least squares (2SLS) to estimate the parameters of the equations. The presence of serial correlation was tested by using Durbin Watson (DW) statistics for the second equation and Durbin "h" for the equations with the lagged variables. However the results must be interpreted very cautiously due to the smallness of the sample size.

The necessary data to test the above model were obtained from different issues of the International Financial Statistical Yearbook, The Direction of Trade Statistics, the Iranian Budget and Plan Organisation and from different issues of the Iranian National Accounts. The data were deflated using various price indices. The sample countries include Belgium, Brazil, France, Germany, Italy, Japan, the Netherlands, Romania, Singapore, Spain and Turkey. The period of the study is 1960 to 1992. The values of trade between countries and their GDPs are measured in constant \$US, and all exports are in current values. The equations were calculated in natural logarithmic

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<sup>2</sup> The identification test is performed in Appendix A

form. The theoretical reason for this is that we do not necessarily expect a constant impact on the economy over time of an export stimulus, and hence a logarithmic model is more appropriate.

#### 8.4: The Magnitude of Trade Between Iran and its Major Trade Partners

The Iranian economy depends on foreign trade. Iranian imports contributed, on average, to about 7.9% of its GDP in constant prices during the period 1960-73. This average percentage increased to 13.2% during the oil boom period (1974-83), but fell to about 10.5% during the period 1983-92. The share of exports in GDP was over 48% in real terms during the period 1960-73. This share decreased to 34% during the boom years of 1974-1983, with a further fall to about 16% following the collapse in oil prices. Table 8.1 provides the shares of the eleven major trading partners of Iran in Iranian trade during the last five years of the study. More than 71 per cent of total Iranian exports were directed to these countries, and approximately 57 per cent of the Iranian imports originated from the same countries during 1988-1992.

**Table 8.1: Iranian Trade with its major trading partners (average 1988-1992)**

Country	% of total Iranian exports	% of total Iranian imports
Japan	16	11
Italy	8.5	8.1
Netherlands	7.7	2.9
France	6.7	3.8
Belgium	6.5	2.6
Germany	5.5	20
Romania	5.5	0.6
Brazil	4.9	2.5
Spain	4.5	1.3
Singapore	3.1	0.8
Turkey	2.5	3.3
Total	71.4	56.9

Source: Direction of Trade, 1994

## 8.5.: The Regression Results

### (1) Japan

Japan is the largest importer of Iranian goods (16 per cent of total Iranian exports), and the second largest exporter to Iran in last 5 years, supplying Iran with 11 per cent of its imported goods requirements. The regression results for Japan is presented in Table 8.2. The results suggest existence of a strong relationship between the independent and dependent variables in equation 1. These results suggest that a 1 per cent increase in Iranian exports to Japan increases Iranian GDP by approximately 0.051 per cent in the short-run and by 0.256 (which is given by  $0.051/(1-0.801)$ ) in the long-run. Inspection of the coefficient of the variable  $(Y_{I,t-1})$  further suggest the existence of significant spread effects.

**Table 8.2: Simultaneous Equation Results for Japan, 1960-1992**

$Y_{It} = 1.60$ (3.57)	$+0.051 X_{Ij,t}$ (5.09)*	$+0.080 X_{Io,t}$ (2.50)**	$+0.801 Y_{I,t-1}$ (13.90)*
$R^2 = 0.995$	$F = 1986$	$h = 1.76$	
$X_{Ij,t} = -2.69$ (-3.40)	$+0.387 Z_{j,t}$ (2.61)**	$+0.745 P_t$ (6.41)*	
$R^2 = 0.931$	$F = 103.2$	$DW = 2.02$	
$Z_{j,t} = 0.480$ (2.75)	$+0.190 E_{j,t}$ (3.04)*	$+0.0008 M_{Ij,t}$ (0.032)	$+0.811 Z_{j,t-1}$ (14.50)*
$R^2 = 0.992$	$F = 1136.2$	$h = 1.85$	
$M_{Ij,t} = -6.30$ (-2.67)	$+0.737 Y_{It}$ (2.69)**	$+0.420 M_{Ij,t-1}$ (2.47)**	
$R^2 = 0.730$	$F = 40.47$	$h = 1.23$	

The figures in the parentheses are 't' values

\* = Significant at least at the 1 per cent level

\*\* = Significant at least at the 5 per cent level

The results of the second equation suggest that the Japanese income is a major determinant of Iranian exports to this country. The coefficient of Japan's income in this equation suggest that 1 per cent increase in Japanese income leads to less than 0.38 per cent growth in Iranian exports to Japan. Oil prices would seem to have a greater effect on Iranian exports to Japan than Japanese income.

The results of the Japanese export function in equation 3 suggest the absence of feedback effects. This is not unreasonable, since the Iranian imports from Japan comprise a very small proportion of total Japanese exports. The results of equation four indicate a significant and positive relationship among Iranian current and past income and its imports from Japan. Short-term and long-term income elasticity of Iranian imports from Japan are 0.737 and 1.27 respectively.

## (2) Italy

Italy imported 8.5 per cent of total Iranian exports and was responsible for more than 8 per cent of total Iranian imports in recent years. The simultaneous equation results for Italy is given in Table 8.3. The significant response of Iran's GDP to its exports to Italy can be seen from the significance of the  $t$  value of the coefficient ( $X_{Ij,t}$ ). The coefficient of the lagged variable, which represents the spread effects "proper", is also statistically significant. The short-run GDP elasticity with respect to Iranian exports to Italy is 0.047 and the long run elasticity is 0.165.

The results of the second equation suggest that both Italy's income and oil prices had a significant impact on the exports of Iran to Italy. The elasticity's of Iranian exports to Italy with respect to income and price of oil are close to one. The regression results of the third equation suggest that exports from Italy to Iran do not have any significant effect on the income of Italy. In other words, there is no feedback effects. The estimates of the fourth equation suggest that the current and past income of Iran

have a statistically significant effect on imports of Iran from Italy. Iranian imports from Italy has a short-term elasticity equal to 0.724 and a long-run elasticity equal to 1.20.

**Table 8.3: Simultaneous Equation Results for Italy, 1960-1992**

$Y_{It} = 2.35$ (6.18)	$+0.047X_{Ij,t}$ (2.64)**	$+0.098X_{Io,t}$ (3.52)*	$+0.718Y_{I,t-1}$ (15.35)*
$R^2 = 0.996$	$F = 2260.1$	$h = 1.28$	
$X_{Ij,t} = -16.29$ (-3.79)	$+1.39Z_{j,t}$ (3.03)*	$+0.622P_t$ (3.07)*	
$R^2 = 6690.$	$F = 30.20$	$DW = 1.85$	
$Z_{j,t} = 1.51$ (1.22)	$+0.146E_{j,t}$ (2.27)**	$-0.104M_{Ij,t}$ (-1.21)	$+0.794Z_{j,t-1}$ (6.03)*
$R^2 = 0.897$	$F = 84.50$	$h = 0.175$	
$M_{Ij,t} = -6.66$ (-2.33)	$+0.724Y_{It}$ (3.25)*	$+0.399M_{Ij,t-1}$ (2.77)*	
$R^2 = 0.891$	$F = 122.2$	$h = 1.40$	

The figures in the parentheses are 't' values

\* = Significant at least at the 1 per cent level

\*\* = Significant at least at the 5 per cent level

### (3) The Netherlands

The Netherlands was the third most important trading partner of Iran during the five years ending 1992. This country imported about 7.7 per cent of the total Iranian exports during this period and supplied about 2.9 per cent of Iran's total imports. The regression results of the Netherlands are presented in Table 8.4. The results of the first equation suggest that Iran's exports have a significant effect on Iran's income. The coefficient of the variable  $(Y_{I,t-1})$ , which represents the spread effect "proper", is also statistically significant. Thus the Iranian economy would seem to enjoy multiplier and long-term spread effects from its exports to the Netherlands. The short-run income elasticity of Iranian exports is 0.077 and the long-run elasticity is 0.236.

The results for the second equation suggest that Dutch income is an important determinant of Iran's exports to that country. Moreover, oil prices seem to affect the level of Iranian exports to the Netherlands. The statistically not significant coefficient of the import variable suggests that the Dutch income does not seem to be affected by Iranian imports from the Netherlands, which suggests the absence of feedback effects. The regression results of the fourth equation suggest that Iran's income is a major determinants of Iran's imports from the Netherlands. The short-term and long-term income elasticity of imports are 0.501 and 0.910 respectively.

**Table 8.4: Simultaneous Equation Results for Netherlands, 1960-1992**

$Y_{It} = 2.76$ (4.74)	$+0.077X_{Ij,t}$ (2.34)**	$+0.095X_{Io,t}$ (2.42)**	$+0.674Y_{I,t-1}$ (9.72)*
$R^2 = 0.991$	$F = 1153.7$	$h = 1.35$	
$X_{Ij,t} = -8.07$ (-4.25)	$+1.26Z_{j,t}$ (2.63)**	$+0.527P_t$ (2.25)**	
$R^2 = 0.729$	$F = 40.36$	$DW = 1.49$	
$Z_{j,t} = 1.14$ (1.63)	$+0.201E_{j,t}$ (2.46)**	$-0.041M_{Ij,t}$ (-0.505)	$+0.616Z_{j,t-1}$ (3.40)*
$R^2 = 0.957$	$F = 213.9$	$h = 1.80$	
$M_{Ij,t} = -5.05$ (-2.70)	$+0.501Y_{It}$ (2.62)**	$+0.450M_{Ij,t-1}$ (2.73)**	
$R^2 = 0.877$	$F = 102.3$	$h = 1.80$	

The figures in the parentheses are 't' values

\* = Significant at least at the 1 per cent level

\*\* = Significant at least at the 5 per cent level

#### (4) France

France is the fourth major importer of Iranian crude oil, while French exports to Iran rank fifth and amounted to about 3.8% of total Iranian imports during the period 1988-92. The results of the trade interdependence between Iran and France are given in Table 8.5. The first equation suggest that there is a significant and positive relationship between Iran's exports to France and the French income, which implies



the existence of a strong multiplier effect. The Koyck variable is also statistically significant and positive. This suggests the presence of long-term spread effects from exports to France and to the rest of economy. The results of equation 1 also suggests that a 1 per cent growth in exports of Iran to France leads to a 0.079 per cent growth in Iran's income. The short-term elasticity is 0.079 and the long-term elasticity is 0.248.

**Table 8.5: Simultaneous Equation Results for France, 1960-1992**

$Y_{It} = 2.73$ (5.18)	$+0.079X_{Ij,t}$ (2.34)**	$+0.083X_{Io,t}$ (2.23)**	$+0.682Y_{I,t-1}$ (11.29)*
$R^2 = 0.994$	$F = 1601.4$	$h = 1.72$	
$X_{Ij,t} = -20.59$ (-7.70)	$+2.78Z_{j,t}$ (6.39)*	$+0.576P_t$ (5.21)*	
$R^2 = 0.892$	$F = 123.7$	$DW = 1.49$	
$Z_{j,t} = 1.50$ (1.36)	$+0.090E_{j,t}$ (2.28)**	$-0.054M_{Ij,t}$ (-0.74)	$+0.713Z_{j,t-1}$ (4.21)*
$R^2 = 0.821$	$F = 44.24$	$h = 0.311$	
$M_{Ij,t} = -5.67$ (-2.66)	$+0.603Y_{It}$ (2.61)**	$+0.418M_{Ij,t-1}$ (2.44)**	
$R^2 = 0.798$	$F = 59.31$	$h = 1.80$	

The figures in the parentheses are 't' values

\* = Significant at least at the 1 per cent level

\*\* = Significant at least at the 5 per cent level

The results of the second equation suggest that the income of France is an important determinant of Iran's exports to this country. The price of oil also seems to have strong effects on the level of Iranian exports to France. The results of equation 3 suggest that there is a significant and positive relationship between the French GDP and its total exports. By contrast, Iranian imports from France have no significant effect on the growth of the French income. This can be explained by the smallness of Iranian imports from France. The results of the fourth equation suggest that Iran's income is a major determinant of its imports from France. The results also suggest

that a 1 per cent growth in Iranian GDP results in 0.6 per cent increase in Iran's imports from France. The long-run elasticity is 1.036.

### (5) Belgium

Belgium has imported about 6.5 per cent of total Iranian oil exports over the past five years. The regression results for this country are provided in Table 8.6. The results of the first equation suggest the existence of a strong positive relationship between Iranian GDP and its exports to Belgium. The short-term income elasticity of these exports is 0.055 and the long-term elasticity is 0.157. Results of the second equation suggest that both oil prices and the income of Belgium exert a strong impact on the Iranian exports to Belgium. The not significant coefficient of the Iranian imports from Belgium in the third equation suggest that there is no feed-back effects. The results of the fourth equation suggest that Iranian income has a strong effect on the level of its imports from Belgium. The short-run elasticity is 0.538 and the long-run elasticity is 1.06.

**Table 8.6: Simultaneous Equation Results for Belgium, 1960-1992**

$Y_{It} = 2.94$ (4.97)	$+0.055X_{Ij,t}$ (2.21)**	$+0.137X_{Io,t}$ (3.59)*	$+0.649Y_{I,t-1}$ (8.98)*
$R^2 = 0.989$	$F = 904.03$	$h = 1.76$	
$X_{Ij,t} = -7.60$ (-2.81)	$+1.35Z_{j,t}$ (2.33)**	$+0.277P_t$ (2.17)**	
$R^2 = 0.779$	$F = 30.80$	$DW = 1.98$	
$Z_{j,t} = 2.09$ (2.96)	$+0.178E_{j,t}$ (2.41)**	$+0.046M_{Ij,t}$ (0.467)	$+0.431Z_{j,t-1}$ (2.73)**
$R^2 = 0.917$	$F = 106.7$	$h = -0.699$	
$M_{Ij,t} = -5.41$ (-2.44)	$+0.538Y_{It}$ (2.38)**	$+0.494M_{Ij,t-1}$ (2.86)*	
$R^2 = 0.858$	$F = 90.25$	$h = -1.83$	

The figures in the parentheses are 't' values

\* = Significant at least at the 1 per cent level

\*\* = Significant at least at the 5 per cent level

**(6) Germany**

Germany is a long standing Iranian trade partner. About 20 per cent of total Iranian imports have come from Germany during last five years and, approximately 5.5 per cent of total Iranian exports went to Germany during the same period. The regression results of the trade interaction between Iran and Germany are given in Table 8.7. The results of the first equation suggest a statistically significant relationship between Iran's GDP and its exports to Germany and to the rest of the world. The short-run elasticity is 0.109 and the long-run elasticity is 0.317. The results of the second equation suggest that Iran's exports to Germany are influenced by the latter country's level of GDP. Approximately a 1 per cent growth in Germany's GDP leads to over 0.56 per cent increase in Iranian exports to the Germany.

**Table 8.7: Simultaneous Equation Results for Germany, 1960-1992**

$Y_{It} = 3.12$ (5.42)	$+0.100X_{Ij,t}$ (2.32)**	$+0.122X_{Io,t}$ (2.73)**	$+0.623Y_{I,t-1}$ (8.77)*
$R^2 = 0.988$	$F = 776$	$h = 1.45$	
$X_{Ij,t} = -5.22$ (-4.24)	$+0.564Z_{j,t}$ (2.45)**	$+0.383P_t$ (2.92)*	
$R^2 = 0.791$	$F = 56.6$	$DW = 1.44$	
$Z_{j,t} = 2.25$ (3.30)	$+0.256E_{j,t}$ (3.12)*	$+0.050M_{Ij,t}$ (0.793)	$+0.468Z_{j,t-1}$ (2.93)*
$R^2 = 0.960$	$F = 230.31$	$h = 1.68$	
$M_{Ij,t} = -4.67$ (-2.51)	$+0.572Y_{It}$ (2.57)**	$+0.425M_{Ij,t-1}$ (2.39)**	
$R^2 = 0.764$	$F = 48.60$	$h = 1.61$	

The figures in the parentheses are 't' values

\* = Significant at least at the 1 per cent level

\*\* = Significant at least at the 5 per cent level

The results of the third equation, suggest that Iran's imports from Germany do not have any significant impact on the German economy. Results of the fourth equation suggest that Iran's income is a major factor in determining Iran's imports from

Germany. The short-run import elasticity in this case is 0.567 and the long-term elasticity is 0.990.

### (7) Romania

Romania is also an important trading partner of Iran. Romania absorbed about 5.5 per cent of Iranian exports during the past five years. Trade relationship between the two countries were based mainly on barter basis before the 1980s. Due to a lack of data, the study of the relationship between Iran and Romania is limited to the period 1980-1992. The simultaneous equation results for Romania are given in Table 8.8. The results of the first equation suggest a strong relationship between Iranian GDP and Iran's exports to Romania. The short-run export elasticity is 0.178 and long-run elasticity is 0.922. Romanian income and oil prices seem to have strong impact on Iranian exports to Romania.

**Table 8.8: Simultaneous Equation Results for Romania (1980-92)**

$Y_{It} = 0.993$ (0.617)	$+0.178X_{Ij,t}$ (2.29)**	$+0.334X_{Io,t}$ (4.17)*	$+0.807Y_{I,t-1}$ (4.79)*
$R^2 = 0.778$	$F = 10.53$	$h = -0.265$	
$X_{Ij,t} = -14.1$ (-3.95)	$+1.76Z_{j,t}$ (3.02)*	$+0.560P_t$ (3.01)*	
$R^2 = 0.617$	$F = 6.84$	$DW = 1.70$	
$Z_{j,t} = 2.17$ (3.71)	$+0.073E_{j,t}$ (2.23)**	$+0.047M_{Ij,t}$ (2.22)**	$+0.667Z_{j,t-1}$ (8.09)*
$R^2 = 0.943$	$F = 49.04$	$h = -0.512$	
$M_{Ij,t} = -29.47$ (-2.32)	$+1.15Y_{It}$ (2.25)**	$+0.522M_{Ij,t-1}$ (2.36)**	
$R^2 = 0.622$	$F = 5.46$	$h = 1.26$	

The figures in the parentheses are 't' values

\* = Significant at least at the 1 per cent level

\*\* = Significant at least at the 5 per cent level

The significant coefficient of Iran's import from Romania in the third equation suggest presence of feedback effects. This is not unreasonable, since the Iran's share in Romania's exports is significant. These results also suggest that, the current and past exports of Romania have a strong impact on growth of its economy. The interesting point is that, these variables are more elastic with respect to its income than the similar variables in rest of the countries under study. The last equation results show a significant relationship between Iranian income and its imports from Romania during the period. The short-run and long-run import elasticities are 1.15 and 2.41 respectively.

#### **(8) Brazil**

Brazil became a major trading partner of Iran after the oil boom. Brazil imported about 4.9 per cent of total Iranian exports during the last five years of the study. As with Romania the lack of data has meant that the analysis is confined to the period 1980-1992. The simultaneous equation results for Brazil are given in Table 8.9. The results of the first equation suggest that there is a strong relationship between Iranian exports to Brazil and Iranian GDP. The statistically significant coefficient of the lagged variable suggests the presence of spread effects.

The short-run income elasticity of exports is 0.058 and the long-run elasticity is 0.116. The regression results suggest that oil prices and the level of Brazil's income had a great impact on exports of Iran to this country. The results of the third equation suggest that there are feedback effects, since the Iran's share in Brazil's exports is significant. and the current and past exports of Brazil have a strong impact on growth of its economy. The last equation results shows, a significant relationship between Iranian income and its imports from Brazil during this period. The short-run import elasticity is 1 and the long-run elasticity is 2.04.

**Table 8.9: Simultaneous Equation Results for Brazil (1970-92)**

$Y_{It} = 4.40$ (4.42)	$+0.058X_{Ij,t}$ (2.32)**	$+0.093X_{Io,t}$ (2.18)**	$+0.500Y_{I,t-1}$ (4.74)*
$R^2 = 0.974$	$F = 237$	$h = 0.943$	
$X_{Ij,t} = -29.23$ (-4.23)	$+3.51Z_{j,t}$ (2.73)**	$+0.961P_t$ (2.51)**	
$R^2 = 0.843$	$F = 34.04$	$DW = 1.84$	
$Z_{j,t} = 3.98$ (5.46)	$+0.137E_{j,t}$ (2.27)**	$+0.055M_{Ij,t}$ (2.18)**	$+0.400Z_{j,t-1}$ (2.55)**
$R^2 = 0.967$	$F = 185.9$	$h = 0.363$	
$M_{Ij,t} = -9.77$ (-2.44)	$+1.00Y_{It}$ (2.30)**	$+0.511M_{Ij,t-1}$ (3.06)*	
$R^2 = 0.625$	$F = 11.05$	$h = -1.84$	

The figures in the parentheses are 't' values

\* = Significant at least at the 1 per cent level

\*\* = Significant at least at the 5 per cent level

### (9) Spain

Iranian trade relationship with Spain has been stronger in the years since the revolution (1979). Iranian exports to Spain accounted for about 4.5 per cent of total exports over the last five years. The econometric results of the trade interdependence between Iran and Spain are given in Table 8.10. The results of the first equation suggest that both Iranian current and past exports to Spain have a great and positive impact on its income growth. The short-run elasticity of Iranian GDP with respect to its exports to Spain is 0.052, which is lower than other cases studied so far. The long-run elasticity is 0.175.

The results of equation two suggest that Iranian exports to Spain are strongly affected by Spain's income. The estimated parameters in equation 3 do not indicate presence of any feedback effects. The last equation's results suggest the presence of a significant relationship between Iranian imports from Spain and the Iranian income.

The short-run import elasticity in this case is 0.520 while the long-run elasticity is 2.13

**Table 8.10: Simultaneous Equation Results for Spain, 1960-1992**

$Y_{It} = 2.51$ (7.93)	$+0.052X_{Ij,t}$ (2.42)**	$+0.094X_{Io,t}$ (2.51)**	$+0.702Y_{I,t-1}$ (11.71)*
$R^2 = 0.963$	$F = 1297$	$h = 1.03$	
$X_{Ij,t} = -11.22$ (-3.43)	$+1.38Z_{j,t}$ (2.28)**	$+1.04P_t$ (6.68)*	
$R^2 = 0.693$	$F = 33.96$	$DW = 1.53$	
$Z_{j,t} = -0.184$ (-0.674)	$+0.068E_{j,t}$ (2.25)**	$-0.095M_{Ij,t}$ (-1.29)	$+0.968Z_{j,t-1}$ (12.06)*
$R^2 = 0.846$	$F = 60.90$	$h = 1.81$	
$M_{Ij,t} = 0.864$ (-2.34)	$+1.025Y_{It}$ (2.30)**	$+0.520M_{Ij,t-1}$ (2.92)*	
$R^2 = 0.882$	$F = 113.04$	$h = 1.83$	

The figures in the parentheses are 't' values

\* = Significant at least at the 1 per cent level

\*\* = Significant at least at the 5 per cent level

### (10) Singapore

Iran and Singapore have had stronger trade ties following Iran's plans to change its direction of trade towards non-western nations, and as a result of the impressive growth of Singapore economy in 1980s. The regression results of this country are given in Table 8.11. This country imported more than 3 per cent of the Iranian exports during the last five years of the study. Results of the first equation suggest that Iranian exports to Singapore exert a significant effect on Iranian GDP. The short-run GDP elasticity with respect to its exports to Singapore is 0.069 and the long-run elasticity is 0.207 in this case.

The results of equation 2 suggest a significant relationship between the growth of Singapore economy, and Iranian exports to Singapore. Inspection of the coefficient of

$M_{Ij,t}$  in the third equation suggests that there is a significant feedback effects, since the Iran's share in Singapore exports is significant. Results of the fourth equation suggest that, there is a significant effects from Iranian current and past income on its imports from Singapore. The short-run elasticity is 1.30 and the long-run elasticity is 2.25.

**Table 8.11: Simultaneous Equation Results for Singapore, 1960-1992**

$Y_{It} = 2.90$ (5.44)	$+0.069X_{Ij,t}$ (2.33)**	$+0.086X_{Io,t}$ (2.30)**	$+0.667Y_{I,t-1}$ (11.02)*
$R^2 = 0.993$	$F = 1500.1$	$h = 1.17$	
$X_{Ij,t} = -5.40$ (-18.50)	$+0.920Z_{j,t}$ (3.55)*	$+0.525P_t$ (2.35)*	
$R^2 = 0.937$	$F = 77.02$	$DW = 1.48$	
$Z_{j,t} = 1.15$ (2.99)	$+0.270E_{j,t}$ (2.62)**	$+0.118M_{Ij,t}$ (2.22)**	$+0.423Z_{j,t-1}$ (2.24)**
$R^2 = 0.977$	$F = 406.3$	$h = 0.135$	
$M_{Ij,t} = -13.20$ (-3.11)	$+1.30Y_{It}$ (3.03)*	$+0.423M_{Ij,t-1}$ (2.52)**	
$R^2 = 0.804$	$F = 61.63$	$h = 1.70$	

The figures in the parentheses are 't' values

\* = Significant at least at the 1 per cent level

\*\* = Significant at least at the 5 per cent level

### (11) Turkey

Turkey is the closest country to Iran, in this sample, both in terms of geographical location and cultural similarities. Turkey accounted for 2.5 per cent and 3.3 per cent of total Iranian exports and imports during the last five years respectively. The results for the study of the trade relationship between Iran and Turkey are provided in Table 8.12.

The results of the first equation are in line with those of other countries, that is indicating the existence of strong multiplier and spread effects. The short-run GDP



elasticity with respect to exports is 0.045 and the long-run elasticity 0.091. The second equation results suggest that Turkey's income and price of oil have strong effects on Iranian exports to Turkey. The results of equation 3 suggest that Iranian imports from Turkey (Turkey's exports to Iran) had a significant and positive effect on the level of Turkey's GDP. This significant impact suggests the presence of feedback effects. The results of the fourth equation suggest the presence of an income elastic imports of Iran from Turkey. The short-run import elasticity is 1.73 and long-run elasticity is 3.03.

**Table 8.12: Simultaneous Equation Results for Turkey (1972-92)**

$Y_{It} = 4.36$ (5.33)	$+0.045X_{Ij,t}$ (2.18)**	$+0.069X_{Io,t}$ (2.11)**	$+0.506Y_{I,t-1}$ (5.71)*
$R^2 = 0.964$	$F = 153.6$	$h = 1.78$	
$X_{Ij,t} = -24.36$ (-3.86)	$+1.96Z_{j,t}$ (2.95)*	$+1.22P_t$ (4.47)*	
$R^2 = 0.769$	$F = 29.90$	$DW = 2.30$	
$Z_{j,t} = 6.15$ (4.26)	$+0.115E_{j,t}$ (2.72)**	$+0.035M_{Ij,t}$ (2.62)**	$+0.387Z_{j,t-1}$ (2.64)**
$R^2 = 0.962$	$F = 143.9$	$h = 1.65$	
$M_{Ij,t} = -25.45$ (-2.21)	$+1.73Y_{It}$ (2.17)**	$+0.430M_{Ij,t-1}$ (2.24)**	
$R^2 = 0.626$	$F = 15.09$	$h = 1.64$	

The figures in the parentheses are 't' values

\* = Significant at least at the 1 per cent level

\*\* = Significant at least at the 5 per cent level

## 8.6.: Summary and Conclusion

This chapter examined the trade relationship between Iran and its major trading partners using a simultaneous equations model. The results emphasised the role played by the interaction of international trade and tested for degree of feedback between the Iranian economy and its major trading partners. The hypothesis tested in this chapter is that an increase in Iran's exports to a major trading partner contributed

to growth in Iranian GDP. The increase in Iranian income expanded its imports from its major trading partners. This in turn contributed to growth in the income of the trade partners.

It can be inferred from the results that Iranian exports to each of its major trading partners have a strong effect on Iranian GDP. The effects of lagged GDP on GDP is also positive and significant, which suggests the existence of a strong spread effects from the export sector to the rest of the economy. In other words, the investment opportunities created by exports were fully exploited. These results support the single equation model results.

The regression results suggest that the GDP of Iranian trading partners is a major determinant of Iranian exports to those countries. The results also suggest that the price of oil exerts a significant effect on Iranian export revenues from its trading partners.

Moreover, the GDP of the major trading partners is strongly influenced by their exports to other countries of the world. However, the level of Iranian imports from its major trading partners do not seem to have any significant effect on the level of the GDP of its major trading partners except Turkey, Singapore, Brazil and Romania. In other words it seems that, a feedback effect exerts only in the trade relation between Iran and the four mentioned countries.<sup>3</sup> The results of the last equation suggest that, Iranian income, has a strong impact on the level of its imports from its trading partners. The short-run import elasticity was highest in case of Turkey (1.73), followed by Singapore (1.30), Romania (1.15), Spain (1.02) and Brazil (1.0)

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<sup>3</sup> As, at best, the feedback variables ( $M_{i,t}$ ) exert only a very minor impact overall, these results suggest that the alternative "structuralist" model was not relevant to the development of the Iranian economy during the period.

## Appendix A:

### Testing the Identification of the Simultaneous Model

There are two conditions which must be fulfilled for an equation to be identified: order and rank conditions.

#### 1. The Order Condition

This condition is based on a counting rule of the variables included and excluded from the particular equation. It is necessary but not sufficient condition for the identification of an equation. The order condition stated as follows. For an equation to be identified the total number of predetermined variables excluded from it must be equal to or greater than the number of endogenous variables in the equation less than one. To explain:

Let  $g$  = total number of endogenous variables in the equation

$k$  = number of total predetermined variables in the model

$m$  = number of predetermined variables included in a particular equation.

For an equation to be identified, the total number of variables excluded from it but included in other equations, must be at least as great as the number of equations of the system less than one.

Then the order condition for identification may be symbolically expressed as

$$(k-m) \geq (g-1)$$

The order condition for the model used in this chapter is given in Table 8A1. The results show that the order condition is satisfied for each equation.

**Table 8A1: Testing the order condition**

Equation	Excluded variables (k-m)	Total number of equations-1 (g-1)	Order condition
1	$(10-4) = 6$	$(4-1) = 3$	Satisfied
2	$(10-3) = 7$	$(4-1) = 3$	Satisfied
3	$(10-4) = 6$	$(4-1) = 3$	Satisfied
4	$(10-3) = 7$	$(4-1) = 3$	Satisfied

But as mentioned before the order condition for identification is necessary for a relation to be identified, but it is not sufficient, in that, it may be fulfilled in any particular equation and yet the relation not be identified.

## 2. The Rank Condition for Identification

The rank condition states that in a system of (g) equations any particular equation is identified if and only if it is possible to construct at least one non-zero determinant of order (g-1) from the coefficients of the variables excluded from the particular equation but contained in the other equations of the model. To illustrate the rank condition of identification one may proceed as follows:

(1) Write the parameters of all the equations of the model, noting that the parameter of a variable excluded from an equation is equal to zero.

$$Y_t - \alpha_0 - \alpha_1 X_{it} - \alpha_2 X_{ot} - \alpha_3 Y_{t-1} = \mu_t$$

$$X_{it} - \beta_0 - \beta_1 Z_t - \beta_2 P_t = \eta_t$$

$$Z_t - \delta_0 - \delta_1 E_t - \delta_2 M_t - \delta_3 Z_{t-1} = \varepsilon_t$$

$$M_t - \gamma_0 - \gamma_1 Y_t - \gamma_2 M_{t-1} = \omega_t$$

Ignoring the random disturbances, the table of the parameters of the model is as follows:

Table 8A2: testing the rank condition

eq.	1	$Y_t$	$X_{it}$	$Z_t$	$M_t$	$X_{ot}$	$Y_{t-1}$	$P_t$	$E_t$	$Z_{t-1}$	$M_{t-1}$
No											
1	$-\alpha_0$	1	$-\alpha_1$	0	0	$-\alpha_2$	$-\alpha_3$	0	0	0	0
2	$-\beta_0$	0	1	$-\beta_1$	0	0	0	$-\beta_2$	0	0	0
3	$-\delta_0$	0	0	1	$-\delta_2$	0	0	0	$-\delta_1$	$-\delta_3$	0
4	$-\gamma_0$	$-\gamma_1$	0	0	0	0	0	0	0	0	$-\gamma_2$

- (2) Select the row of the coefficients of the equation which is being examined for identification.
- (3) Select the columns in which a non-zero coefficient of the equation being examined appears. By deleting the relevant row and columns we are left with the coefficients of variables not included in the particular equation, but contained in the other equation of the model.

(4) Form the determinants of order  $(g-1)$  and examine their value. If at least one of these determinants is non-zero, the equation is identified. In the model tested in this chapter there are four determinants of order  $(g-1) = 4-1=3$ . They are:

$$|A| = \begin{vmatrix} -\beta_1 & 0 & 0 \\ 1 & -\delta_3 & 0 \\ 0 & 0 & -\gamma_2 \end{vmatrix} \neq 0$$

$$|B| = \begin{vmatrix} 1 & 0 & -\alpha_3 \\ 0 & -\delta_2 & 0 \\ -\gamma_1 & 0 & 0 \end{vmatrix} \neq 0$$

$$|C| = \begin{vmatrix} 1 & -\alpha_1 & 0 \\ 0 & 1 & 0 \\ -\gamma_1 & 0 & -\gamma_2 \end{vmatrix} \neq 0$$

$$|D| = \begin{vmatrix} -\alpha_1 & 0 & 0 \\ 1 & -\beta_1 & 0 \\ 0 & 1 & -\gamma_2 \end{vmatrix} \neq 0$$

Since all four determinants are non-zero and  $(k-m) > (m-1)$ , the four equations in the model are overidentified.

## **Chapter 9**

### **Future Impact of the Oil Sector on Iranian Economic Growth**

#### **9.1. Introduction**

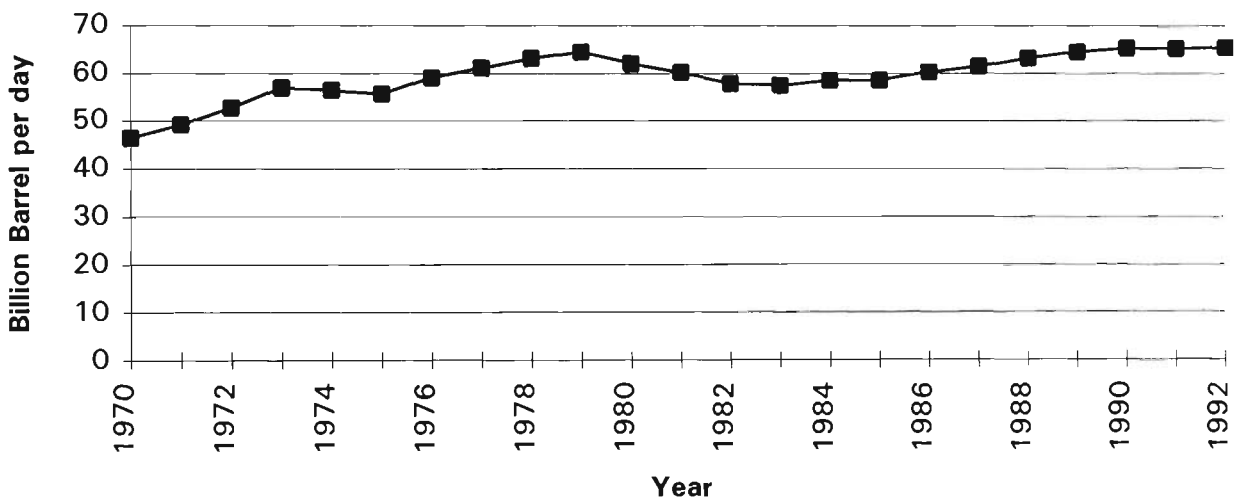
Oil is currently the main source of government revenue and foreign exchange in Iran; accounting for 18 per cent of GDP and over 90 per cent of the total exports. Although the oil sector has made a large contribution to Iran's economic development in recent decades, its future role has been questioned. This role depends on developments in the international oil market and on the Iranian government vision regarding the future path of development. This chapter tries to throw some light on these issues. The chapter is divided into four sections. The next section analyses the trend in world oil consumption. World supply of oil is discussed in the third section. Finally, the Iran's policies towards the oil industry are presented in section four.

#### **9.2. Trends in World Oil Consumption**

The demand for oil is a function of a large number of variables, including per capita income, population, oil prices, price of alternative energy products, market monopolies and environmental policies. World oil consumption grew from 46.4 million barrel per day (mb/d) in 1970 to 65.39 mb/d in 1992 (an average annual rate of 1.02 per cent over the period) (Energy Statistics Sourcebook, 1993). The oil consumption of the OECD countries dropped 15 per cent between 1979 and 1987 and was accompanied by a number of shifts in the composition and seasonal pattern of demand. The largest drop was in residential fuel oil, which declined by 53 per cent over that period. By contrast, the consumption of middle distillates and other products declined by only 10 per cent 6 per cent respectively (Caruso, 1989, p.6).

Hydrocarbon consumption has continued to increase despite the oil shocks of 1973 and 1979; the 1990 Gulf Crisis, as well as active policies to reduce energy use through efficiency gains, and the environmental debate over the use of fossil fuels, Figure 9.1 shows the trend in world consumption for oil during the period 1970-92. (Dorian, 1992, p. 3).

**Figure 9.1 World Oil Consumption 1970-92**



Source: Energy Statistics Sourcebook, 1992

There have been a number of important developments and events in recent decades which have had a strong influence on the demand for energy beginning from the expansion of the world economy in the post World War Two period (Dovers, 1994, p. 15). The increase in GDP was one of the most influential factors in energy consumption. The reverse has also happened as the world economy moved into recession, although the link between energy consumption and the level of economic activity has weakened in recent years (Thorpe, 1991, p. 16). For example, the primary and final energy inputs per unit of GDP has historically, been close to one in Germany. This ratio was reduced since 1973 as a strong reaction to the second oil price increase (Hansen 1990, p. 631).



Low (or negative) economic growth as well as improved fuel efficiency and substitution caused oil consumption to stagnate through the early 1980s. Following the price fall of 1986, the OECD oil consumption grew somewhat faster than that predicted by most analysts. Low economic growth as well as improved fuel efficiency and fuel switching caused oil consumption in developing countries to stagnate through the early 1980s (Franssen, 1989, p. 47).

### **9.2.1 Effects of Energy Substitution on Demand for Oil**

Oil price increases have been instrumental in encouraging considerable substitution of other fuels for oil in many applications. The oil price shocks of 1979 and 1983 made oil substitution a major issue in energy planning and policy formation worldwide. The result was a reduction in oil use as a percentage of total energy from 53.7 per cent in 1973 to 41.8 per cent in 1992 in OECD countries, as can be seen in Table 9.1. According to International Energy Agency (IEA) prediction, this ratio will be reduced to 39.8 per cent by the year 2000 (Hoeller and Coppel, 1992, p. 115). Mikdashi (1986) expressed the relationship between the price of oil and energy use during the two periods 1960-73 and 1973-82 in the following words:

Assuming that consumer's prices for petroleum products have increased roughly parallel to those of crude oil, oil price stability over the years between 1960 and 1973 appears to have been responsible for a 7.5 per cent per annum growth rate in world oil consumption outside the centrally planned economies. A price increase of 23 per cent per annum between 1973 and 1982 brought, by comparison, a decline in oil consumption of about 0.7 per cent per annum. (Mikdashi, 1986, p. 22)

Oil price increases not only played a major role in encouraging energy conservation in the 1980s, but have also encouraged considerable substitution of other fuels for oil in many applications.

**Table 9.1 The ratio of oil consumption to total energy consumption in OECD countries during 1970-1992**

Year	Oil consumption/energy consumption	Year	Oil consumption/energy consumption
1970	0.506	1982	0.469
1971	0.513	1983	0.460
1972	0.521	1984	0.450
1973	0.532	1985	0.434
1974	0.516	1986	0.444
1975	0.513	1987	0.436
1976	0.518	1988	0.436
1977	0.521	1989	0.433
1978	0.518	1990	0.423
1979	0.504	1991	0.414
1980	0.498	1992	0.418
1981	0.476		

Source: IEA, Energy Balances of OECD Countries, Several Issues

Hoeller and Coppel predicted that world oil consumption will rise at an annual average rate of 1.7 per cent over the period to 2005 assuming a gradual rise in oil prices to \$35 per barrel (in constant 1990 US\$). Consumption of oil is expected to rise most in developing countries (3.6 per cent per annum), largely because of rapid population growth, urbanisation, greater transport needs and accelerating industrialisation, particularly of heavy, relatively energy-intensive industries. Demand from Eastern Europe and the former Soviet Union is expected to increase at about 1.8 per cent per annum while the rate of the OECD is projected to increase at 0.6 per cent per annum (Hoeller and Coppel, 1992, p. 72).

The data in Table 9.2 suggest that the fall in the share of oil within total energy use was accompanied by increases in all other forms of energy during the period 1973-1989 in OECD countries. Coal, nuclear, and hydro and geothermal energies grew by 16 per cent, 629 per cent and 16.7 per cent respectively during the period 1973-1989.

**Table 9.2. Proportions of different energy forms in OECD countries**

Year	Solid fuel	Oil	Natural Gas	Nuclear	Hydro/Geo
1973	21.0	55.3	19.9	1.4	2.4
1979	21.6	52.4	19.5	3.9	2.7
1988	24.6	43.6	18.9	10.1	2.9
1989	24.4	43.3	19.4	10.2	2.8

Source: IEA, Energy Balances of OECD Countries, Several Issues

### **9.2.2 Effects of Environmental Policies on the Demand for Oil**

Although all energy sources have undesirable environmental effects, high levels of fossil-fuel consumption are of special concern. They pose three interrelated threats to the environment: air pollution, acidification of the environment and climate change (World Commission on Environment and Development 1987, p.16). It has been claimed that the rise in global mean temperature in the first half of the next century would be greater than any in recorded history. According to the WCED Report global warming of 1.5 to 4.5 Celsius degrees at the equator should be anticipated within the next 45 years. This would cause the sea level to rise from 25 cm to 145, which would overflow low-lying coastal cities and agricultural areas. Many countries could expect their economic, social and political structure to be severely affected (WCED 1987, p. 24).

### 9.2.2.1. Reducing Carbon Emissions Policy

Energy production and consumption contribute to pollution in many ways:

- (1) Motor vehicles produce carbon monoxide, lead, nitrogen oxides and hydrocarbons;
- (2) Fossil fuel-fired electricity generation produces sulphur dioxide, nitrogen oxides and particulates;
- (3) Fuel processing (e.g. refineries, coke ovens) produces monoxide, sulphur dioxide and hydrocarbons.

Carbon dioxide is considered the predominant contributor to greenhouse gas emissions and it is responsible for about 55 per cent of total emissions of which about 8 per cent can be attributed to coal combustion for electricity generation. For this reason, carbon dioxide has received more attention than the other greenhouse gases (Dorian, 1992, p. 97). The pre-industrial concentration of carbon dioxide was 280 parts of carbon dioxide per million (ppm) parts of air by volume. This concentration rose to 340 in 1980 and is expected to reach 560 between the middle and the end of next century. How soon this occurs will depend almost entirely on the energy path followed in the meantime (WCED, 1987, p.24). It is widely agreed that at an atmospheric concentration of 600 ppm or more, global temperature and climate changes would almost certainly become significant and be a cause for concern. If CO<sub>2</sub> emissions from fossil fuels were to continue to expand at a rate of growth similar to the period 1950-73 (i.e. an average of 4.5 per cent per year) then CO<sub>2</sub> concentration of 600 ppm would almost certainly be encountered within 50 years (Edmonds and Reilly, 1985, p.265).

A tax on the carbon content of fossil fuel has received significant international attention as a policy option to reduce greenhouse gas emissions. In effect, this policy imposes a charge on the polluting activities of fossil fuel users. A carbon tax would

raise the cost of using fossil fuels, which in turn would raise the price of the energy services provided by fossil fuels. With such a tax in place, the market should respond by beginning to conserve energy and seek areas of efficiency gains, for example, through inter-fuel substitution and technological development (Dorian, 1992, p.297).

Some Scandinavian countries have introduced formal carbon taxes. Finland has agreed to a tax equal US\$6.10 per tonne of carbon emitted, while Sweden has made an even greater tax commitment of about US\$39 per tonne. However, these tax levels are relatively small and at this stage have not substantially affected the relative prices of different fuels (Dorian, 1992, p.297).

Accumulation of CO<sub>2</sub> and other greenhouse gases such as methane in the atmosphere may have negative effects in the future in the form of climate change. This negative external effects of CO<sub>2</sub> may harm all countries in the world and not only the country emitting gases. Thus, while benefits from CO<sub>2</sub> emissions are directed towards the emitting country, the damage costs will be worldwide and will continue as long as the CO<sub>2</sub> remains in the atmosphere (Ierland, 1994, p.46). The economic theory of environmental regulation is an externality - a form of social cost that is not borne by the agent which is its source. The policy implication is to correct this misallocation by placing a charge, a unit tax, on the offending activity that is equal to the marginal social damage. This policy fulfils two tasks with a single instrument insofar as it regulates environmental quality and raises public revenues.(Oates, 1993, p.35). According to Beckerman (1991, p.72) :

Reducing CO<sub>2</sub> emissions by 50 per cent usually put the taxes into the region of a few hundred dollars per ton of carbon, which usually translates into taxes of four or five hundred per cent on the net (of tax) price of energy. And estimates along these lines by Whalley and Wigle show taxes of this magnitude leading to net economic welfare losses over the period 1990 to 2030 amounting to about \$18 trillion, or about 4 per cent of total world output over the same period.

Carbon taxation would also encourage the substitution of fossil fuels within individual countries together with use of energy sources with other environmental impacts, such as nuclear fission. (Dovers, p.179) The carbon tax in 1988 was much higher for oil than for gas in all OECD countries, while coal was largely untaxed. Hoeller and Coppel claim that in many European countries, the oil product tax is above \$250 per ton of carbon or equivalent to about \$30 on a barrel of oil. These authors examined the effects of maintaining existing taxes and adding a combined carbon/energy tax of \$40 per ton of carbon and \$33 per ton of oil equivalent. The result was a 28 per cent reduction in emissions of fossil fuels in OECD countries which would raise average energy prices by 41 per cent. Under such a model, oil prices suffer the least price increase of 20 per cent after natural gas and coal with 32 per cent and 105 per cent increases respectively. This change in relative prices is shown to motivate substitution from coal and gas into oil (Hoeller and Coppel, 1992, p.185).

#### **9.2.2.2. Energy Conservation**

Energy intensity (the ratio of energy consumption to GDP) fell 20 per cent in the OECD countries between 1973 and 1985, saving the industrialised countries the equivalent of 18 mb/d per annum (Franssen, 1989, p.61) Transport is a major consumer of oil and accounts for 50-60 per cent of total oil use in the majority of developed and developing countries (WCED, p.47). Almost all energy used in the transportation sector is oil (99 per cent) and according to some researchers oil will keep its dominant role for the remainder of the century (Franssen, 1989, p. 50). Energy use in transport grew quite slowly in the Western industrialised countries, after 1973 and began to decline in the late 1970s (WCED, p.47). Higher petrol prices after the two oil shocks had the effect of improving fuel efficiency of new cars and encouraging the trend towards smaller cars. According to Franssen (1989), fuel consumption for commercial vehicles is estimated to increase by about 1.0 to 1.4 mb/d in the OECD by the year 2000, whereas the growth of demand for fuel for

passenger cars during the same period is projected to be between 0.4 and 1.3 mb/d. Growth of aviation fuel efficiency has also been considerable. The switch from narrow to wide-body aircraft improved efficiency per passenger kilometre by 20-40 per cent. Aviation fuel in the OECD is estimated to grow between 0.2 and 1.0 mb/d by 2000, while the maritime fuel consumption, which was about 1.3 mb/d in 1986, is estimated to expand by 0.5 mb/d by the year 2000. In total, OECD transportation fuels could grow by some 2-4.5 mb/d by the year 2000, depending on economic activity, oil prices, and efficiency trends (Franssen, 1989, p.51).

The vehicle market is expected to grow much more rapidly in developing countries from the year 2000 and beyond, adding greatly to potential air pollution in cities. In view of this, certain developing countries may gain from exploring the potential of non-oil based transport fuels, such as the alcohol-based fuels, solar energy, ethanol and methanol, both obtainable by biomass. The encouragement of more energy efficient modes of transport is another option and one which reverses the trend in developing countries. In particular, rail has given way to road and the bus to private vehicles. Reversing this trend is not easy, since the least efficient transport modes are seen the most individually convenient and flexible (WCED, p.47-49).

Industry is also a major source of energy demand and accounts for 40 per cent to 60 per cent of all energy consumed in industrialised countries and 10 per cent to 40 per cent in developing countries. Most trends point to a very rapid growth of industry by the turn of the century (WCED, p.50). Declining energy consumption per unit of output is not an entirely new phenomenon of the post 1973 oil price hike. Industrial energy data for the OECD countries show a steady decline of industrial energy use per unit of output during the 1960s, when energy prices declined in real terms (Franssen, 1989, p.48). New technologies, more rational use of production input, and more efficient management techniques were the prime reasons for these

developments. The post 1973 oil price increases resulted in an almost one-third decline in industrial energy intensity in the industrialised countries between 1973 and 1985. Recessions and industrial restructuring contribute further to the reduction in energy growth in the industrial sector, so that energy consumption in the OECD's industrial sector fell by almost 20 per cent (Franssen, 1989, p.48), and the share of most expensive fuel, oil, fell from 48 per cent to 28 per cent in favour of coal, natural gas and electricity. Most of the energy consumption in the industrial sector of OECD countries is concentrated in seven industries: iron and steel, aluminium, chemicals, non-metallic minerals, paper and pulp, textiles and food (Franssen, 1989, p.48).

There is a number of potential constraints which will influence the pace at which future oil substitution in industry takes place. These include:

- (1) Availability and price of natural gas,
- (2) Limitations of space for coal storage and handling,
- (3) The normally high capital cost of change from oil to coal fired boilers,
- (4) The relatively high current price of electricity compared to oil in most countries, and
- (5) Air emission controls in some urban areas (World Energy Conference, 1983, p. 9).

### **9.3 Trends in the Supply of Oil**

Over 90 per cent of the world's energy requirements were met from exhaustible resources, namely coal, oil and natural gas. Oil dominated the world energy market with a 37.1 per cent share of primary energy consumption in 1991. Coal accounts for 29.2 per cent and natural gas accounts for 23.7 per cent. Other sources of energy including, nuclear power, geothermal, solar, and biomass and ethanol provided about 10 per cent of world energy supply (World Resources, p.166).



The main factor affecting the supply level of any energy source is the production cost of that energy source. Factors affecting the relative production cost of different kinds of energy are mainly grouped in the following four categories:

- (1) natural and geographical characteristics which affect the quality, quantity and the ease of extraction,
- (2) technology of the extraction which have an impact on the economies of exploiting in different areas of the world,
- (3) institutional factors which mostly relates to fiscal facilities including, tax levels, incentives, distribution of risks and reward between the host country and contracting companies,
- (4) perception for political risks in the country of energy production, and the availability of the means of averting, moderating or insuring that risk.

The extraction cost of oil, in turn is affected by a range of factors including,

- (1) Exploration and development costs,
- (2) The size of oil or gas recoverable reserves, and
- (3) The rate of production of these reserves.

The oil boom has encouraged many producers to enter the oil market. The marginal cost of some of these producers would have not justified economic production before 1974. However, the rate of discovery has slowed down since the mid-1980s. This was mainly due to the sharp reduction in prices.

### **9.3.1 The Level of Oil Exploration**

The world oil supply is heavily dependent on the level of exploration and development spending, both of which depend on world oil prices and other factors. There is a strong correlation between falling oil prices and falling exploration and development expenditures. Expenditures on oil exploration and production outside communist countries reached a maximum of \$88.9 billion in 1982 (Khan, 1987, p.22).

Probably the single most important factor affecting recent developments in oil exploration has been the dramatic change in expectations regarding the long-term development of world oil prices. Most international oil exploration is being carried out on the basis of long-term considerations regarding price and other economic conditions. There is generally a time span of 5-10 years between the initial drilling of an exploratory well and the date when an oil field reaches full-scale production (Cameron, 1988, p. 48). The oil price boom in the mid 1970s and early 1980s meant intense competition between oil companies for the available market. The expectation of ever-rising oil prices has been translated into the willingness to speed up exploration. By contrast, under the low oil prices of the late 1980s, new exploration and development were heavily curtailed, and financing was difficult to obtain, either from banks or from government resources. Companies reported reduction in staff, falling exploration expenditures, a scaling down of new projects and a reassessment of current and planned operations (Waelde, 1988, p.9).

### **9.3.2 Share of OPEC in World Oil Production**

The members of OPEC control three-quarters of the non-communist world oil reserves. OPEC reserves doubled in the 1960s from 218 to 434 billion barrels. Despite a cumulative production of more than 200 billion barrels between 1974 and 1986, OPEC reserves at the end of 1992 still stood at more than 780 billion barrels (OPEC Bulletin 1992, p11).

OPEC was a successful cartel during the 1970s. However the unforeseen fall in world oil consumption, together with rapidly rising non-OPEC production, caused a major decline in the demand for OPEC oil. OPEC's market share which had remained fairly stable during the late 1970s, was almost halved over the following five years. OPEC production fell in absolute terms from an average of 31 mb/d in 1979 to just below 20 mb/d in 1982.

Despite this reduction in production share and the decline in the effectiveness of OPEC in manipulating the price of oil in recent years, it would be misleading to conclude that its future prospects are grim. OPEC still has 75.7 per cent of the world oil reserves (OPEC Bulletin, 1992). Moreover according to Cairnie (1992) the world oil demand is expected to increase about 5 mb/d between 1990 and 1996. This increase in demand will need to be met largely from OPEC sources; with an expected 25.5 mb/d (Cairnie, 1992, p.44-46).

### **9.3.3. Share of non-OPEC Oil Producers in World Oil Production**

The distribution of crude oil reserves worldwide, has not changed much since 1978. The Middle East still possesses about 60 per cent of world reserves while OECD countries have approximately 15 per cent. Major changes have taken place in some new areas such as the North Sea and Mexico. Moreover, North American oil production is considerably higher today than was thought possible at substantially higher prices a decade ago (Franssen , 1989, p.53). North Sea oil production jumped from 0.5 mb/d in 1976 to 4 mb/d in 1988. Mexico, a net oil importer during the mid-1970s, produced 3 mb/d in 1988 and exported half of its production. Production has also increased in other non-OPEC countries worldwide as can be seen from the data in Table 9.3.

The discovery of substantial oil deposits in the North Sea in 1960s and their successful exploitation has made the United Kingdom a major oil producer. For example, United Kingdom became the fourth non-communist oil producer in the world after, the United States, Saudi Arabia and Mexico. Britain was requested to join OPEC, but declined, and even refused to co-operate in oil production agreements with OPEC. (Kula, 1992, p.137).

**Table 9.3 Oil production for Selected Countries, 1976-1990 (thousand barrels per day)**

Country	1976	1986	1990
Brazil	167	593	781
Mexico	831	2,430	2974
Colorado	167	305	446
Oman	366	560	676
Angola	108	280	476
Egypt	330	813	916
Malaysia	165	501	631

Source: IEA Annual oil market report, 1990, p.35 and Franssen (1989), p.54

OPEC's problems are due not only to the decline in the consumption of oil, but also, and indeed mainly to the growth of non-OPEC production. OPEC production fell by two and half times the drop in world oil demand between 1979 and 1985. About 9.8 mb/d of new capacity were added in the world outside the Soviet bloc and OPEC between 1975 and 1985. The reason was that OPEC pushed the price up so much that the marginal producers became profitable. Hence, in a sense OPEC cut its own throat. Thus non-OPEC production rose from about 28.1 mb/d in 1975 to 40.1 mb/d in 1985. According to Robinson (1987) since the production in the USA and North Sea has levelled off and is expected to decline in the future, the long-term threat to OPEC control of the oil market could come from countries such as Mexico and China (Robinson, 1987, p.21).

#### **9.4. Iranian Policies Towards the Oil Industry**

Perhaps no other sector of the Iranian economy was as thoroughly affected by the 1979 revolution and subjected to many different internal policies than the oil sector. Similarly, no other variables influenced the behaviour and performance of the domestic economy as much as petroleum output and exports.

Iran had sought, after the revolution, to reduce dependence on oil revenues, seeking instead to develop industry and agriculture. Economic realities soon forced a revision of this approach and the government now fully appreciates the contribution of the oil sector which accounts for some 80 per cent of foreign exchange earnings and 60 per cent of budget revenues. The government's development plans now stress the role to be played by the energy sector. An expansion in oil and gas exports is the only short- to medium-term solution to the country's economic development (Rathmell, 1995).

Iran's long-term energy strategy is based on the hypothesis that the country will, over the next two decades, become primarily a gas, rather than oil, exporter. Proven gas reserves are around 735 trillion cubic feet and this may rise to 1000 trillion cubic feet by the end of the decade. This makes Iran the second largest owner of gas reserves, after Russia. Exports of liquefied petroleum gas (LPG) restarted after a 12-year break in 1991. Annual production of LPG is 75 billion cubic metres (BCM) but it is hoped to boost this to 135 BCM by the year 2000: the country's 20-year plan forecasts an output of 310 BCM by 2010. Under current plans, the aim is to export 30 BCM per year through pipelines to Europe and 20 BCM per year through pipelines to Asia by 2000 (Rathmell, 1995).

Gas revenues are unlikely to make a significant impact on the Iranian economy for years to come due to the necessity of huge investment on infrastructure for gas exploitation. Iran will continue to rely, at least in the near future, on oil export revenues. In order to maximise oil revenues, Iran's energy planners marked down a target which involves expanding production and export capacity, cutting domestic consumption, increasing refining capacity, and altering marketing strategy.

According to figures from the National Iranian Oil Company (NIOC), current production from Iran's 25 onshore and seven offshore fields is 3.56 mb/d (Iran's OPEC

quota is 3.6 mb/d). NIOC currently has a maximum capacity of 4.2 mb/d. NIOC has announced its intention to increase output to between 4.5 mb/d and 5.5 mb/d by the end of the new five-year plan (Rathmell, 1995).

The second strand in Iran's energy strategy is a major effort to reduce domestic consumption of oil. The Iranian government implemented a plan to switch domestic consumption from oil to other forms of energy. Oil supplied 80 per cent of Iran's primary energy needs in the mid 1980s. Under the second five-year plan (1995-2000), gas is expected to supply 45 per cent of primary energy demand, oil, 45 per cent, hydro-electric, 5 per cent and nuclear, another 5 per cent. In order to achieve these goals, Iran hopes to almost double its national gas pipeline network and to convert the majority of its thermal power plants to run on gas. Since national electrical power generating capacity is also expected to double by the year 2000, the scale of the investment needed is clear. Plans to double hydro-electric output are dependent upon the Karun Dam project in Southern Iran. Nuclear power is planned to be provided by the twin 1250 mega watt (MW) reactors at Bushehr on Caspian Sea coast. Russia has pledged to complete the unfinished reactors by 1999. For years, the price of petrol has been heavily subsidised. This subsidy is estimated to have cost US\$11 billion in total and has led to a 10 per cent annual increase in consumption since 1988. Annual consumption now exceeds Iran's refining capacity by over 15 per cent. The second five-year plan seeks to remedy this distortion by raising the price of gasoline from IR50/litre to IR170/litre in the hope of cutting consumption by a third. (Rathmell, 1995).

The third element in Iran's oil strategy is the expansion of refining capacity, both at home and overseas. In 1980, Iran's eight refineries had a capacity of 1.32 mb/d. These refineries were badly damaged during the war with Iraq and capacity fell to less than 0.6 mb/d. The National Refining and Distribution Company, which controls Iran's refineries, announced a refinery capacity of 1.11 mb/d in 1995. It aims to boost this to

1.91 mb/d by 2000. A key element will be the reconstruction of the huge Abadan complex which had a capacity of 0.635 mb/d in 1980. By March 1995, it had only achieved a capacity of 0.33 mb/d.(Rathmell, 1995).

The new oil policy is also based on a new marketing strategy. Iran has also made strong efforts to lock its customers into long-term contracts. The National Iranian Oil Company (NIOC) now strongly opposes the selling of Iranian oil on the spot market and claims that its whole export capacity has been taken up by customers who have signed term agreements. It also prefers to sell oil for hard currency whenever possible, as opposed to barter, and where oil money can be used to purchase modern technology and know-how. Some Japanese customers have even helped NIOC's cash flow further by paying in advance. As a consequence, Western markets are given priority and the policy includes selling more crude to European refineries.

Amirahmadi (1994) believes that there is a conflict between Iran and Arab states within OPEC. According to him:

In reality, it is a major source of conflict. In 1986, during the Iran-Iraq war, a Saudi engineered oil glut, helped by Kuwait and the United Arab Emirates (UAE) and encouraged by the United States, reduced oil prices from around \$28 per barrel to below \$10 per barrel in less than two months. Iran's expected oil revenue of \$15 billion dropped to an actual \$5.8 billion. Also, after the cease-fire in 1988, Arab members of OPEC backed Iraq's demand for parity in production quota with Iran. This was inequitable as Iraq's share had always been lower, and Iran's economy and population are about three times larger than those of Iraq (Amirahmadi, 1994, p. 103).

Iran has made dramatic attempts to break out of OPEC constraints, arguing that the organisation is dominated by pro-American Saudi Arabia. First, Iran proposed that its oil sales to Japan be paid in yen, rather than dollars. This was in response to the collapse in the value of the dollar which has wiped out most of Iran's revenue gains from higher oil prices since the late eighties. Secondly, there was an attempt to undermine

the influence of the USA and its allies in the oil market. More dramatically, Iran's deputy speaker proposed during a trip to Moscow in May 1995, that Iran and Russia should launch an 'alternative OPEC'. The idea would be to bring Azerbaijan, Iraq, Kazakhstan and Turkmenistan into the grouping and perhaps invite China to join. This proposal is indicative of Iran's desire to counter the influence of Saudi Arabia for low prices at a time when Iran desperately needs higher revenues (Rathmell, 1995).

Other aims of the Second Five Year Development Plan (1995-99) include:

1. Reducing the annual growth rate of domestic oil consumption from 6 per cent to half of this amount through increasing energy efficiency, increasing the custom tariff of the less efficient oil burning machinery, expansion of natural gas distribution network, charging higher electricity prices during the peak consumption hours, and regulating the business hours for business centres and individual shops to save more oil for export.

2. Raising the price of domestic oil products to reduce consumption as well as carbon dioxide emissions<sup>1</sup>. Such an energy policy could result in additional revenues which would accelerate the economic development.

## 9.5. Summary

Despite the oil shocks, energy conservation, efficiency gains and energy substitutions and different environmental policies world oil consumption grew at 1.02 per cent per annum between 1970 and 1992. The oil boom 1974 encouraged many producers to enter the oil market. World oil supply grew at 17 per cent annually during the period 1970-1992. The unforeseen fall in world oil consumption together with rapidly rising

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<sup>1</sup> Before 1995 the prices of domestic oil products were highly subsidised and it were even lower than their transportation costs. A study by Birol, Aleagha and Ferroukhi (1995) suggests that if the domestic oil prices in Iran were to increase to half the world level, Iran can save about 13 per cent in domestic demand for oil. This combined with improvement in energy efficiency would reduce domestic demand by over 20 per cent.



non-OPEC production reduced OPEC's market power. OPEC production fell by two and half times the drop in world oil demand between 1979 and 1985.

Iran is heavily dependent on oil revenues. An expansion in energy exports is the only short- to medium-term solution to the country's economic development. However, Iran's long-term energy strategy is based on the hypothesis that the country will, over the next two decades, become primarily a gas, rather than oil, exporter. Gas revenues are unlikely to make a significant impact on the Iranian economy for years to come due to the necessity of huge investment on infrastructure for gas exploitation. Therefore, Iran will continue to rely, at least in the near future, on oil exports.

# Chapter 10

## Conclusions and Recommendations

It has been claimed that increasing oil revenues did little, if any thing, to accelerate economic development in the oil producing countries including Iran. To address this problem, an attempt was made to analyse the effect of oil exports on economic growth in Iran and in particular to find out whether the oil sector played the role of "a leading sector " in Iranian economic development, and whether other sectors responded to the expansion in oil revenue in a manner which helped to achieve the main goal of economic diversification. The study also examined the interaction between the Iranian economy and the economies of its major trading partners, and tested for feedback effects. This investigation is of great significance, considering the fact that oil is not a renewable asset, and its revenue is subject to considerable fluctuations.

The study used single and simultaneous equation regression models to test export-led-growth models and the interaction between the Iranian economy and its major trading partner. The single model used Koyck-type lags to test for spread (carry over) effects. The test was applied to both aggregated and disaggregated sectoral output. The single equation models also used dummy variables to test for structural shifts in the functional relationships over the period of study. The simultaneous equations model used dynamic relationships and incorporated determinants of GDP, imports, exports and the resources balance.

## Conclusions

The main findings of this thesis may be summarised in the following:

- (1) Oil prices proved to be much more volatile than the price of most other primary commodities. The analysis in this thesis has shown that oil prices were ranked 13th among 28 selected commodities in terms of variation during the period

1955-69. This picture was completely reversed during the period 1970-82. The coefficient of variation in oil prices during that period was the largest among primary commodities. The story was different once again during the period 1983-92, when variations in oil prices were dropped in rank to 9th among other commodities. The results of the analysis also showed that during the period 1955-69, oil prices were ranked in terms of percentage decline (3.2 per cent) as fourth after cotton, rubber, and jute. However, oil prices enjoyed the highest rate of increase (28.29 per cent) among all primary commodities during the period 1970-82.

(2) The thesis examined the validity of the widely held view that oil exports in Iran contributed to the growth of aggregate non-oil GDP and to sectoral output. The regression results of this thesis suggest that, during the period 1960-92:

(a) Oil exports did contribute directly, through a multiplier effect, and indirectly, through the accelerator mechanism, to the growth of aggregate non-oil GDP.

(b) The spread effects are quite substantial.

(c) Structural shifts took place in all sectors except the mining sector.

(d) The agricultural sector's output responded significantly to the changes in oil exports. However, there were negative structural shifts which may be due to a variety of factors including a mild "dutch disease", failure of commercial farming; government food subsidy program for poor families; and ineffective utilisation of the oil revenues.

(e) The construction sector also responded strongly to changes in oil revenue. A large proportion of the oil revenues were invested in the building of infrastructure such as roads and ports as well as on public and private housing.

(f) The response of the output of the electricity, water and gas sector to the growth in oil exports was significant. These public utilities depend heavily on government revenue, which in turn depends on the oil revenue.

(g) There is evidence of multiplier-accelerator effects of expansion in the oil sector on the Iranian manufacturing sector. A significant portion of oil revenues was spent on importation of machines and equipment for the rapid industrialisation of the 1960s and 1970s which was carried on through import substitution policies. However, there is evidence of some backward structural shifts in the manufacturing sector during the period 1970-82. This may be explained by the tendency to purchase foreign-made products during the oil boom and the shift to armament production during the Iran-Iraq war.

(h) The regression results also suggest that expansion of the oil sector contributed significantly to both mining and services sectors in the Iranian economy during the period of the study.

(3) The results of the simultaneous equation model revealed the existence of feedback between the Iranian economy and only a few of its major trading partners. The level of Iranian imports from various countries do not seem to have any significant effect on their GDP except in the cases of Turkey, Singapore, Brazil and Romania

The simultaneous equation results suggest that Iranian exports to each of its major trading partners have a strong effect on Iranian GDP. The results of the simultaneous model support the single equation model results. However the simultaneous model gives better statistical results for the cases where there is evidence of the feedback effects.

The simultaneous regression results also suggest that the GDP of Iranian trading partners is a major determinant of Iranian exports to those countries. Furthermore, the price of oil exerts a significant effect on Iranian exports to its trading partners. Moreover, the GDP of the major trading partners is strongly influenced by their exports to other countries of the world.

The simultaneous regression results suggest that Iranian income has a strong impact on the level of its imports from its trading partners. The short-run import elasticity was highest in case of Turkey (1.73), followed by Singapore (1.30), Romania (1.15), Spain (1.02) and Brazil (1.0).

## Recommendations

The following policy recommendations may be offered in the light of the results obtained from this study.

(1) To exploit fully the opportunities generated by the expansion in its exports, Iran should encourage the emergence of relatively more risk taking entrepreneurs who are prepared to invest in productive activities.

(2) To reduce the adverse effects of bottlenecks, investment in infrastructure (particularly telecommunication and transportation) must be accelerated.

(3) Given the favourable feedback effects demonstrated in the study, an open trade policy may be more rewarding to Iran in the long-run. Therefore, it is recommended that Iran reduces its tariffs and all barriers to international trade and enhance its international competitiveness.

(4) Since, as shown in the study, oil prices fluctuate heavily the Iranian government should consider building up a reserve fund to be drawn upon at times of decline of oil revenues.

(5) Iran should persuade the OPEC to reconsider carefully its pricing and quota systems in order to achieve greater stability in the oil market.

(6) Iran may expect some substitution of oil for natural gas if new taxes were imposed to protect the environment. Therefore, the Iranian government needs to study carefully its proposed program of expanding natural gas exports at the expense of oil exports.

(7) Iran should price its oil for domestic use on international basis in order to release resources for exports and also to protect its environment.

(8) To strengthen linkages between the oil sector and other sectors and exploit its comparative advantage, Iran should use oil as much as possible in the domestic industrial sector through vigorous expansion of energy-based industries, like aluminium and petrochemicals, and encouraging the consumption of intermediate and final oil products by both local producers and consumers. Energy based industries and petrochemicals could become the leading sector in the process of economic development. However, it is expected that the oil sector will continue to play its role as the leading sector in Iran for some time to come.

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