THE 1973 OPEC CRISIS: A PRELIMINARY STUDY OF ITS EFFECTS ON EIGHT COUNTRIES

by

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ABSTRACT

In preparing this thesis an investigation has been carried out of the impact of the 1973 Oil crisis on the economies of eight selected nations.

Economic theory and econometric analysis are applied to determine a nation's ability to absorb an exogenous economic shock. An equation is formed relating international reserves to other economic variables, e.g. the current account balance, direct foreign investment, oil imports and exchange rates, during the period 1968 to 1976. Data pertaining to eight selected countries, of varying economic strength and dependence on imported oil, have been applied in the equation.

It has been concluded, on the basis of empirical evidence including available references from the literature, that the several economies could strengthen their reserves positions by an expansion and diversification of their export markets, improved management of direct foreign and direct domestic investment, and a general stabilization of economic growth.

INTRODUCTION

During the 1970's the world economy underwent drastic changes in its structure. The most significant and paramount of these events was undoubtedly the 1973-1974 Oil crisis. The effects of this crisis have been both widespread and long-term in nature. The ability of a country to adjust to and coexist with the changing world oil market has depended upon several factors. Some nations have been successful in adjusting to this shock while other countries have not been so fortunate. Several nations have, in fact, actually benefited from this event.[1]

The objectives of this study are to analyze the crisis and its effects, and by doing so, formulate an equation which will quantify a country's ability to absorb an external shock. After selecting an appropriate economic indicator, and integrating it with the theories of international trade and international finance, the actual construction of the equation will transpire.

To achieve this equation, the paper will concentrate on eight nations of varying economic and political strength. The eight nations described in the following chapter all represent economies of individual and varying degrees of susceptibility to economic shocks. The shock created by the actions of the oil-producing cartel in 1973 provides an excellent breaking point to study the foreign sector

of an economy. The period under study encompasses both the pre-crisis and the post-crisis years. In this thesis we will look at the countries individually, and will analyze the paths each economy has taken before and after the crisis. The drastic increase in world prices and the new controlled supply levels of oil present an opportunity of studying the degree to which countries are able to withstand such economic shocks. Once the indicator is chosen and the equation constructed, the project will be able to suggest various policies and adjustments that countries should implement in order to strengthen their position with regards to external economic shocks. In concluding the paper, certain observations will be made regarding the adjustments each country has taken and may take in the future when confronted with similar economic shocks.

CHAPTER I

THE COUNTRIES

The 1973-74 Oil Embargo has had varying adverse effects on the economies of nations, worldwide. The impact this shock has had on each country depended not only upon the extent to which each nation imported its oil, but in general upon the interaction of that economy with the changing world economy. The sudden and drastic increases in crude oil prices caused all oil importing nations to reconsider their energy needs. In the immediate short-run, no real changes could be made. All countries experienced this shock through changes in the balance of international payments and through their entire economy as well.

This chapter presents a brief description of each country chosen for inclusion in the study and the reasons in each case for the singling out of these economies for individual analysis. It should be noted that each country was selected based on its present economic position. In other words, the current characteristics of each economy represented the reasons for its selection. In doing so, the study will be able to emphasize how certain economies have been more successful than others in adjusting to the world energy events of 1973 and 1974. This study takes its starting point then from a consideration of the present economic status' of the eight nations indicated below while inter-

preting their respective paths during the two periods before and after the crisis.

Table 1 gives a brief description of each country and their respective economics.

CANADA

Canada is one of the few non-O.P.E.C. countries in the world which can boast of its relatively advantageous energy position. Canada's future with regards to energy resources in general, and petroleum in particular, has become clouded, however, with the present Federal-Provincial debate over the Constitution and resource revenue sharing. During the 1960's and early 1970's, Canada was a net exporter of petroleum products. The trade surplus bolstered by this exportation of oil along with other products was able to curb to some extent a widening deficit in the service payments area which has plagued Canada throughout the 1950's, 1960's, 1970's and into the 1980's.

This scenario, however, quickly changed for Canada. In 1975, because of the rise in prices of imported oil and fall in the value of oil exports, the Canadian economy found itself in the position of a net oil importer.[2] This situation has remained throughout the 1970's and 1980's, and has resulted in a worsening current account deficit.

While important crude oil discoveries at the Ben Nevis and Hibernia fields off the coast of Newfoundland have brought some optimism to Canada's future energy outlook,

A BRIEF ECONOMIC SUMMARY OF THE COUNTRIES FOR 1974

TABLE 1

	Currency	1974 Gross Domestic Product Per Capita[1]	1974 Current Account[2]	1974 Oil Imports[2]	1974 C.P.I. (1970=100)
Barbados	East Caribbean Dollar	$914.9	$-61	$32.5	195
Brazil	New Cruzeiro	844.8	-7181	1911.2	192
Canada	Dollar	6463.0	-1896	2669	129
India	Rupee	129.0	-1116	1432	165
Japan	Yen	4152.0	-4549	21161	154
Mexico	Peso	1119	-2997	397	168
Sweden	Krona	6876	- 806	2825	134
Tanzania	Shilling	152	- 311	64	149

1 Measured in current U.S. dollars

2 Measured in millions of U.S. dollars

Source: Statistical Yearbook, 1975, United Nations, 1976 (Sales - No.E/F.76 XVII.1)

there are still many necessary steps which must be taken to secure its energy, and in turn, economic position. The major objective of the government is to gain some degree of self-sufficiency in the energy sector by the 1990's. This independence will be attempted through various policies striving for conservation, substitution, and diversification.[3]

Because of Canada's strong economic ties with the United States (over 60% of its exports and imports are involved with the United States), the effects of the 1973-74 Crisis on the United States economy had a great amount of influence on the Canadian economy as well. In other words, in studying Canada over this ten year period, several inferences can also be made about the position and stability of the United States economy in the external sector. With these strong economic ties to the American economy and a very unique energy position, Canada presents some very interesting characteristics to study within the framework of this analysis. It has a highly industrialized and open economy and is attempting to reduce and eventually eliminate its dependence on imported fuels.

JAPAN

While the parliamentary state of Japan experiences the same political stability as Canada, it is at the same time afflicted with the worst energy security problem of any industrialized nation. The 1973 Oil crisis came as a great surprise to the Japanese. This action by the Arab nations

commencing during October of 1973 made the government realize its extreme vulnerability to disruptions of oil flow into Japan.

The development and progress of the Japanese economy since World War II has been an event worthy of much study in itself. This island nation of approximately 115 million people has built an economy around highly technological intensive inputs. This strategy is evident in its major source of export receipts, stemming largely from the sales of automobiles, electrical appliances, and more recently, high technology parts and equipment. The entire economy meanwhile is faced with importing fully 99% of its oil consumed.[4]

Before 1973, Japan was mainly concerned with the price of oil. As events through the 1970's have unfolded, in particular the embargo and Iranian Revolution, her concerns have changed to the issue of oil supplies and not prices. Any interruptions in the shipments of oil to Japan would have serious consequences for the people, economy and government; normal patterns of day-to-day living would be affected; pressures in the economy would result because of higher prices, shortages, and, of course, a redistribution of wealth; and finally, Japanese foreign policy would have to be altered in order to secure new sources for its energy needs.[5] Despite these energy limitations, Japan has still remained a major participant in foreign commerce. Various

programs attempting to achieve alternative sources of energy (for example, the 1974 Sunshine Project) and to conserve the already existing supplies, along with a general solidarity of the Japanese people have enabled a continuation of a positive trade balance throughout the 1970's.[6]

In the context of this study Japan represents a strong industrialized nation which has to date successfully adjusted to the dramatically changed international oil market conditions. The continued progress of this economy is particularly noteworthy when one considers Japan's near total dependency on imported petroleum. Because of these characteristics of being highly industrialized and virtually totally dependent on foreign fuels, Japan is an instructive example of a country facing an external shock, and adjusting to that shock quite successfully.

SWEDEN

This nation of eight million people ended over four decades of Socialist Democratic rule in 1976 in electing Prime Minister Thorbjorn Falldin through parliamentary elections. This socialist country since the post-World War II era has been regarded as having one of the highest standards of living in the world. This society of affluence and economic success, however, has begun to feel the effects of the Oil crisis, and has shown signs of attaining, and in some cases, surpassing its capacity in certain industries.

Immediately after the crisis, Sweden continued to experience economic growth. While most countries were struck by the 1974-75 recession, the growth in the Swedish economy, measured in terms of gross domestic product, in fact increased. As the economies of the seven major Organization for Economic Cooperation and Development countries (United States, Canada, Japan, France, West Germany, Italy, and Great Britain) registered decelerated economic growth, Swedish industries increased their output. This avoidance of the post-crisis recession was a result of certain economic policies brought forth by Swedish economists. These policies stated that Swedish industries should continue to produce at high levels, and stock pile the excess quantities. They were then to wait for the other industrialized nations to recover from their slumps and resume purchasing the Swedish exports as their own economies expanded.[7] These policies appeared to be successful in 1974 and early 1975. What the economists failed to foresee was that the superior Swedish quality and technology of the 1960's and early 1970's have been equaled recently by other nations and industries. At the same time, prices of their exports, namely forestry products, iron ore, and automobiles have increased. A more general increase in export prices which has furhter hindered their trade balance has resulted from the ties starting in 1973 between the Swedish Krona and the appreciating German Mark. The external position has thus changed from a current account surplus in

1973-74 to a deficit.

This country which has strived for full employment and low economic growth has like Japan a problem of importing a major percentage of all petroleum products consumed. The detachment of this country from the world political arena and the high degree of technology and industrialization of its economy provides the study with yet another subject. The adjustment process of Sweden will be particularly noteworthy because of its combined political and economic transitions during the post-crisis period.

MEXICO

This southern neighbor of the United States has undergone drastic economic and political changes during the period under study. Under President Luis Echeverria's administration (1970-1976), the government took on a strong aggressive position regarding developing countries' socio-economic and political rights. This concern of the Echeverrian government preceded all others, and as a result, the domestic problems of the nation blossomed. When the present leader, President Lopez Portillo, assumed control of this democratic state, the previous concerns were modified to better suit the overall development of Mexico internally and externally. One of the major developments in the 1970's was that Mexico evolved from a net importer to a net exporter of petroleum products. The country has become one of the

gest producers of oil in the decade. With this oil boom, ever, the domestic economy has suffered high rates of in- tion, unequally distributed income, widespread unemploy- t, and a dependence on imports of basic foodstuffs.[8] ddition to these economic and political changes, the for- n policy of Mexico has taken on a new role in guiding its de with other nations.

The major problem facing Mexico today is the short- needs of the petroleum sector conflicting with the long m goals of a balanced development of the national economy. government at this point fully intends to fulfill dom- c oil needs before exporting. The more general policy that energy and food products will receive the highest lopment priorities. This economy which has large for- n debts, a balance of payments deficit, and increasing od imports has many obstacles to overcome. President illo will attempt to achieve progress by placing inpor- e on socioeconomic development, increasing economic tions with Japan, Western Europe, Canada and et al, and so decreasing dependence on the United States.

Under the Echeverrian administration, Mexico came se to joining the Organization of Petroleum Exporting tries. While avoiding membership, it has reaped the fits of this cartel by following the pricing policies averting any direct or indirect association with the

group. Pricing strategies have been designed to increase the prices gradually to lower the differential between world and domestic prices. This policy has and will continue to attempt to restrain both domestic demand and any inflationary consequences of the oil boom.

The progress and development of this oil-producing country will greatly depend on its political stability, since the government will undergo certain changes as rapid economic growth evolves from the oil boom.

Mexico, though similar to Canada in its proximity to and interaction with the United States, offers different characteristics as a subject of the thesis. Mexico is now faced with major policy decisions both at home and abroad. A country of potentially limitless growth, it is also stricken with very serious domestic socioeconomic problems. With its growing importance in the oil exporting community, and its restrictive economic development needs, this country adds yet another degree of the stability towards external shocks to the study.

BRAZIL

Through the late 1960's and early 1970's, Brazil emerged as the leading industrialized nation in Latin America. Despite the unparalleled economic growth of Brazil in this region, the country has been unable to escape a similar fate of its neighboring countries. During the years

under study, Brazil has been ruled by two administrations (President Delfim Netto from 1967 to 1974 and President Geisel from 1974 to 1978), both of which were militaristic. Because of the structure of the economy, society, and government, it has been all but impossible for Brazil, and other similar Third World countires, to avoid strict regulation and at times oppression. The political insecurity of the government was evident in the administrations of both these leaders during the period called the Black years (1968-1975). In an attempt to gain greater control of the country, both administrations used press censorship and intimidation of the opposition to their advantage.[9]

The recurring theme of restricted and uneven domestic economic development for most Third World countries is also a characteristic of Brazil. The socioeconomic conditions of this nation are not unique. An unequal distribution of income, high unemployment, high rates of inflation and various social problems have plagued the economy into the 1980's. Although the domestic economy has been afflicted with these problems, it also experienced rapid growth before the Oil crisis, and moderate growth after the crisis. While Brazil has been classified as a Third World country, it has also been labelled as a newly industrialized country.[10] The rapid growth and industrialization of this economy have been the cause of debate over what steps Brazil should take into the 1980's. Some politicians

feel that growth must be cut to slacken a widening balance of payments deficit and increasing inflation rates. Others, however, believe that these moves would only result in additional political problems.

Through its economic growth and development, Brazil has remained one of the few bright spots in this region. While Brazil's experience in the internal sector has been unequaled by its neighbors, this is not the case in the external sector. Brazil has undergone balance of payments deficits, increasing interest payments on foreign debts, and increased foreign borrowing as have other Latin American countries since the 1973 crisis. With the bulk of exports consisting of agricultural goods mainly, coffee, soya and sugar, Brazil's trade balance is closely linked to weather and other uncontrollable factors. The majority of import payments are for machinery equipment, chemicals and petroleum. Brazil is fortunate in that it is an oil producing country of nearly 160,000 barrels per day. Yet, Brazil still must import close to 960,000 barrels per day as well. The size of oil imports has not increased greatly since the crisis (only 20%, despite rapid economic growth).[11] What has hurt the economy, however, has been the drastic increases in oil prices. To remedy this balance of payments deficit caused by the import oil payments, the major government policy has been to increase exports. Considering the

exports with which the country has to work, the attainment of a stable external sector will be a difficult task.

Brazil which has evolved into one of the few thriving countries of the Third World has added yet another dimension to the study. Brazil represents a country which has strived for economic growth during the past decade. Similar to Mexico with regards to present socioeconomic and possible future political difficulties, Brazil is still a nation somewhat dependent on foreign oil and a nation surviving on primary goods as exports. The steps taken by Brazil during the ten year period illustrate a developing nation attempting to and partially succeeding in rectifying its external economic problems.

INDIA

India is unique among the Third World countries in that it is one of the world's largest industrial powers (tenth). In addition, the levels of technology and science are unparalleled by other less developed countries. The most significant trait of the Indian economy which sets it apart from the other less developed countries is its use of nuclear devices for energy and defence purposes. From 1966 to 1977, the sovereign democratic state was led by Prime Minister Indira Gandhi. For the remainder of the period, India was governed by the Janata Party. For the most part, however, the period under study for India can be looked

upon as the "Indira Decade".[12]

India appears to have a very stable and healthy economy, yet it is in fact experiencing economic stagnation. In the 1970's the country faced decline in the rate of growth, increases in the general price level for goods, and little or no increase in employment. The country indeed possesses an impressive industrialized sector. However, the benefits of industries such as steel, fertilizers, tools and aircraft have not been spread equally over the society because of its rigid class structure. Furthermore, despite the relatively high degree of industrialization, India is still an agrarian society.

The major trading policy of this nation has been to bring foreign trade under the control of the newly instituted trading agencies. In addition to being a net importer of oil, India also imports to a large extent machinery equipment, wheat, iron, and steel. At the same time, its major exports include jute, cotton, leather, and tea. The main problem of the Indian economy lies in energy and food. These two categories represent the economic areas, both the external and internal sectors, which require improvements.

Despite the introduction of nuclear energy in 1971 and the "Bombay High" oil find off the west coast, India is still vulnerable to drastic price increases and

and interruptions of flows of oil. The development of this economy under one government, while at times oppressive, at least adds some consistency to the political structure of the country. The extremes of the economic well-being of its inhabitants, and its varying degrees of economic development make India an illustrative model for this study. Like the above mentioned Brazil, the Indian economy has undergone significant changes in the ten year period. The limitations of its socioeconomic problems and energy needs provide yet another country which will be useful in studying the the effects of the 1973-74 Oil crisis on an economy's external stability.

TANZANIA

This east African nation, though small in relative size, has had a great impact not only on the politics of neighboring countries, but also on the general economic and political stability of this region. Since Tanzania gained its independence from Great Britain in 1961 and elected its present leader, President Julius Nyere, the country has made great strides in forming a stable independent state. Nyere who is the most socialistic of the African leaders has interwoven his political ideologies into Tanzania's government and society as well.

Once again, this is an economy which depends upon primary commodities as the major source of export receipts. These exports, which in 1978 made up 48% of the country's

total exports include coffee, cotton and spices. As one would expect of a Third World country, Tanzania's major imports include machinery equipment, transport equipment, chemicals, and petroleum. Tanzania has no domestic oil production, and in addition, is truly an agrarian society. In order to strengthen the economy and nation as a whole, Nyere has become more and more socialistic in the 1980's. Many of the nation's banks and industries have become nationalized to gain more control of these financial sectors. Furthermore, Nyere has stressed rural vis a vis industrial development to establish this nation as a viable and successful state.

Because of Tanzania's total dependence on imported fuels, the economy underwent tremendous pressures immediately after the crisis. A country which enjoyed a balance of payments surplus in 1969 as a result of the rising oil prices, Tanzania quickly was afflicted with a deficit running into the 1970's. 1976 was the first year since the crisis that Tanzania had a balance of payments surplus. The economy, however, is far from stable. Tanzania, while being one of the more politically stable countries in Africa, has key areas of concern in its socioeconomic structure. Tanzania and Barbados, the Caribbean country listed below are illustrative examples of oil-importing developing countries attempting to adjust to the new world oil market. The Nyere government and economy will add these characteristics of

a lesser developed country to the study.

BARBADOS

The small caribbean nation of approximately 280,000 people gained its independence from Great Britain in 1966. The parliamentary democracy has kept economic ties with Great Britain, but has also sought to broaden economic and political relations with the western hemisphere countries. The eastern most caribbean island, Barbados, is regarded by the United Nations as one of the 35 middle income nations. Barbados must, however, undertake serious economic policies if it is to become less vulnerable to shocks like the 1973-1974 Oil crisis.

Like most of this region's economies, Barbados is a net importer of oil. While some oil exploration has taken place recently, its extreme dependence on foreign oil is still present. The economy's major source of export revenues lies in sugar. The major imports are food stuffs, machinery equipment and petroleum. Because of the increase in oil prices since 1973, Barbados has experienced trade deficits for the period. These deficits, however, are lessened by the invisible gains received through tourism. The major goal of the government is to reduce the island's dependence on sugar and tourism for foreign revenues.

Many of the Caribbean countries along with Barbados have common characteristics which determine their energy and

in turn external economic position. For example, energy demand increased considerably faster than Gross Domestic Product in Barbados prior to 1973. As was stated above, most of these nations including Barbados are net importers of oil. The impact of the immediate increase in oil prices after the crisis was somewhat softened during 1974 and 1975 in this and other regions because of all-time high sugar prices.[13] Once the sugar price fell, however, and petroleum prices continued to rise, the effects of the crisis became evident in these economies.

The inclusion of Barbados completes the list of countries in the study. The cooperation and interdependence of countries of this region, and Barbados' unique economic characteristics add yet another degree of stability towards external shocks to the study. Its dependence on imported fuels, and dependence on sugar as the lone export goods make Barbados a representative of a developing western country adjusting to the effects of the 1973-1974 Oil crisis.

FOOTNOTES

INTRODUCTION AND CHAPTER ONE

1. The small number of non-OPEC oil-producing members have had their economies strengthened considerably since October of 1973; higher world oil prices have increased their export receipts and lowered any deficits in their national accounts areas.

2. Quarterly Estimate of Canadian Balance of Payments, Fourth Quarter, 1975.

3. David A. Deese and Joseph S. Nye, Energy and Security (Cambridge, Mass.: Ballinger Publishing Co., 1981), p. 133.

4. Deese and Nye, p. 211.

5. Deese and Nye, p. 211.

6. Project Sunshine, Initiated in 1974, focused on developing solar, geothermal, coal conversion, and hydrogen technology.

7. "Sweden: The Model loses her glamour", Economist, August 27, 1977, p. 22.

8. Deese and Nye, p. 164.

9. Maria Anna Thompson, "Brazil", South: The Third World Magazine, October, 1980, p. 37.

10. Thompson, p. 33.

11. Deese and Nye, p. 245.

12. "The Challenge for Janata", Far Eastern Economic Review, April 29, 1977, p. 38.

13. J. Uwe Richter, Caribbean Energy Survey, May 7, 1979, Report No. 2511-CRB, p. 1.

CHAPTER II

OPEC AND THE OIL CRISIS

The outbreak of the 1973 Arab-Israeli War on October 6 culminated a series of events which enabled the Organization of Petroleum Exporting Countries to exert for the first time some of its influence on the world oil market. The development of The Organization of Petroleum Exporting Countries and the 1973 Oil crisis did not occur overnight. For nearly fifteen years, both economic and non-economic events transpired to set the stage for the introduction of the thirteen member cartel to the world oil market. While The Organization of Petroleum Exporting Countries had been established since 1960, it was not until the middle of October of 1973 that the influence and potential of this organization were evident to itself and the economic community. The following chapter discusses the background and emergence of OPEC. It also deals with the actual crisis, its impact on the world economy, and the strengths, weaknesses and successes of this cartel.

The Organization of Petroleum Exporting Countries was formed in Baghdad on September 14, 1960. The original five members included Iran, Iraq, Kuwait, Saudi Arabia and Venezuela. The inception of Ecuador and Gabon in 1973 as full and associate members respectively completed the present thirteen member cartel (the other six nations

being: Indonesia, Nigeria, Libya, Algeria, Qatar, and the United Arab Emirates).

The main interests of the cartel in 1960 were in the area of the production and revenue sharing of oil. Throughout the 1950's and even the 1960's, these countries had little or no say in the pricing strategies of the major international oil companies. Although the annual revenues of the five governments from the export of petroleum had risen from 1950 to 1960, the revenue per barrel while rising at first declined steadily in the late 1950's. The following table illustrates this.

Table 2

ANNUAL REVENUES FROM OIL
(In Millions of Current U.S. $)

	1950	1955	1960
Saudi Arabia	113	288	355
Iran	91	91	285
Venezuela	331	596	877
Kuwait	12	307	465
Iraq	19	207	266

PER BARREL REVENUES (GOVERNMENTS)
(In Current U.S. $)

	1950	1955	1960
Saudi Arabia	.632	.821	.750
Iran	.479	.818	.801
Venezuela	.597	.807	.892
Kuwait	.103	.767	.765
Iraq	.400	.862	.786

Source: OPEC: Success and Prospects, (New York University Press, 1976), p. 130-131.

The formation of the Organization of Petroleum Exporting Countries was also preceded by other factors instrumental in its creation. In 1948, Venezuela adopted the "fifty-fifty" arrangement where its government would receive at least 50% of the net income from oil production.[1] In 1949, this same country initiated discussions with Saudi Arabia, Kuwait, Syria, Iran and other Arab countries concerning a possible oil producer's organization. Several Arab nations followed in Venezuela's footsteps in adopting the "fifty-fifty" policy. Throughout the 1950's an interdependence and exchange of information developed in this community. The nations were quickly realizing their situation.

Several other indirect factors led to the eventual formation of OPEC. The inequality of concession agreements between the oil companies and the governments resulted in the nationalization of several companies, and in general produced widespread dissatisfaction amongst the countries. Two other factors which brought about this 1960 agreement were of a much more general and abstract nature. During the post World War II years, the dependence of the world economy on oil became more and more evident. The oil producing nations, in turn, came to realize their own growing importance. These nations through education, experience, and consultation gradually prepared themselves and their

economies to take on this responsibility.[2] The increased interaction and communication among these oil producing nations gave even more impetus to the formation of some type of organization. The above mentioned Venezuelan-initiated discussions along with several agreements between these oil producing nations in the 1950's would eventually (regardless of the price cuts of 1960) have evolved into some type of international group. Nevertheless, the addition of this newly established cooperation to the economic conditions facing the nations' economies set the stage: the five original member governments decided to take action. Because of this lack of control over the production of their own resources, and the unilateral price cuts proposed by major oil companies in 1958, 1959, and 1960, the five nations in the fall of 1960 created the same cartel which would later impose on the world the greatest economic shock since World War II: the 1973 Oil crisis.

The first decade of OPEC can be looked upon as a buyer's market; high competition and large supplies of oil were prevalent at this time. The actions of the organization, thus, had little impact on the world oil market during this period. The countries had to wait for favorable economic and political conditions to achieve their full potential. The member countries, however, were still able to establish clear cut objectives and goals. The goals and objectives can best be summarized by the follow-

ing passage from the Declaratory Statement of Petroleum Policy in Member Countries adopted at OPEC's sixteenth conference on June 24, 1968:"....bearing in mind that the principal aim of the Organization, as set out in Article 2 of its Statute, "is the coordination and unification of the petroleum policies of Member Countries and the determination of the best means for safeguarding their interests, individually and collectively"....".[3] Basically, the aims were and still are to expand the governments' control over production, to maximize revenues and in general to produce and to implement a collective oil exporting policy. As we have seen since 1973, the organization has been quite successful at this.

From 1960 to 1973, the Organization's exports gradually gained a larger share of the world's total imports; the dependence on OPEC oil increased. Table three illustrates these significant increases in the dependence on OPEC petroleum. As this dependence increased and as the pricing policies and nationalization of companies occurred, the cartel gained more confidence in its ability to influence the world oil market.

As was stated above, the formation of The Organization of Petroleum Exporting Countries in 1960 was a result of certain conditions and events. The development of the 1973 Oil crisis also did not occur suddenly and without

Table 3

PRODUCTION, EXPORTS AND IMPORTS
(Million Barrels Per Day)

OPEC	1950	1955	1960	1965	1970	1971	1972	1973	1974
Production	3.19	5.27	7.89	13.19	22.13	25.08	26.73	30.78	30.77
Exports	3.03	5.01	7.50	12.53	21.05	23.66	25.39	29.44	29.54
Exports as a % of World Imports	83.0	82.3	83.0	83.6	82.2	84.1	84.1	86.1	88.1

Source: OPEC: Success and Prospects, p. 129.

warning. The economic conditions and political events of the 1960's and early 1970's were necessary for the success of the October Crisis. When looking at the causes of the 1973 Oil crisis it is necessary to differentiate between the reasons for the increase in oil prices and reduction in supplies, and the conditions which allowed this event to take place.

Much of the reasoning behind the cartel's decision to raise prices was based on a decrease in the real prices of oil from 1950 to the 1970's. In addition, these actions came as a response to the rising inflation of the early 1970's.[4] While lost revenues from decreasing real prices and high rates of inflation caused the drastic price hikes of late 1973 and early 1974, the political situation in the Middle East region had an even greater influence on the adoption of the new exporting policies. As the establishment and expansion of Israel in Palestine progressed, the interests of the Arab countries were quickly being opposed. The Third Arab-Israeli war in 1967 along with the Fourth war in 1973 were evidence of the growing hostilities and conflicting goals of the two parties. As western aid, and specifically United States' assistance, was sent to Israel, the position of the Arab countries became more bleak. On October 19 and 20 of 1973, Libya and other Arab countries within OPEC decided that the only alternative remaining to influence western policy towards Israel and the Middle

East was through an oil embargo. It should be noted that this was not the first instance of an OPEC-imposed embargo. During the 1967 war all ministers of the Arab oil producing nations met at Baghdad and declared a halt of petroleum shipments to Great Britain and France. Although this embargo proved ineffectual, it remained a viable option and topic of serious discussion for the OPEC group throughout the 1960's, 1970's and even into the 1980's.

This halt of oil shipments to the United States and later Netherlands coupled with the oil price increases of late 1973 and early 1974 produced what we now know as the Oil crisis. Although OPEC in the past had refrained from intervening in political matters, the combination of political and economic conditions at this time enabled the group to strengthen and to capitalize on its monopoly power. The emergence of this oil cartel and the development of the Oil crisis climaxed in the fall of 1973. This economic shock was to have both severe short-term and long-term effects on the world economy; the economic ramifications were to be studied, and adjustments taken.

The success of this embargo and the overall price hikes depended upon certain economic conditions present at this time. Even though the actual formation of the cartel had been successful in 1960, its own progress and increased influence rested on various economic events and trends which had been developing through the post-World War II era.

Since 1950, world oil consumption had increased drastically relative to other energy sources. The increase in petroleum's share of total energy consumption, shown in Table 4, in turn strengthened the position of all oil exporting countries. This shift among energy sources to meet the increased demand had an even greater effect on the members of OPEC. As was shown before, not only did the overall consumption of oil increase, but the demand for OPEC oil and its own share of the world imports increased over the same period. Because of this growing dependence on oil, and specifically OPEC oil, the bargaining power of the oil exporting countries of the Middle East vis a vis the major international companies rose substantially.

Several economists have stated that one other major factor in the success of the oil crisis was the United States' growing volume of oil imports. Traditionally, American oil imports came from western exporting countries, namely Canada and Venezuela. Throughout the 1960's and even more so in the early 1970's, these two suppliers of American oil were unable to meet the increasing demand for their exports.[5] The United States had no other choice but to look to the Middle East for its imported petroleum. The increased American dependence on OPEC fuel and its financial and military assistance to Israel made the country a prime target for the 1973-1974 Oil embargo. The transformation of the world oil market from that of a buyer's market in the

Table 4

WORLD ENERGY CONSUMPTION
Per Cent Shares

	1950	1960	1965	1968	1970	1971	1972
Coal	55.7	44.2	39.0	33.8	31.2	29.9	28.7
Oil	28.9	35.8	39.4	42.9	44.5	45.2	46.0
Natural Gas	8.9	13.5	15.5	16.8	17.8	18.3	18.4
Primary Elect[a]	6.5	6.4	6.2	6.5	6.5	6.6	6.9

a. Comprised of geothermal, nuclear and hydro.

Source: The Oil Crisis, (Norton & Company, 1976), p. 19.

1970's made it possible for this crisis to take place; the world economy was ripe for the 1973-1974 embargo and its ensuing effects.

As the world has become more industrialized in the past four decades, its dependence on energy has increased. This development in turn has brought forth a dilemma which faces all economies: the energy security problem. A severe change in a country's energy position can send shocks through its entire economy. There are three distinct areas which the Oil crisis affected. Although each country suffered through this period in varying degrees, all nations to some extent experienced the impact of the 1973-1974 shock. The following two tables illustrate the changes in both the price and quantity produced of oil.

Table 5

1973 PETROLEUM PRODUCTION OF OPEC COUNTRIES
(Millions Barrels Per Day)

	Sept.	Oct.	Nov.	Dec.
Saudi Arabia	8.57	7.73	6.27	6.61
Iran	5.83	6.02	6.05	6.11
Venezuela	3.29	3.38	3.38	3.36
Kawait	3.53	3.09	2.47	2.55
Iraq	2.11	1.80	2.15	2.16
Qhtar	0.60	0.60	0.47	0.46
Indonesia	1.42	1.41	1.45	1.45
Libya	2.29	2.38	1.77	1.77
Alteria	1.10	1.00	.90	.90
Nigeria	2.14	2.19	2.24	2.26
Ecuador	.12	.10	.21	.14
Gabon	.19	.19	.16	.19
U.A.E. Abu Dhabi	1.40	1.36	1.17	1.03
Dubai	.27	.21	.14	.14
Total OPEC	32.96	31.46	28.83	29.13

(cont'd)

Table 5 (cont'd)

Participants in 1973/74 Embargo	17.76	16.37	13.19	13.46
Non-Participants	15.20	15.09	15.64	15.67
Index Numbers (Sept 73 = 100)				
Total OPEC	100.0	95.5	87.5	88.4
Participants in 1973/74 Embargo	100.0	92.2	74.3	75.8
Non-Participants	100.0	99.3	102.9	102.1

Source: OPEC: Success and Prospects, p. 136-137.

Table 6

Price of OPEC Oil (U.S. $ per Barrel)

	Saudi Arabia	Iran	Kuwait	Iraq	Qatar	Abu Dhabi	Neutral Zone
1/1/1973	1.52	1.50	1.47	1.49	1.55	1.53	1.18
4/1	1.62	1.60	1.57	1.59	1.65	1.63	1.27
6/1	1.70	1.68	1.65	1.67	1.74	1.72	1.35
7/1	1.74	1.72	1.68	1.71	1.78	1.75	1.38
8/1	1.80	1.78	1.75	1.77	1.85	1.82	1.45
10/1	1.77	1.75	1.72	1.74	1.81	1.82	1.42
10/16	3.05	3.02	2.94	3.00	3.15	3.58	2.60
11/1	3.08	3.21	2.97	3.04	3.48	3.62	2.63
12/1	3.00	3.12	2.89	2.95	3.38	3.52	2.55
1/1-6/30/1974	9.27	9.49	9.26	9.30	9.82	10.06	8.93
7/1-9/30	9.37	9.58	9.35	9.39	9.91	10.17	9.02
10/1-10/31	9.69	9.92	9.68	9.72	10.26	10.52	9.31
11/1-12/31	10.09	10.33	10.08	10.12	10.70	10.98	9.64

Source: OPEC: Success and Prospects, p. 135.

The events in Table 6 of late 1973 and early 1974, indicated in the above two tables, has a great impact on world oil market. The most wide spread aftereffect was the disruption of normal social and economic conditions due to the oil shortages. The rise in prices caused additional economic and political turmoil. Political instability, however, was most prevalent in countries whose governments were previously unstable and countries whose economies were extremely susceptible to external shocks. The final area of concern resulting from the Oil crisis was the future foreign policy of each government. While the changes in foreign policy will not be discussed in the context of this thesis, it should be noted that governments had to reconsider their positions on various issues. Economic alliances and agreements were created and destroyed as a result of the crisis. Governments were now forced to construct foreign policy with much more emphasis placed on economics in general, and the country's energy position in particular.

The purpose of this study once again is to construct some type of index which will measure a country's ability to absorb external economic shocks. The Oil crisis provides an excellent illustration of an economic disturbance in the world economy; its effects were and still are clearly evident, and its range of impact is world wide.

The actual size of the impact of the additional

costs of imported oil depended upon the relative importance of that oil as well as the size of the price increases in each country's economy. These high oil costs affected both the standard of living and growth of consuming countries. The most immediate effect was the redistribution of world income. The higher bills for imported petroleum diverted millions of dollars from the consuming nations to the oil producing countries. This reduction in the purchasing power and income of all oil importers aggravated changes in capital movements and further altered the entire world monetary system. This tremendous shift in income had varying implications throughout all economies. The quadrupling of oil prices also slowed and in some instances decreased economic growth. The oil-induced reductions in GNP were clearly evident by the world-wide recession which occurred in 1974 and early 1975. A sample of several Organization for Economic Cooperation and Development members in Table 7 illustrates the drastic decline in growth rates since the 1973 Oil crisis.

The depressing influences of higher OPEC prices can be attributed to three major factors. One factor has already been discussed: the transfer of purchasing power to domestic producers of oil. Increased payments for imported oil for all nations and the loss in exports to the oil-importing developing countries (OIDC) also had a depressing influence on aggregate demand. These initial

Table 7

GROWTH RATES IN GNP
1960 - 1979

	1960-1973 Annual Average	1974-1979 Annual Average
France	5.7	2.9
W. Germany	4.8	2.3
Italy	5.2	2.5
United Kimgdom	3.2	1.1
Japan	10.5	4.1
United States	3.9	2.3

Source: Energy and Security, (Cambridge, 1981), p. 185.

depressing effects were transmitted throughout each economy. This initial reduction in consumption by individuals to finance increasing energy costs led to lay-offs in consumer-goods industries.[6] Reduced individual incomes and decreases in capital investment further reduced national incomes. As the income of a nation falls, it tends to import less, thereby reducing the exports and in turn Gross National Products of its principal trading partners. This was also the case for most countries following the crisis.

The above mentioned implications of the Oil crisis pertain mainly to decreasing aggregate demand and the

eventual recession. There is, however, a price side to this crisis as well. The direct and indirect effects of the crisis created tremendous inflationary pressures. The introduction of recession associated with high rates of inflation in the mid-1970's resulted in a new economic phenomenon: stagflation. The oil crisis was instrumental in bringing about this new coexistence of inflation and recession.[7]

The increases in oil prices had immediate implications for oil consumers. The indirect effects of OPEC's decision to raise prices were even more substantial in the world economy. Cost-push inflation was a major cause for much of the general increases in prices after 1973. Rising prices for competitive fuels and secondary products (fertilizers, chemicals, ...etc.) were found in all economies. The overall importance of oil and the long-run trend of rising prices contributed significantly both directly and indirectly to the general inflation of the 1970's.

The balance of international payments and international indebtedness of nearly all oil importing nations suffered serious changes in the post-crisis period. The most obvious of the changes was created by high oil import costs. The increased import costs made it difficult to maintain a balance of payments or even stabilize a decreasing current account deficit. As import payments of the major industrialized countries shifted and increased to the

oil producing nations, the demand for and ability to pay for other imports fell. The balance of international payments of many lesser developed countries (LDC's) were affected in this manner; demand for their export goods fell drastically because of the slowdown in the growth of industrial nations. At the same time, the major industrialized nations were experiencing reductions in exports to OIDC countries. The latter group of countries had to reduce their imports because of their own loss of export revenues and the need to use larger proportions of the available foreign exchange to pay for imported oil.

While trade between industrialized nations and OPEC countries, LDC's and OPEC countries, and industrialized nations and LDC's experienced changes which in turn affected their balance of international payments, trade of the industrialized nations with each other was also affected. The effects of higher oil prices in reducing gross national product and the decreased aggregate demand restricted the trade between these countries. As is now evident, the Oil crisis was and still is responsible for much of the disruptions in the international trade and finance sectors of the world economy. This shock produced havoc for industrialized and developing nations alike.

The degree of which a country was able to absorb the effects of the 1973-1974 Oil crisis was dependent on its overall economic strength and its own dependence on imported

these are applicable to the more developed countries, the severity of each effect is far greater for the lesser developed nations. First in importance was the slowdown in economic growth of the industrialized nations which adversely affected nearly two-thirds of the OIDC's export markets. The export markets for many of these nations are their only means of gaining foreign exchange. Furthermore, the ability of a developing country to absorb the oil import burden depends upon the stability of its own export market. The second most significant effect of the oil price increases is closely related to the first. The terms of trade (price of Exports divided by the price of Imports) has weakened considerably causing deterioration of each country's trade position. The third effect is that oil import payments for these developing nations have become a larger and larger proportion of the importers' foreign exchange earnings. This has caused both a sudden and continuous loss of income and a corresponding current account deficit. The fourth and final effect described by the author deals with the economic growth of the countries. Deese states that the shortage and increased cost of energy has restricted the growth of these nations. For many of the LDC's, their ability to withstand the effects of the Oil crisis was and still is dependent on the economic recovery of industrialized nations.

In general, the economic growth in most of these countries is heavily dependent upon the availability of foreign exchange which in turn is a major factor in determining their ability to import capital goods, to support investment, and to generate economic growth.[10] One characteristic which is traditionally applicable to most OIDC's is that their export market depends largely on a small number of primary commodities whose price and quantities depend on unstable economic and non-economic conditions. While industrialized nations have had the ability to adjust to and to absorb the effects of the Oil crisis, the OIDC's have not been so fortunate. The rise in oil prices has created a tremendous economic, social, and political burden for these countries.

The success of OPEC can for the most part be tied to the unique characteristics of oil. No other primary product has similar attributes and market structures as petroleum. The small number of producing countries (high concentration), the absence of reasonable substitutes within the price range, and the inelastic short-run demand for oil have all added to the monopoly power of the OPEC cartel. The organization has further benefited from its own structure. The long period of gestation from 1960 to 1973 enabled the countries to set up this highly efficient and structured body. The high degree of cohesiveness of the

member countries has also added to the success of the cartel. As was stated earlier, the market conditions of oil, that is to say the increased demand and oligopolistic nature in the oil industry, enabled the cartel to succeed in dictating new policies to the world oil market.

Despite its immediate and present success, the survival of OPEC was questioned from the start. Several economists and politicians listed various reasons which would diminish OPEC's apparent monopoly power and lead to its eventual collapse. Dr. M.A. Adelman, a leading American petroleum economist, has stated that the major weaknesses are the excess capacity of the group, and a general tendency of cartel members to cheat.[11] A decrease in the demand for and an increase in the supply of oil were regarded as potential weak spots for the cartel immediately after 1973. Other predictions of OPEC's downfall were based on economic differences of the members, social and political differences, and changes in government-company relations. So far, none of the above conditions has materialized, allowing OPEC to continue to exploit the world oil market.

The prospects for OPEC in the near future are favorable to say the least. The existence of the conditions listed above needed for an OPEC collapse is highly unlikely. At this time, it appears that the member countries will be able to maintain their bargaining power over the petroleum

Table 8

THE ORGANIZATION OF PETROLEUM EXPORTING COUNTIRES

Countries	Entry	Popul.	GNP per capita	Exports	Oil: % of Exports	Current Acct.Bal.	Oil Reserves (bbl)
Saudi Arabia	1960	9.5mil	$4,459	$40.9b	99.9%	$14.0b	153.1b
Venezuela	1960	12.7mil	$2,518	$ 9.5b	95.5%	$-1.0b	18.2b
Iraq	1960	11.9mil	$1,190	$ 9.7b	98.4%	$ 2.7b	34.5b
Iran	1960	33.9mil	$1,968	$24.2b	97.3%	$ 5.1b	62.0b
Kuwait	1960	1.1mil	$12,194	$ 9.8b	90.2%	$ 5.4b	70.1b
Algeria	1969	17.9mil	$898	$ 5.2b	91.8%	$-0.9b	6.6b
Libya	1962	2.7mil	$6,605	$ 9.7b	99.9%	$ 2.9b	25.0b
U.A.E.*		0.66mil	$13,680	$ 9.5b	96.0%	$ 4.6b	32.4b
Ecuador	1973	7.6mil	$786	$ 1.2b	38.9%	$-0.3b	1.6b
Nigeria	1971	64.8mil	$399	$11.8b	90.5%	$-0.9b	18.7b
Gabon	1973	0.53mil	$2,803	$ 1.0b	84.7%	$ 0.07b	2.1b
Qatar	1961	0.01mil	$9,090	$ 2.0b	99.1%	$ 0.5b	5.6b
Indonesia	1962	139.6mil	$ 259	$10.8	67.2%	$-0.02b	10.0b

* United Arab Emirates: Abu Dhabi, Duabai and Sharjah

All data is based on 1977 estimates and measured in current U.S. dollars

Source: The Conference Board, Economic Road Maps, October, 1978, No. 1841.

consuming nations. There is, however, one issue of concern for the cartel which has gained much attention as of late. Some economists believe that the very sudden and drastic rise in the price of oil has caused and will further stimulate research for alternative energy sources. As the cost of oil rises, other types of energy become economically feasible. If this is the case, the organization will have to reconsider its pricing policies and objectives. Table 8 gives a brief economic summary of this thirteen member cartel.

Nevertheless, this cartel founded in 1960 has in the past seven years completely restructured the world oil market and has been a major factor in the large-scale international redistribution of income. The crisis of 1973 and early 1974 imposed severe limitations on the economic development of developing countries and has restricted the growth of industrialized nations. The 1973 shock has had immediate and long-term effects on the world economy. The years before October 1973 and the years after the crisis represent totally different economic periods; the 1973 Oil crisis sent shocks throughout all economic sectors, changing the policies and conditions of the world economy.

FOOTNOTES

CHAPTER TWO

1. Dankwart A. Rustow and John F. Mugno, OPEC: Success and Prospects, (New York: New York University Press, 1970), p. 10.

2. Rustow and Mugno, p. 10.

3. Rustow and Mugno, p. 167.

4. David Healy, "Oil, Money and Recession", Foreign Affairs, Winter 1979/80, p. 48.

5. Raymond Vernon, The Oil Crisis, (New York: Norton & Company, 1976), p. 23.

6. Edward R. Fried and Charles L. Schultze, Higher Oil Prices and the World Economy, (Washington, D.C.: Brookings Institution, 1975), p. 20.

7. Jan S. Hogendorn, The New International Economics, (Reading, Mass.: Addison-Wesley, 1979), p. 398.

8. David A. Deese and Joseph S. Nye, Energy and Security, (Cambridge: Ballinger Publishing Co., 1981), p. 229.

9. Deese and Nye, p. 232.

10. Fried and Schultze, p. 6.

11. Rustow and Mugno, p. 47.

CHAPTER III

ECONOMIC INTERPRETATIONS OF THE OIL CRISIS

The quadrupling of oil prices in late 1973 and early 1974 had various adverse effects on the world economy. The economic ramifications of the oil crisis discussed in the previous chapter have received much attention by economists and politicians alike. Although much literature has been devoted to this issue, there are still areas of the crisis which have yet to be fully analyzed; this study looks at one of these areas.

Consideration of an economy's ability to withstand a sudden exogenous change leads us first to a review of several theoretical concepts to be found in the economic literature. This chapter sets forth then the theory of a cartel in an international setting, reviews the concept of the terms of trade, and describes the phenomenon of the vicious circle as it relates particularly to countries in the wake of the 1973 oil price increases.

THE INTERNATIONAL CARTEL

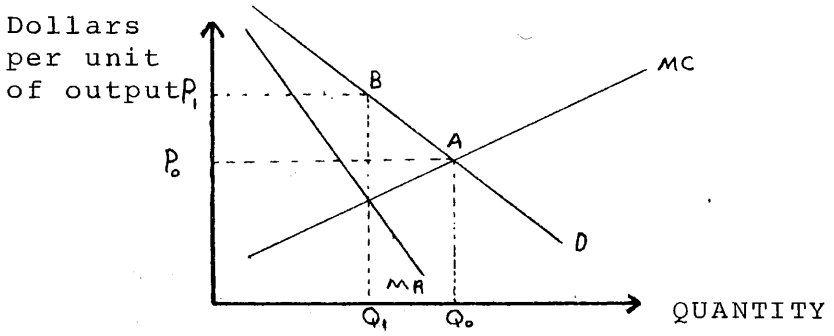
Oligopolistic behavior both restricts the output and raises the price of a commodity. When individual firms (or countries in this case) attempt to strengthen their monopoly power in a given market through collusive agreements, the resulting group is generally called a cartel. The cartel

can be looked upon as a group of firms (countries) in the same industry acting together to increase the net worth of the members.[1] As is the case in an oligopolistic industry, the cartel restricts the output level and raises the price of the commodity to increase producer profits.

The figure below depicts the profit-maximizing, short run equilibrium position of both a competitive and a cartelized industry. Point A represents the price and output combination for a competitive industry, while point B

Figure 1

Competitive and Cartelized Industry



Source: Edwin Mansfield, Microeconomics, (New York: Norton Co., 1975) p. 336

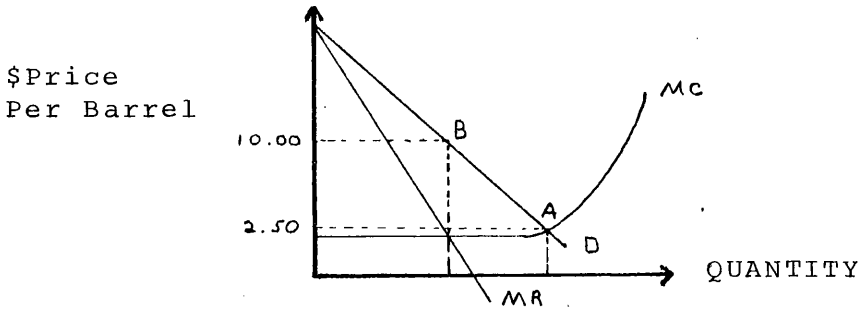
indicates the price, quantity values for a cartel. In the perfectly competitive situation, the marginal cost curve (MC) is regarded as the supply curve for the industry. The intersection of this marginal cost curve and the demand curve results in the price, P_o, and the quantity, Q_o. With the introduction of the cartel, the group is able to maximize the potential monopoly profits by reducing output to Q_1 and increasing price to P_1 according to the MC = MR profit

maximizing criteria.

The pricing and output behavior of an international producer's association such as OPEC can be usefully analyzed with the aid of standard comparative static techniques. Although OPEC was formed in 1960, it was not until thirteen years later that market conditions allowed the cartel to realize its monopoly power in the world oil market. The figure below, presented by Charles P. Kindleberger, once again represents a cartel as a profit maximizing monopoly.

Figure 2

An Oil Cartel as a Profit-Maximizing Monopoly



Source: C.P. Kindleberger and P.H. Lindert, International Economics, (Homewood, Ills.: Irwin, 1978) p. 191

Kindleberger has illustrated in this diagram the hypothetical market conditions which were present in early 1974. By increasing profits through cartelization, prices quadrupled from an average of $2.50 per barrel to $10.00 per barrel. At the same time, as is evident from the diagram, the output level was markedly reduced.[2]

The stability of a cartel depends upon four basic factors. First, there must be a low price elasticity of

demand for the industry's product. Second, there must be a high elasticity of demand for the product of any one producer. Since each individual producer could bid away business from other producers (of similar quality output) by slightly lowering the price of its own product, there is a common interest among the cartel members to maintain group solidarity and to avoid predator pricing policies by individual members. Third, the producers should have similar costs. And finally, there should be a small number of producers (countries) in the cartel.[3] According to the above criteria, OPEC should continue to be successful in the short-run.[4]

There is an additional theoretical construct which may prove to be of some value in our analysis of the monopoly power of a cartel. Kindleberger suggests the following formula to be used in the determination of the optimal monopoly mark-up:

$$t = \frac{\text{optimal price minus marginal cost}}{\text{price}} = \frac{1}{d_c},$$

where d_c is the elasticity of demand for the cartel's sales (elasticity of export demand).[5] This formula shows that the higher (lower) the elasticity of demand for the cartel's sales, the lower (higher) is the optimal monopoly mark-up.

The elasticity of demand facing the cartel depends upon three other factors: the elasticity of world

demand for the product(d), the elasticity of supply of the product for competing non-cartel countries (s_o), and the cartel's share of the world market (c). The relevance and importance of each factor on d_c is readily apparent. A highly elastic world demand for the product (a large negative value of d) means that buyers would find it easier to spend their money on other goods if the price of the product were to rise substantially. This same high elasticity of demand for a product would in turn limit the power of a cartel to raise its prices. The success of a cartel would also depend upon the elasticity of supply for other countries. That is to say, the more difficult it is for countries to increase their competing output and sales when the cartel raises its prices, the greater are the cartel's chances for success. Finally and quite obviously, the larger the cartel's share of world sales, the greater is its monopoly power.

Kindleberger has shown that these factors can be combined in a simple formula to derive the demand for elasticity facing a cartel.

$$d_c = \frac{d - s_o\ (1 - c)}{c}$$

This formula in turn implies that the optimal monopoly mark-up may be represented as:

$$t = \frac{c}{d - s_o(1 - c)}\ ^{6}$$

At this juncture we might observe that the OPEC cartel is likely to enjoy a large value of the Kindleberger

t coefficient. OPEC maintains a large share of the world oil sales. The demand elasticity for oil is relatively low, at least in the short-run. And the supply elasticity of oil for other countries (again in the short-run) is also relatively low.

While the above formula explains in some measure OPEC's recent success as a cartel, the same formula points to the possibility of change in underlying conditions which may lead to the cartel's eventual collapse. The elasticity of demand for oil (d) will increase over time as the cartel continues to raise prices and restrict output. Secondly, the success of OPEC has stimulated further research for other sources of energy. As the ability of non-cartel countries to increase competing output and sales grows, so will the supply elasticity for these same countries. Finally, the cartel's share of the world oil market will eventually decline as it restricts its own output and other nations increase their own oil production. These three countervailing trends will gradually decrease the monopoly mark-up of the cartel, and may eventually lead to its disappearance.

THE WORLD OIL MARKET

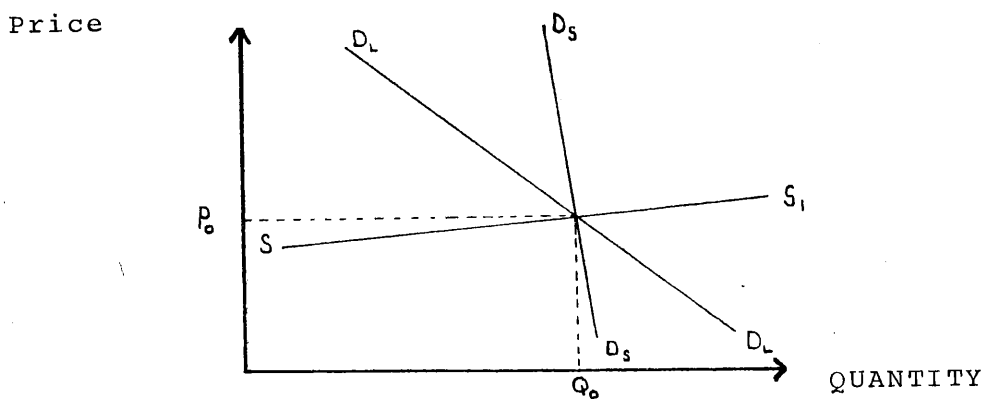
The 1973 Oil crisis and the subsequent success of the OPEC cartel have had a great impact on the world oil market since that time. The dramatic increase in

prices significantly changed the structure of this market. While much space has been devoted in the literature to a general discussion of the ramifications of OPEC and the Oil crisis, theoretical analyses of the structure of the world oil market are virtually non-existent. In what follows, an attempt is made to objectively assess the pre-crisis and post-crisis world oil market conditions. Much of this analysis is based on the work of Yoon S. Park in his work, Oil, Money, and the World Economy.[7]

As was stated in the previous chapter, in the 1960's OPEC was faced with a buyer's market; the oil industry was highly competitive. The low prices and declining real costs of oil maintained this situation throughout the 1960's and into the early 1970's. The following figure illustrates the crude oil market before 1973.

Figure 3

Crude Oil Market Before 1973



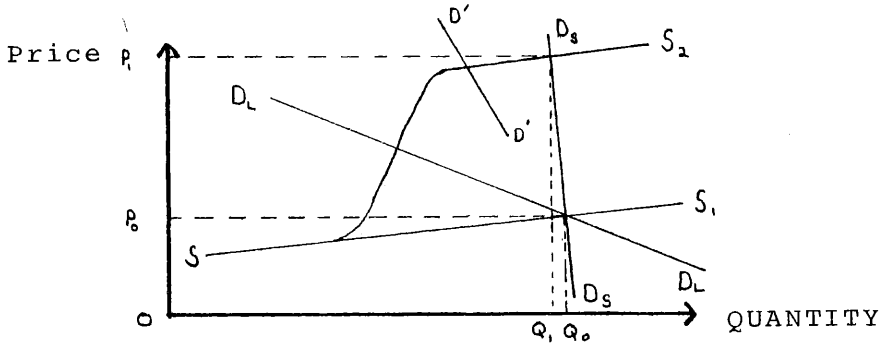
Source: Y.S. Park, Oil, Money, and The World Economy (Boulder, Colo: Westview Press, 1976), p. 37.

It is assumed by Park that the supply curve (SS_1) was highly price-elastic before 1973. It was also assumed that the short-run demand curve (D_sD_s) was highly price-inelastic, while the long-run demand curve (D_1D_1) was less price-inelastic. The relative positions of the two demand curves are justified and supported by basic microeconomic theory; the more time individuals have to adjust to price increases, the more price-elastic will be their demand for a good. In late 1973 and early 1974, OPEC was able to exploit fully this short-run price-inelasticity by quadrupling prices. Although prices were increased by more than 400%, the quantity of oil purchased fell by only 10%.[8] This fact in itself lends support to the idea that oil is price inelastic in the short-run.

The four-fold increase in petroleum prices radically changed market conditions in the world oil industry after 1973. The following figure is useful in illustrating the changes which have taken place since the crisis.[9]

Figure 4

Oil Market After 1973 Price Increases



Source: Y.S. Park, p. 38.

Park introduces the 1973-1974 oil price increases into the analysis by shifting the supply curve from SS_1 to SS_2. The new supply curve is oligopolistically determined by the OPEC members. Furthermore, since OPEC has, and will continue to attempt to maximize its revenues, the new supply curve is also market-determined.[10]

It should be noted at this juncture that it is virtually impossible to speak of 'a' supply curve. Jan S. Hogendorn goes to some length in discussing this matter. Hogendorn states that there is in fact a "montage of supply curves of individual producers, each operating under the umbrella price."[11] For monopolists and cartels, there is no unique relationship between price and quantity; thus, there is no unique supply curve. The curve represented above is based merely on conjecture. Nonetheless, Park's representation of the post-crisis oil market sheds some light on the conditions facing consuming nations.

The new supply curve is presented here as an illustration of the possible shape of the post-1973 supply curve. Over the short-run, the new price and quantity are determined by the intersection of D_sD_s and SS_2. Although the price of oil quadrupled, the quantity of oil demanded fell by only 10%, that is, $OP_s = 4xOP_o$ and $OQ_s = 0.90Q_o$). In the long-run, the price and quantity of oil will be determined by the intersection of D_1D_1 and SS_2.

As the demand curve gradually shifts from D_sD_s to D_1D_1, illustrated by D'D', the price of oil will also fall. This long-run trend in Park's model should be looked upon as an issue of concern for OPEC. As consumers move closer and closer to the long-run demand curve, the quantity demanded of oil, and specifically OPEC oil, will decrease. This may cause increases in internal pressures which eventually may lead to OPEC's collapse.

Park's model thus presents a plausible explanation of the changes which have occurred in the world oil market since 1973; adjustments in the price, quantity demanded and quantity supplied of oil, and in the behavior of producers and consumers are usefully analyzed in the demand and supply framework.

THE TERMS OF TRADE

The terms of trade, defined as the ratio of a country's export prices to its import prices, have gained considerable attention since 1973, particularly as they relate to the situation facing less developed countries.

There are three different measures of the terms of trade which are relevant to the oil crisis and its impact on the external sector of a country's economy. The net barter terms of trade, that is $\frac{\text{Price of Exports}}{\text{Price of Imports}} \times 100$, is the most commonly used and widely known measure. A decline in the net barter terms of trade means that a given volume of exports will now exchange for a smaller volume of imports

than before. The major drawback of this measure is that it does not include the physical volume of goods traded. The second measure is the income terms of trade:

$\frac{\text{Price of Exports x quantity of Exports}}{\text{Price of Imports}}$. This expresses the change in the physical volume of exports accompanying any change in the ratio of export to import prices. The final measure applicable to this study is the total terms of trade, defined as $\frac{\text{Price of Exports x Quantity of Exports}}{\text{Price of Imports x Quantity of Imports}} \times 100$. This is simply another way of expressing a country's trade balance in terms of a ratio of magnitudes rather than a difference.

The dispute over the direction the terms of trade have taken since the crisis is obscured by conflicting data and contradictory interpretations. The terms of trade for developing countries takes into account all primary products, including petroleum. Therefore, the improvements in the terms of trade for developing countries illustrated in the following table can be attributed to the increasing prices of petroleum and other minerals.[12]

Table 9

TERMS OF TRADE

LDC's as a group (1972=100)

Year	Index
1972	100
1973	110
1974	153
1975	136
1976	142

Source: Jan S. Hogendorn, The New International Economics, (Reading, Mass. : Addison Wesley Co., 1979) p. 405

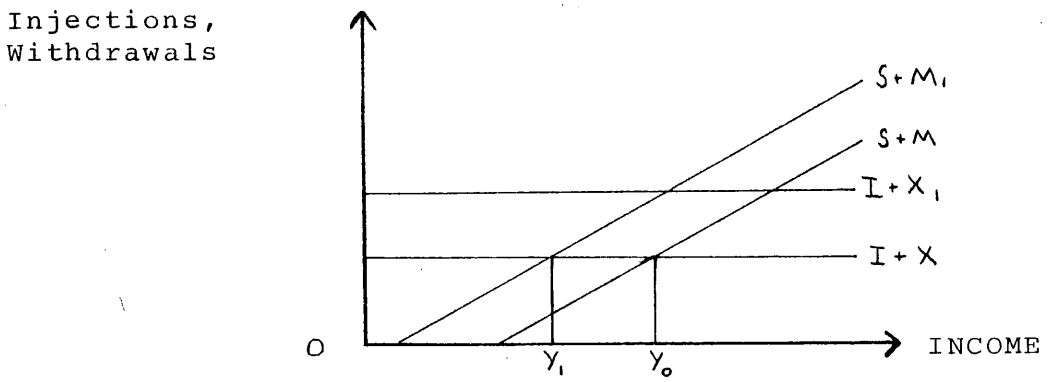
This is, of course, where the problem develops; petroleum is not a major export good for lesser developed countries, and is in fact one of their main import commodities. Thus the arguments put forth by Paul Prebisch and others is in fact quite correct in stating that the terms of trade, excluding petroleum, have deteriorated significantly since 1973.[13] Prebisch supports his arguments by presenting the following factors: the increase in petroleum prices, the increase in prices of manufactured goods, and insufficient increases in demand for primary products. These three factors leading to a deteriorating and unstable terms of trade have caused balance of payment deficits for many lesser developed countries.

THE STANDARD KEYNESIAN MODEL

The most serious problems facing all countries after the 1973 crisis were the downward pressures on aggregate demand, and the resulting increases in balance of payment deficits. For the developing countries, the deteriorating terms of trade were responsible for much of the pressures imposed on their economies. The declining terms of trade representing lower export prices and/or higher import prices have immediate effects on both the aggregate demand and balance of trade of each economy. Hogendorn, utilizing the basic withdrawal-injection approach, has demonstrated the impact of these effects on real national income and the trade balance.

Figure 5

The Keynesian Model I



Source: Jan S. Hogendorn, The New International Economics, (Reading, Mass: Addison Wesley Publishing Co., 1979) p. 396.

In analyzing figure 5 and 6, it is important to interpret carefully the terminology and concepts used. When referring to income in these two models, we are speaking in terms of real national income. The change in nominal income resulting from the increase in the general level of prices is disregarded. While the nominal income of countries has in fact increased since 1973, we limit our discussion to real income in order to illustrate the effects of the crisis on income and aggregate demand.

The initial shift in the S+M curve in figure 5 is, as the author puts it, an "autonomous(oil-price induced) shift".[14] Real income declines from Y_o to Y_1 as imports increase from M_o to M_1. To reiterate, the increase in the size of imports for all countries was caused by the drastic increase in the price of oil. In the case of developing countries, this increase in import payments can be looked upon as a result of the decline in the terms of trade.

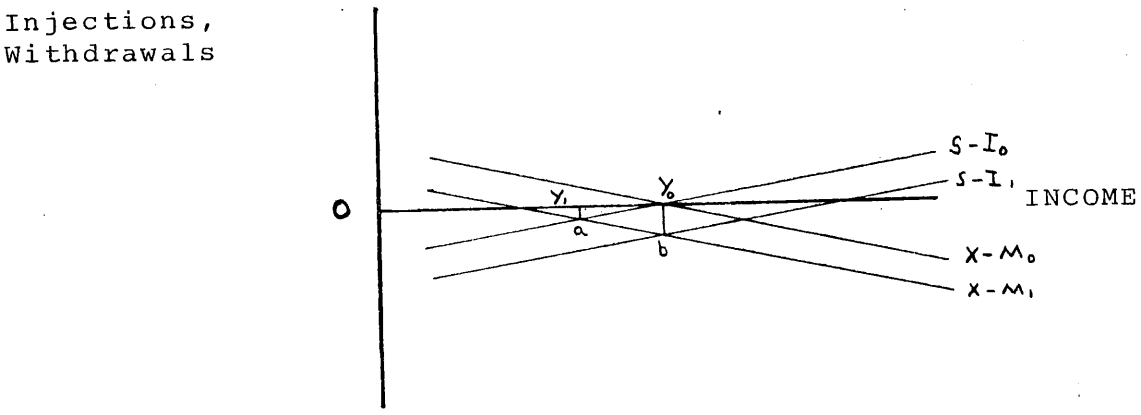
Hogendorn uses this same approach to examine the changes taking place in the trade balance. One of the most obvious effects of the crisis is the outflow of income in the form of rising import payments. As oil payments increase, the real national income of the country will experience the downward pressures noted above. Standard Keynesian economic policy would suggest that the government restimulate demand to shift the real national income back

to its original level of Y_o. A policy of this nature is needed to replace the millions of dollars that have gone abroad as oil import payments. This movement would be brought about by the upward shift in the I+X curve, reflecting, for example, an easy money policy.[15] This policy, however, has the unfortunate side effects of increasing the balance of trade deficits.

The change in income and the balance of trade deficits presented by Hogendorn can be seen in the following figure.

Figure 6

The Keynesian Model II



Source: Jan S. Hogendorn, p. 397

The intersection of $S-I_o$ and $X-M_o$ represents the initial equilibrium level of income. As the oil crisis developed, resulting in deteriorating terms of trade and increasing

import payments, the $X-M_o$ curve shifted to $X-M_1$. This movement in the above hypothetical economy resulted in both a lower level of income and a balance of trade deficit of Y_1a. In attempting to restimulate demand, the $S-I_o$ schedule would in turn shift downward to $S-I_1$. This policy, while restoring the income level to Y_o, would produce an even larger balance of trade deficit of Y_ob.

Although the two figures presented in this section represent highly simplified versions of an economy in the pre and post crisis state, Hogendorn's analysis is useful in illustrating the general impact of the Oil crisis on national income and the balance of trade.

THE VICIOUS CIRCLE

With the advent of floating exchange rates in the early 1970's,it became evident that the disparities in balance of payments of countries were partially linked to the strength of each economy's currency. Some countries appeared to be caught in a situation of depreciating exchange rates and domestic inflation, now known as the vicious circle. In its simplest form, the vicious circle manifests itself this way: exchange rate depreciation caused by an initial disturbance rapidly leads to higher domestic prices and costs which in turn lead to further depreciation of the exchange rate, and the cycle is repeated. In her 1980 article, Marian Bond outlines the stages of this circle

and why it occurs.[16] Bond's analysis has much relevance to the 1973 Oil crisis. The sharp increase in oil prices constitutes a prime example of the shock needed to initiate the vicious circle.

The initial impact of the adjustment to a foreign oil price shock can be found in the goods market. The first phase of an oil-induced vicious circle is characterized by rising unemployment, a deteriorating current account, and a downward tendency in the exchange rate. The second phase consists of increases in domestic prices and wages caused by rising oil prices. This in turn causes unemployment to increase and domestic output to fall. This situation of high inflation, unemployment, current account deficits, capital inflows (to cover the deficits), and exchange rate depreciations will persist as long as the inflation itself continues. Once the inflation process slows down, the economy will move back towards equilibrium. But it is here where many countries are afflicted with the vicious circle, for they have been unable to control the inflationary forces in their respective economies. If a country is fortunate enough to enter the third phase of the circle, it will experience an improving trade account and rising domestic output. This will in turn decrease unemployment and domestic inflation,moving the country back into a state of equilibrium.[17]

There are three necessary conditions to be fulfilled in order that the vicious circle outlined in the above paragraph can be set in motion. Bond states that the existence of a flexible exchange rate system is mandatory; this allows a country to adopt an independent monetary policy. Secondly, wage rigidity in the labor market would further help stimulate a more rapid rate of growth in nominal wages. And thirdly, political conditions which lead to expansionary monetary policies, ensuring that unemployment is not used as a means of holding down rising prices and wages, would also aid the development of the vicious circle.

While it is not our primary concern to study at great length the vicious circle, it should be noted that Bond has made some interesting observations about small country vulnerability to this phenomenon. It is quite evident that less developed countries are less able to deal with exchange rate depreciations. At the same time, it is suggested that,in response to a depreciation, small countries experience higher rates of inflation and unemployment than do larger countries. Bond bases much of her small country vulnerability hypothesis on the strength (or weakness) of a country's currency and its poorly functioning labor market.[18] If these are in fact the prevailing conditions, a country's exchange rate will be more likely

to undergo wide fluctuations, with import price changes heavily influencing domestic prices. If prices and wages do not stabilize as unemployment rises, these vulnerable countries will be subject to high rates of unemployment over a "prolonged period unless domestic policies are used at this stage to reduce unemployment".[19]

As has been stated throughout this thesis, the Oil crisis of 1973 has had profound effects on the economies of all nations. The vicious circle is one of several concepts reviewed in this chapter that sheds some light on the conditions facing nations in the post 1973 era. In the chapter which follows we formulate and empirically test an equation depicting the international reserves of a country as a function of several other economic variables.

FOOTNOTES

CHAPTER THREE

1. Roger L. Miller, Intermediate Microeconomics, (New York: McGraw Hill, 1978), p. 307.

2. While there are of course many grades of petroleum all with their own prices, for simplicity sake, output and prices are treated here as being homogenous.

3. Y.S. Park, Oil, Money and the World Economy, (Boulder, Colo.: Westview Press, 1976), p. 41.

4. The most pressure on The Organization will probably arise from the dissimilar costs of production experienced by OPEC members for premium grades. At the same time, the existing excess productive capacity of the members will cause strains in the association.

5. C.P. Kindleberger and P.H. Lindert, International Economics, (Homewood, Ill.: Irwin, 1978), p. 193.

6. Kindleberger and Lindert, p. 194.

7. Y.S. Park, Oil, Money and the World Economy, (Boulder, Colo.: Westview Press, 1976).

8. Park, p. 37.

This small decrease in quantity demanded resulting from the drastic increase in price further illustrates the price-inelasticity of demand for oil in 1973 and 1974.

9. Park, p. 39.

10. Park, p. 37.

11. Jan S. Hogendorn, The New International Economics, (Reading, Mass.: Addison - Wesley Publishing Co., 1979), p. 347.

12. Hogendorn, p. 407.

13. Hogendorn, p. 407.

14. Hogendorn, p. 396.

15. Hogendorn, p. 397.

16. Marian E. Bond, "Exchange Rates, Inflation, and the Vicious Circle", Finance & Development, (March, 1980).

17. Bond, p. 28.

18. Bond, p. 30.

19. Bond, p. 30.

CHAPTER IV

THE INTERNATIONAL RESERVES EQUATION

In the discussions and theories presented to this point, several economic variables have been observed to be particularly important in a country's post 1973 struggle for economic stability. The purpose of this chapter is to construct and to analyze an equation which will aid in determining a country's ability to absorb an external economic disturbance. The presentation which follows combines the theory and descriptive material of the preceding chapters with available empirical information to formulate, estimate and interpret the aforementioned equation. Discussion of the general implications of the results obtained will conclude the thesis in the following chapter.

An external shock such as the Oil crisis imposes wide-ranging restrictions on and creates severe problems for an open economy. As was illustrated in the standard Keynesian withdrawal-injection model, the rising oil prices of 1973-74 resulted in downward pressure on the level of income for all oil-importing countries. This immediate increase in import payments had further implications for these countries; a balance of payments crisis had developed. The excessive growth of imports along with a worsening terms of trade for developing countries adversely affected an already critical balance of payments situation. Even for

the developed countries, the crisis had serious effects. All nations were forced to adjust not only to the increased oil payments, but also to the eventual inflation and recession of the post-crisis period.

Because external shocks can arise very suddenly, and more importantly, because they can be due to a variety of factors, the ability of governments and economists alike to predict these disturbances with any degree of accuracy is virtually impossible.[1] For all economies, but especially for those of lesser developed countries, it is crucial that they be prepared for any type of external disturbance. The problems resulting from the oil price shock have had long-lasting effects on the progress of both developed and developing countries. Thus, it is necessary for countries to take action to anticipate and to avoid potential crises.[2]

The years leading up to and including the Oil crisis of 1973 present a period which allows for an analysis of the various factors and indicators representing an economy's ability to withstand and to absorb external shocks. The varying degrees to which the eight countries described earlier adjusted to the crisis were an important determinant in their selection.

At the outset of this project it had been proposed that the period under study would include the five year period before and five year period after the crisis in 1973.

Once the variables described below were chosen, however, it became apparent that gaps in the data would not allow the model to be estimated for the years 1975 through 1978.[3] The significance of this development and its implications on the interpretations of the model will be discussed later. Although the project does not include the years after 1974, the individual characteristics of each country's economy along with the variables included in the model will allow us to draw inferences from and state observations about a country's ability to withstand an external shock.

THE VARIABLES

The choice of variables for inclusion in the empirical estimations at first appears quite open. The crisis has affected nearly all external and internal economic indicators to some degree. As this study progressed and the literature was consulted, the list of possibilities narrowed. The description which follows of each variable together with the actual data presented in the appendix should serve to explain the reasons for the inclusion of these variables in the model.

The most important consideration of this part of the study is the selection of the dependent variable. Along with making the choice of this variable, it is also necessary to argue its significance and relevance with regards to the topic under study. To reiterate, the

the objective here is to construct and estimate a single equation linear model which will help determine an economy's ability to absorb a large exogenous disturbance. It is, therefore, essential that the dependent variable be regarded as a measure of this ability.

The international reserves of a country defined as the accumulation of gold, SDR's (Special Drawing Rights), the reserve position in the International Monetary Fund, and foreign exchange provide the study with one measure of a country's external position.[4] While the changes in the international reserves of a country are not a direct result of a shock, they do indicate indirectly changes within an economy. For the more developed countries, the major component of the reserves is simply foreign exchange. Meanwhile, for the lesser developed countries, the reserve position in the International Monetary Fund also comes into play. It should be noted that there are two sides to this variable. International reserves for countries can rise because of increased sales of their exports and increased foreign investment in their financial sector. These reserves can also increase as a result of foreign borrowing. Thus, when the reserves equations are analyzed, it will be important to remember that countries can both earn and purchase foreign exchange.

Since the 1973 crisis, lesser developed countries have been able to attain reserves from other sources as well.

The International Monetary Fund stated above has continued to aid and to help finance many developing nations' economies. One other major source of international reserves for the developing countries has been OPEC itself. While some members of the third world will state otherwise, OPEC has indeed been a major contributor of aid to developing countries.[5]

For the eight countries under study, each nation experienced declining reserves in 1973 or in 1974.[6] Harold van B. Cleveland and W.H. Brittain have outlined the actual effects of the rise in oil prices on a country's reserve position. "This led to a very large surplus not only in the trade and current balances, but also in the overall balance of payments of the industrial countries vis a vis the LDC's. With LDC exchange rates mostly fixed or supported, their foreign exchange reserves declined, slowing the growth of their domestic money supplies. In this way, tight money in the developed countries was transmitted to developing countries. Tighter money in LDC's increased their demand for foreign credit. This in turn led to a sharp rise in foreign borrowing, as the recession and easing inflation in the industrial countries reduced domestic demands for credit and enlarged the supply of funds available for lending to LDC's."[7] Because of these and other factors which influence a country's level of international reserves, this

variable was chosen as the measure of a country's ability to absorb external shocks. Although international reserves are more significant a measure for the lesser developed countries than the developed countries, they still represent an adequate and reasonable index of external stability for all nations. The following equation attempts to quantify the impact of the oil crisis on a country's international reserve position.

$R_{ij} = b_o + b_1 A_{ij} + b_2 I_{ij} + b_3 M_{ij} + b_4 E_{ij} + b_5 D_{ij}$, where R = International Reserves.

The first independent variable appearing in the equation, A_{ij}, represents the current account balance for a country. The current account, which includes all payments for goods and services of a country, will have a significant effect on the level of international reserves. As a current account surplus (deficit) increases, the foreign exchange component of the reserves will increase (decrease). The current accounts for the countries with the exception of Japan were in a deficit position for most of the period under study. This account which encompasses the services sector is helpful in determining whether a country is experiencing net foreign investment (a current account surplus) or net foreign disinvestment (a current account deficit).[8] As is clearly evident, the current account position will have a significant influence on a nation's

ability to maintain certain levels of international reserves. With the introduction of the oil price increases in 1973, the deteriorating current account was responsible for depleting these same reserves.

The next variable included in the model, I_{ij}, is defined as the direct foreign investment in a country. The ability of a country to attract foreign investment depends upon several factors. The economic and political stability of a nation are by far the most important. In addition, the flexibility of a country's financial sector will have much bearing on an investor's decision. The extent to which a country receives direct foreign investment also depends upon the more intangible aspects of international economics. Although interest rates and rate of expected economic growth play an important part in determining the level of investment in a country, there are other more abstract reasons for a nation to experience increased or decreased direct foreign investment.

The significance of I_{ij} in this context is readily apparent. The larger the levels of foreign investment, the higher will be the international reserves of a country. Conversely, a decline in direct foreign investment will lead to a reduction in the accumulation of foreign reserves. The level of significance of this variable in the model will allow the study to propose various policies which may

increase a country's international reserves holdings, and consequently, improve its position with regards to external shocks.

The third independent variable, M_{ij}, represents oil import payments as a percentage of total imports. This is the first of two variables in the equation which attempts to bring to light the effects of the Oil crisis on the international reserves of a country. As was first hypothesized and later illustrated in the chapter concerning the Oil crisis, the demand for oil and the size of oil import payments increased significantly during the early 1970's. This oil import variable is closely related to the value of the current account. Interpretation of the parameter b_3 and the level of significance of M_{ij} will necessitate caution in the later stages of this chapter. It is hypothesized that as the value of the variable increased over time (particularly during 1973 and 1974) the level of international reserves would eventually decrease; higher import costs would develop, thus causing foreign exchange to leave the country. This variable measured in percentage terms has since 1970 increased for all eight countries in the study.

The final two variables in the equation are dummy variables representing qualitative characteristics of the countries and the world economy. The dummy variable, E_{ij}, is concerned with measuring the direction of change of the

exchange rate of each country. The variable takes on the value of 1 when the domestic currency has depreciated from one year to the next. E_{ij} will be 0 if the currency either remains stable or appreciates in value. There are two reasons for including this variable in the model. First, it will provide some information on which to base an assessment of Marian Bond's vicious circle argument. And secondly, the empirical results will enable comments to be made concerning the relative impact of a depreciation on a country's reserve position. It should be noted that exchange rates are strongly influenced by a country's external sector; conversely, the foreign sector is dependent upon the exchange rate. As a consequence of this feedback relationship, statistical results involving the variable E_{ij} must be interpreted with caution.

The last independent variable included in our specification above, D_{ij}, is the second of the two variables which attempts to illustrate the effects of the Oil crisis on the international reserves of a country. This dummy variable takes on the value of 1 during the "effective" OPEC years 1973 and thereafter. For all years preceding 1973, D_{ij} will be equal to zero.[9]

Before continuing, brief mention should be made of some of the short-comings of the model and its econometric interpretation. It was intended that part of this study would be devoted to the formulation of a model which

would measure an economy's ability to absorb an external shock with the 1973 price increase providing the test case. This investigation was to be carried out by analyzing the five year periods before and after the 1973 Oil crisis. For reasons mentioned earlier in this chapter, this type of procedure was not possible. Although the lack of data availability during the post-crisis period denies the possibility of an analysis of the full impact of the crisis on the level of international reserves in the model, regression techniques are still useful in shedding light on the significance of the overall relationship.

From the outset, it was intended that this study would be based on a pooled cross-sectional,time-series data set. This fact presents additional problems for parameter interpretation. Since the cross-sectional, time-series approach assumes that the parameter associated with each variable is the same for all countries included in that equation, it was thought necessary to separate the eight countries into three groups, according to similar economic characteristics. By grouping together nations with similar economies and economic features, it is possible to run regressions on each group and to obtain more accurate and efficient parameter estimates. Mexico, Canada and Brazil were included in the first group. These countries represent economies which were the least dependent on imported fuels;

each of these countries has oil producing capabilities. The second group, consisting of Tanzania, Barbados and India, represent three lesser developed nations with virtually no domestic oil production. Although India is more developed than the other two countries, it seems reasonable to include it in this grouping when we consider the extreme dependence on imported fuels of all three nations. The final group, consisting of Japan and Sweden, is representative of highly developed economies which possess strong foreign trade sectors and which are heavily reliant upon imported petroleum for their economies' continued operation.

In order to run three separate regressions by ordinary least squares, it was necessary to assume away any major differences among the countries in each group. The three groups of data can be looked upon as representing time series information on three separable and distinct units. In summary then, the first unit (Canada, Mexico and Brazil) is representative of a middle to upper income country whose dependence on foreign oil is diminished by its own domestic production. The second unit (Tanzania, India, and Barbados) depicts a third world country which is heavily dependent on foreign oil.[10] The third unit (Japan and Sweden) is illustrative of a highly developed industrialized nation heavily dependent upon imported fuels.

In combining the available data for Japan and Sweden, the number of observations is constrained to fourteen. In addition, then, to the limitations associated with the cross sectional, time-series approach mentioned above, a new problem has arisen: too few observations. Attempting to alleviate this by adding observations at either end of the period under study would merely bias the equation and create further difficulties. Thus, it was decided to leave the equation as it is, and deal with the problems of econometric interpretations as they arise.

One of the major problems evident in the structural make-up of the model is that of multicollinearity. As was mentioned earlier in the chapter, the linear dependence of several variables within the model is readily apparent. This situation, however, was unavoidable. The objective of the analysis is not to discuss and to evaluate each equation separately, but rather to compare the parameter values of each variable(and their statistical significance) with those same parameter estimates from the other equations. By analyzing the following equation estimates of the three data units, keeping in mind the particular economic conditions which faced each group during the period 1968 to 1974, some tentative conclusions can be put forth regarding the matter of a country's susceptibility to large exogenous economic disturbances.

RESULTS

Estimation 1*

Canada, Mexico and Brazil $n = 21$ $R^2 = .7215$

$$R = -1175 + .315A + 7.58I + 62.1M + 793E - 174D$$
$$(-1.517)\ (1.373)\ (6.393)\ (.584)\ (.986)\ (-.214)$$

Barbados, Tanzania and India $n = 21$ $R^2 = .8431$

$$E = 80.9 - 995A - 9.91I + 10.5M + 148E - 201D$$
$$(.676)\ (-5.102)\ (-1.37)\ (.897)\ (1.566)\ (-1.417)$$

Japan and Sweden $n = 14$ $R^2 = .7178$

$$R = 669 + 1.36A + 6.06I + 589M - 1680E + 2350D$$
$$(-2.627)\ (3.052)\ (.342)\ (3.058)\ (-.443)\ (.803)$$

Estimation 2*

Canada, Mexico and Brazil $n = 21$ $R^2 = .4692$

$$dR = -630 + 417A + 1.41I + 148M - 98.4E - 470D$$
$$(-1.621)\ (3.619)\ (2.382)\ (2.778)\ (-.244)\ (-1.154)$$

Barbados, Tanzania, and India $n = 14$ $R^2 = .3459$

$$dR = 31.1 - .105A - 1.61I + .887M - 52.4E - 37.3D$$
$$(.768)\ (-1.59)\ (-.657)\ (.223)\ (-1.631)\ (-.776)$$

Japan and Sweden $n = 14$ $R^2 = .6894$

$$dR = 2676 + .657A + 39.4I - 95.0M + 1691E + 917D,$$
$$(-1.82)\ (2.56)\ (3.86)\ (-.857)\ (.777)\ (.545)$$

*The numbers in the parentheses represent the estimated t-values for each parameter.

Where dR represents the change in the level of international reserves from one year to the next.

The above sets of regression equations represent the estimated models for international reserves. The results entitled Estimation 2 comprises of a set of regressions using the change in the level of international reserves as the dependent variable rather than absolute levels themselves. Discussion will, however, pertain for the most part to Estimation 1.

Variables A and I are measured in millions of current United States dollars. The oil import variable, M, is measured in percentage terms and is expressed in this manner: 10% = 10.0. The information which is normally included with the equations estimated by the Time Series Processor programs has been omitted from this section. The relevant information has, however, been presented in the appendix.

The earlier discussion of the possibility of multicollinearity being present in the equations would appear to be born out in the results. Intuitively, one can expect that there is some linear dependence between the current account variable and the direct investment variable, since direct investment is simply a component of the current account. Evidence of multicollinearity in the estimation results is signalled by the relatively high R^2 values and the low t-values for several of the independent variables. If multicollinearity is indeed present here, it will cause some imprecision in the parameters and will reduce their reliability.

Estimation sets 1 and 2 illustrate some very interesting relationships between the dependent variables and the level of reserves. For Canada, Mexico, Brazil, Japan and Sweden, the current account variable in the model is clearly a source of international reserves. The negative coefficient of A in Estimation 1, for Tanzania, Barbados

and India, indicates that the current account variable has, in fact decreased the level of international reserves, and in turn, the ability of these countries to absorb an external shock such as the 1973 Oil crisis. In general, as was hypothesized, a surplus in the current account will lead to an accumulation of foreign reserves. Conversely, a recurring deficit in the current account will lead to a decline in the reserves of a country. For Tanzania, Barbados and India, this is one area which warrants special attention, if the nations' goals are to diminish external debt and to attempt to achieve some state of external stability.

The signs of the coefficients of the direct foreign investment variable in estimation set 1 are as hypothesized. For Canada, Brazil and Mexico, the variable I is statistically significant at the 99% confidence level, and is seen to exert a positive influence on the level of international reserves. This direct relationship is easily supported when one considers the vast growth each of these economies has experienced in the years under study. In comparison to the other countries in the study, these three economies have experienced tremendous increases in direct foreign investment since 1968. This investment in turn has provided these nations with another source of international reserves.

In the case of Japan and Sweden, this positive relationship between I and R is also exhibited. While the coefficient of I for these two nations is not statistically

significant at the 95% level, the positive sign of the coefficient illustrates that direct foreign investment is a variable which can improve the external position of an economy with regards to their foreign reserves. Once again, for the lesser developed countries of Tanzania, Barbados, India, a variable which is a source of reserves for the more developed countries fails to have the same influence on their position. The insignificance of this variable shown by the low t-ratio for I further indicates the absence of direct foreign investment in these economies.

It was hypothesized that the coefficient of M would be negative, thus implying that an increase in oil imports relative to total imports would cause the international reserves of that country to fall. The coefficients of M for all three groups in Estimation 1 are in fact positive. By way of partial explanation of this result we might note the observations of Cleveland and Brittain as they address the issue of external debt, lesser developed countries, and the Oil crisis. "The borrowing that was caused by the industrial countries' recession and the price of oil was the result of external forces and the responses of economic units in LDC's to them, rather than of LDC's internal policies. Borrowing increased because economic units (household, private firms and public enterprises) in developing countries responded to the adverse impact on

their liquidity of higher oil costs and declining export revenues by borrowing abroad. Borrowing of this kind cannot be attributed to any failure on the part of LDC's to adjust domestic policies to eliminate balance of payments deficits."[11] Therefore, the positive relationship between the variable,M, and the dependent variable, R, can possibly be explained by the increase in borrowing mentioned above.[13]

Two of the more noteworthy and interesting variables in the model are the dummy variables E and D. E, it is to be recalled, takes on the value 1 when the currency has depreciated in the past year, and is zero otherwise. When a currency does in fact depreciate, the domestically produced goods become cheaper in the export market. At the same time, the foreign produced goods will become more expensive. In other words, export prices decrease and import prices increase when depreciation takes place. If this adjustment does come about, one would assume that there would be an accumulation of international reserves; exports are increasing because of the lower prices, while imports are falling because of the rising prices.

Although none of the coefficients for E is statistically significant, the sign of the parameters for the countries of the first unit (Canada, Mexico, and Brazil) and the second unit (Tanzania, Barbados and India) are in fact positive, as one would have hypothesized. In instances

where depreciation has occurred for these two groups, a net accumulation of international reserves would result. The coefficient for E in the Japan-Sweden group is negative, implying an inverse relationship between the exchange rate and international reserves. There is, however, a possible explanation for the negative signs of the parameter. If these latter countries' demand for imports is price-inelastic, and their trading partners have inelastic demand schedules for their imports, a depreciation of either country's currency would in fact lead to an outflow of international reserves as the E variable coefficient tends to suggest.

When comparing the two estimation sets with regard to the exchange rate dummy variables, we obtain our most conflicting results. In estimation set 2 Japan and Sweden are the only two countries which experience reserve accumulation when a depreciation occurs. For the other two groups of countries, the coefficients are negative, implying that a depreciation leads to a depletion of reserves. The results in the second estimation set, while running totally contrary to the results in the first, support Marian Bond's argument that some nations, usually small, open and less developed countries, experience the described vicious circle. For Canada, Mexico, Brazil, Barbados, India and Tanzania, estimation set 2 indicates that as their national currencies depreciate, their international reserve levels fall.

The second dummy variable, D, takes on the value 1 for the years 1973 and 1974 and is equal to zero otherwise. Once again, the coefficient estimate of the variable for each equation is statistically insignificant. Be that as it may, the sign of these parameters is important in determining the actual impact of the OPEC crisis years on a country's level of international reserves. This is the one variable which, if it had in fact been statistically significant, would have denoted each country's adjustment to the shock.

The countries in units one and two (Canada, Mexico, Brazil, Tanzania, Barbados and India) all exhibit negative coefficients estimates for D, indicating that these nations did in fact suffer reduced international reserves as a result of the crisis. It is interesting to note that the remaining two countries in the study group, Japan and Sweden, two of the world's most highly developed and industrialized nations (and heavily dependent on imported fules) registered a positive coefficient for this variable. In other words, the general conditions present in the world economy during the OPEC crisis years had a positive effect on the international reserves of these two countries.

Each variable in the model represents several influences on a country's international reserve position. The results outlined in the preceding section together with the theory of international economics presented in chapter

three provide us with the information necessary to draw some conclusions about the OPEC crisis and its effects on the external and internal sector of a country. The final chapter then will offer some general comments on the significance of the estimated equation and the possible adjustments open to countries experiencing these international economic disturbances.

FOOTNOTES

CHAPTER FOUR

1. Bahram, Nowzad, "Managing External Debt in Developing Countries", Finance & Development, (September, 1980), p. 26.

2. Nowzad, p. 26.

3. Since the model consists of countries of varying political and economic structures, the lag between the measurement of data and its publication became a problem. While data for the variables of all eight countries was available through 1974, gaps quickly developed for specific nations from that point on.

4. The International Monetary Fund use this definition as the measure of a country's international reserves.

5. "Oil Prices: The Real Impact on the Third World", South, The Third World Magazine, (October, 1980), p. 11.

6. See Appendix

7. Harold van B. Cleveland and W.H. Brittain, "Are the LDC's in over Their Heads", Economic Impact, (1978/2), p. 52.

8. C.P. Kindleberger and P.H. Lindert, International Economics, (Homewood, Ill.& Irwin, 1978), p. 259.

9. Although the variables in each equation vary for each year and country (denoted by 'i' and 'j'), throughout the remainder of the thesis, they will be referred to without the use of subscripts.

10. This unit is in fact extremely susceptible to all exogenous shocks.

11. Cleveland and Brittain, p. 53.

12. It should be noted that in Estimation 2 the coefficient of M for Japan and Sweden is negative, as hypothesized. However, the coefficient value is insignificant at the 95% level.

CHAPTER V

CONCLUDING REMARKS

The equation formulations discussed in the preceding chapter are affected by several econometric problems. However, while the incidence of multicollinearity, the cross-sectional,time series pooling of data observations and the problem of totality within the equation itself combine to make statistical interpretation of the results more difficult, the estimated relationship provides some evidence upon which to base policy recommendations.

Before proceeding with a summary discussion of the estimation results and our general concluding observations it will be useful, within the context of this study to note several avenues outlined by Darmstadter and Landsberg which a country can take to avoid the repercussion of a future oil crisis.[1] While the crisis of 1973 came as a great surprise to many nations, oil importing nations are now better prepared, say the two authors, to cope with a similar shock providing the following measures are taken.

It has been extremely important that the international monetary system adjust to the tremendous flow of income passing from the oil consuming to the oil producing countries. It was feared early on that under the generally prevailing floating exchange rate system, the world economy would suffer a serious setabck as a result of these large

money flows. For the most part the world economy and the international financial institutions have withstood the crisis quite well.

To lower a country's susceptibility to another oil crisis, it is also important that countries reduce their rates of growth in energy consumption. As discussed in chapter two, the increasing rate of growth in energy consumption was an influencing factor in the emergence of the crisis. Even more so, countries must curb their shift towards oil as a source of energy. Both the increase in energy consumption and the growing dependence on oil led to the conditions which allowed the OPEC cartel to exploit their market position. Since the winter of 1973-1974, nations have begun to adopt conservationist policies with regard to energy use in general, and oil consumption in particular.

Of equal importance to the demand side adjustments are the supply side considerations for the energy dependent countries. To this point no short-term alternative to Middle Eastern and North African oil have materialized. While oil production in the North Sea and other locations has developed, and new discoveries have been made, the oil importing nations of the world still depend to a large extent on oil from Arab producers. If the market power of OPEC is to be reduced in the future, clearly a substitute

for OPEC oil must be found. In the short-run, this has not been possible; the cartel has continued to exploit its oligopoly power.

The most short term of the solutions to a future oil crisis offered by Landsberg and Darmstadter is the policy of stockpiling oil reserves. Several countries including Japan and the United States have adopted policies which require a specified amoung of stockpiled oil.[2] By insuring against supply interruptions, countries will be able to lessen the impact of a new crisis.

One final possibility concerns the prospect of mutual assistance programs among user nations. Landsberg and Darmstadter state that cooperation amongst countries can help avoid another crisis. Cooperation in financial areas and allocation of scarce oil supplies is suggested. While countries have begun to aid each other financially, the policy of re-allocating oil supplies to countries in emergency situations has met with some difficulties.

This thesis has analyzed and interpreted the economic ramifications of the 1973 Oil crisis. While the regression equations were formulated to illustrate the effects of the crisis on the international reserves of a country (through M and D), the econometric specification also allowed for the investigation of other influences on the dependent variable.

The influence of the current account balance on a country's international reserves can be observed in all the estimation results. For the group of India, Barbados and Tanzania, this variable has had a negative effect on the countries' level of reserves. In the cases of the two remaining groups, the converse is true; the current account has been a source of international reserves. The significance of this variable in the estimation equations further indicates the importance of a favorable current account position for a country. For those countries which have experienced weak and deficit-ridden balances, it is imperative that they improve their position. Barbados, India, and Tanzania must, therefore, adopt various policies which will decrease their deficits and, as the results of the equations indicate, provide the economies with a new source of reserves.

Direct investment as observed in this study has had similar effects on the change and levels of the international reserves of each of the three country groups. In the two sets of estimations this variable has illustrated another crucial area which affects the external position of an economy. Once again, Barbados, India and Tanzania all were faced with decreasing international reserves as a result of this independent variable. The remaining five countries in the study, on the other hand, experienced an accumulation of reserves through direct

investment. The implications of this are quite obvious: a country which experiences high levels of direct investment will accumulate international reserves and, in turn, benefit with respect to its external position.

Developing countries, if they are to improve their ability to withstand economic shocks, must make their financial markets much more attractive to foreign investors. Barbados, India and Tanzania will have to take measures which will strengthen and stabilize their economies internally and externally. It is here, however, that the less developed countries are faced with a real dilemma. In order for a country to receive high levels of direct investment, it must have a stable economy. And, for a developing nation to stabilize its economy, it must also attract some direct foreign investment.

A general observation which follows from the estimation results is that the more developed a country is, the better able it will be to absorb a large exogenous disturbance. The relatively developed nations in this study have been able to accumulate international reserves through their current accounts and direct investment. This has not been the case for the less developed countries. In many instances, these nations are primary commodity exporters heavily dependent on imported fuels and other resources. When faced with these economic realities, many of the avenues for attaining international reserves available to

advanced nations do not present themselves.

Developing nations, like Barbados, India, and Tanzania, must adopt policies and make adjustments which will expand and at the same time stabilize their economies. It was observed earlier that the growth of a developing country depends upon the level of foreign reserves it has. In order to gain a dependable continuous source of reserves, the developing nations must improve their existing export markets. They will also be forced to diversify into other markets to decrease their extreme dependence on the present export commodities.

While measures should be taken to expand and diversify the export markets of less developed countries, it is also necessary that internal changes take place. In order for distributed economic growth to occur, the management of both foreign and domestic investment will be crucial.

Once these and other changes have been implemented, the resulting increased foreign reserves and direct investment could be profitably used to improve the economies through the initiation of new development projects and the extension of existing industries, rather than to finance debts caused by exogenous economic disturbances. If the less developed countries are able to diversify their sources of international reserves and to enhance their economic growth rates, their susceptibility to external

shocks should diminish substantially.

For the advanced nations, this problem is much less severe. The more developed the country, the easier it is for it to adjust to shocks in the economy, as illustrated by the estimation results of chapter four. The five more developed countries of our study not only easily withstook the Oil crisis in the short-run, but also were able to adjust to the relative price changes much more rapidly than the developing nations. The more advanced nations decreased consumption and where possible increased their production from existing domestic sources, while at the same time, expanding their search efforts for alternative sources of supply.

It is hoped that this study of the 1973 Oil crisis with its brief review and analysis of some aspects of the theory of international trade and finance and with its admittedly modest empirical revelations, may help to clarify the economic implications of the OPEC oil pricing changes and provide some basis for analysis of future developments of this nature.

FOOTNOTES

CHAPTER FIVE

1. Joel Darmstadter and Hans H. Landsberg, "The Crisis: The Economic Backgroung", in The Oil Crisis, by Raymond Vernon (New York: Norton & Co. Inc., 1976), pp. 35-36.

2. Darmstadter and Landsberg, p. 36.

APPENDIX I

Results of Empirical Analysis

Empirical Results

The following results were obtained with the use of the Time Series Processor program. TSP is a program for econometric analysis fo time series data.

Estimation 1

Canada, Brazil and Mexico

Sum of squared residuals =	.2084E + 08
Standard error of the regression =	1178.6
Mean of Dependent Variable =	2895
Standard deviation of the Dep. Var. =	2233
R-squared =	.7911
Adjusted R-squared =	.7215
F-Statistic (5, 15) =	11.36
Durbin-Watson Statistic =	2.098

Barbados, India and Tanzania

Sum of squared residuals =	572628
Standard error of the regression =	195.39
Mean of Dependent Variable =	406.1
Standard deviation of the Dep. Var. =	493.3
R-squared =	.8824
Adjusted R-squared =	.8431
F-Statistic (5, 15) =	22.5
Durbin-Watson Statistic =	1.907

Japan and Sweden

Sum of squared residuals =	.8815E + 08
Standard error of the regression =	3320
Mean of Dependent Variable =	5722
Standard Deviation of the Dep. Var. =	6248
R-squared =	.8263
Adjusted R-squared =	.7178
F-Statistic (5, 8) =	7.62
Durbin-Watson Statistic =	1.602

Estimation 2

Canada, Brazil and Mexico

Sum of squared residuals =	.5249E + 07
Standard error of the regression =	591.6
Mean of Dependent Variable =	427.1
Standard Deviation of the Dep. Var. =	812.0
R-squared =	.6019
Adjusted R-squared =	.4692
F-Statistic (5, 15) =	4.536
Durbin-Watson Statistic =	1.956

Barbados, India and Tanzania

Sum of squared residuals =	65720
Standard error of the regression =	66.19
Mean of Dependent Variable =	32.43
Standard Deviation of the Dep. Var. =	81.84
R-squared =	.5094
Adjusted R-squared =	.3459
F-Statistic (5, 15) =	3.115
Durbin-Watson Statistic =	2.323

Japan and Sweden

Sum of squared residuals =	.2193E = 08
Standard error of the regression =	1908.5
Mean of Dependent Variable =	884.5
Standard deviation of the Dep. Var. =	3424.3
R-squared =	.8089
Adjusted R-squared =	.6894
F-Statistic (5, 8) =	6.77
Durbin-Watson Statistic =	2.451

APPENDIX II

Data

International Reserves*
R
(millions of U.S. $)

Country	1968	1969	1970	1971	1972	1973	1974
Barbados	$80	$76	$71	$60	$58	$54	$64
Brazil	257	656	1187	1746	4183	6417	5252
Canada	3046	3106	4679	5701	6050	5786	5825
India	682	926	1006	1206	1180	1142	1325
Japan	2906	3654	4840	15360	18365	12246	13519
Mexico	657	662	744	952	1164	1356	1395
Sweden	815	696	761	1110	1575	2528	1735
Tanzania	78	80	65	60	120	145	50

* Expressed as Gold + SDR's + Reserve Position in the International Monetary Fund + Foreign Exchange

Changes in International Reserves*
dR
(millions of U.S. $)

Country	1968	1969	1970	1971	1972	1973	1974
Barbados	$-7	$-4	$-5	$-11	$-1	$-5	$11
Brazil	58	399	531	559	2437	2234	-1165
Canada	329	60	1573	1022	349	-282	57
India	20	244	80	200	26	-38	183
Japan	876	748	1186	10520	3005	-6119	1273
Mexico	71	5	82	208	212	192	39
Sweden	-26	-119	65	349	465	953	-793
Tanzania	16	2	-15	-5	60	25	-95

* Expressed as Gold + SDR's + Reserve Position in the International Monetary Fund + Foreign Exchange

Current Account
A
(millions of U.S. $)

Country	1968	1969	1970	1971	1972	1973	1974
Barbados	$-23	$-34	$-48	$-50	$-48	$-58	$-61
Brazil	-503	-154	-561	-1352	-1488	-1783	-7181
Canada	-100	-887	1025	396	-587	-427	-1896
India	-840	-463	-624	-909	-434	-803	-1116
Japan	2018	1223	1970	5797	6614	-136	-4549
Mexico	-757	-609	-1123	-893	-980	-1489	-2997
Sweden	-14	-195	-311	189	228	1014	-806
Tanzania	-15	21	-35	-101	-66	-112	-311

Direct Foreign Investment
I
(millions of U.S. $)

Country	1968	1969	1970	1971	1972	1973	1974
Barbados	$8	$6	$9	$13	$17	$12	$6
Brazil	150	252	145	216	396	979	945
Canada	546	666	797	867	722	720	598
India	-5	3	-10	6	-1	4	-13
Japan	76	72	94	210	168	-39	202
Mexico	227	297	323	307	247	460	678
Sweden	105	154	108	82	67	70	76
Tanzania	2	11	8	17	5	11	24

Oil Imports as a Percentage of Total Imports

M
(%)

Country	1968	1969	1970	1971	1972	1973	1974
Barbados	10.8%	8.4%	6.7%	8.6%	6.8%	7.9%	17.6%
Brazil	10.8	10.1	10.0	11.2	12.6	14.1	15.2
Canada	3.1	2.7	3.0	3.4	3.5	4.0	8.5
India	8.0	9.8	9.0	11.5	11.1	22.4	33.6
Japan	20.6	18.4	14.9	19.3	23.4	20.7	40.0
Mexico	2.2	2.4	2.4	2.7	4.8	7.6	6.9
Sweden	10.4	10.0	9.8	12.3	10.1	11.1	18.6
Tanzania	3.0	3.8	3.6	4.6	4.1	7.9	9.9

Exchange Rates*
E
(National Currency Per U.S. $)

Country	1968	1969	1970	1971	1972	1973	1974
Barbados	2.01	2.00	2.01	1.88	2.04	2.07	2.04
Brazil	3.83	4.35	4.95	5.64	6.22	6.22	7.44
Canada	1.07	1.07	1.01	1.00	.996	.996	.991
India	7.56	7.49	7.51	7.21	8.01	8.13	8.08
Japan	358	359	358	315	302	280	301
Mexico	12.5	12.5	12.5	12.5	12.5	12.5	12.5
Sweden	5.17	5.16	5.16	4.86	4.74	4.59	4.08
Tanzania	7.14	7.14	7.14	7.14	7.14	6.90	7.14

* Are measured mid-point rates for each year

APPENDIX III

Sources of Data

SOURCES

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