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THE IMPACT OF OIL PRICE CHANGES ON THE ECONOMIC GROWTH OF SELECTED OPEC COUNTRIES

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ÖZ

PETROL FİYATLARINDAKİ DEĞİŞİKLİLERİN SEÇİLEN OPEC ÜLKELERİNİN EKONOMİK BÜYÜMELERİ ÜZERİNE ETKİLERİ

TASNIM DEKHILI

Petrol, dünya genelinde birçok ülke ekonomisinin, özellikle de petrolün kendi girdilerinin ana kaynağı olan petrol ihracat gelirlerine büyük ölçüde bağımlı olanların motoru haline gelmiştir. Bu çalışma petrol fiyat değişikliklerinin 1979 yılından 2016 yılına kadar olan dönemde altı büyük OPEC ülkesinin (Suudi Arabistan, Irak, İran, Kuveyt, Nijerya ve Venezuela) iktisadi büyümelerine etkisini incelemektedir. Bu çalışmanın amacı, gelişmiş petrol ithalatçı ülkelere odaklanan benzer önceki çalışmaların aksine, petrol fiyatlarının petrol ihraç eden ülkelere etkisini analiz etmek ve petrolün bu ülkelere ilişkin olumlu ve olumsuz taraflarını vurgulamaktır. Bu çalışmada bağımlı değişken olarak seçilen ülkelerin Gayri Safi Yurtiçi Hasılaları (GSYİH) ile bağımsız değişken olarak alınan Petrol fiyatları, Petrol dışı ihracat, Petrol İhracatı, Döviz kuru ve Toplam İhracatın arasındaki ilişkileri incelemek için Rastgele Efektli Panel Veri Modelini kullanılmıştır. Sonuçlar, petrol fiyatlarının, petrol ihracatının, döviz kurunun ve petrol dışı ihracatın, ülkelerin GSYİH'sı üzerinde olumlu ve önemli bir etkisi olduğunu göstermiştir; burada, petrol fiyatlarındaki %1'lik artış GSYİH'da %33'lük bir artışa katkıda bulunmuştur. Petrol dışı ihracattaki %1'lik artış GSYİH'yı %6 oranında artırırken, petrol ihracatındaki %1'lik artış GSYİH'yı %25 oranında, döviz kuru oranındaki %1'lik artış ise GSYİH'yı %3 oranında artırmıştır. Sonuçlar, petrol fiyatlarının bu petrol ihraç eden ülkelerin GSYİH'sını güçlü bir şekilde etkilediğini kanıtlamaktadır.

Anahtar Kelimeler: Petrol Fiyatları, Petrol İhracat Gelirleri, Petrol Şokları, GSYH, İktisadi Büyüme, OPEC.

ABSTRACT

THE IMPACT OF OIL PRICE CHANGES ON THE ECONOMIC GROWTH OF SELECTED OPEC COUNTRIES

TASNIM DEKHILI

Oil has become the engine of many economies around the world, especially for those that largely depend on oil export revenues, as it is the primary source for their inputs. This study examined the impact of oil price changes on the economic growth of six major OPEC countries (Saudi Arabia, Iraq, Iran, Kuwait, Nigeria, and Venezuela) over the period spanning from 1979 to 2016. Unlike the similar previous studies that focused on the developed oil importing countries, the aim of this study is to analyze the impact of changing oil prices in developing oil-exporting countries and highlight both the negative and positive aspects of oil concerning these countries. We have used the Panel Data model with the Random Effects to examine the relationship between the dependent variable, namely, the Gross Domestic Product (GDP) of these countries and the independent variables, namely, Oil prices, Non-petroleum exports, Oil exports, Exchange rate, and Total Exports. The results demonstrated a positive and significant impact of oil prices, oil exports, exchange rate and non-petroleum exports on the GDP of the countries, wherein, the increase in oil prices by 1% contributed to an increase in GDP by 33%. The increase in non-petroleum exports by 1% increased the GDP by 6%, the increase in oil exports by 1% increased the GDP by 25%, while the increase in exchange rate by 1% increased the GDP by 3%. The results prove the fact that oil prices strongly affect the GDP of these oil-exporting countries.

Keywords: Oil prices, Oil Export revenues, Oil shocks, Gross Domestic Product, Economic Growth, OPEC.

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LIST OF ABBREVIATION

OPEC	Organization of Petroleum Exporting Countries.
US	United States.
GNP	Gross National Product
GDP	Gross Domestic Product.
IMF	International Monetary Fund
PPP	Purchasing Power Parity
USSR	Union of Soviet Socialist Republics
MB/D	Million Barrels per day
BP	British Petroleum Company
ECI	Economic Complexity Index.
MDGs	Millennium Development Goals.
EIA	Energy Information Administration.
MENA	Middle East and North Africa.
UAE	United Arab Emirates.
SAMA	Saudi Arabian Monetary Authority
USD	United States Dollar.
EIU	Economist Intelligence Unit
IOM	International Organization for Migration
WTRG	West Texas Research Group
NYMEX	New York Mercantile Exchange

WTI	West Texsas Intermidiate
IEA	International Energy Agency
Mtce	Million tons of coal equivalents
NEA	Nuclear Energy Agency.
GW	Gigawatts
TWh	Terawatt per hour
KWh	kilowatt per hour
PV	Photovoltaic
GEA	Geothermal Energy Association.
KD	Kuwaiti Dinar
BBC	British Broadcasting Corporation
OECD	Organization for Economic Co-operation and Development
VAR	Vector Auto Regression
GCC	Gulf Cooperation Council
FE	Fixed Effects
RE	Random Effects
SERI	Sustainable Europe Research Institute

INTRODUCTION

Considered as the backbones of so many economies, the black gold as it is called has moved from being just a commodity like all other commodities that bought and sold around the world's markets to the role of the world engine. The importance of oil becoming clear to the nations since the first oil shock of the 1970s, and it has become the main concern for the oil importing and the oil exporting countries as well. Despite numerous attempts from the oil importers to create alternatives for this source of energy in order to get rid of the dominance of oil owners, the oil still has a huge role in affecting the economic activity of countries and playing the role of the motor for the economies since its discovery.

The world suffered from the undesirable effects of the oil prices during decades, and the oil prices-economic growth relationship has been the subject of various studies, where many researchers found that price swings of oil have significant impacts on the economic activity. However, these impacts differ among the oil importers and the oil exporters, moreover; the strength of the impact is linked with the dimension of the dependence of the economy on oil.

The majority of economists focused on analyzing how the changes in oil cost affect the economic expansion of oil-importing states, quite a few of studies have applied to the developing oil-exporting countries. Fluctuations in oil prices caused disturbances in the economy of the oil exporting countries since the oil field has a key role in their productions and exports, and the recent collapse of the oil prices led to a huge crisis in so many oil-exporting economies such as Venezuela.

For the reasons mentioned above, and in order to know in depth the consequence of oil cost shifts on the economic expansion of the nations that export oil, we studied the case of six countries from the Organization of Petroleum Exporting Countries (OPEC). The aim of this study is to see how oil price shifts influence their economies during a selected period (1979-2016), the selected countries are Saudi Arabia, Iraq, Iran, Nigeria, Venezuela, and Kuwait.

The thesis is divided into five chapters besides the introduction and the conclusion. The first chapter provides the reader with the background on the two main factors in the study, the oil and the economy, highlighting on the evolutions happened in the global economy, introducing the Organization of Petroleum Exporting Countries (OPEC), and clarifying its objectives since its establishment. In this chapter, we will take a glance focusing on the economic expansion of the study's countries. We will discuss the causes and the effects of the oil crises as well, since the first oil shock of 1973 until the last collapse of oil prices in recent years.

Chapter two shows the main factors that influence the oil prices represented by the alternative energies, the expectations, the US dollar and the OPEC decisions concerning the oil production and oil prices. By analyzing the relationship between OPEC oil production and the world oil production, we will show how OPEC can affect the total oil production and then the oil prices. The last part of this chapter shows the effects of the oil crises on the global economy, and then on our six selected countries, showing the positive and negative aspects of oil price changes.

Chapter three represents the basic economic model, which is the Solow Model, explaining the components of the model and the importance of human capital and technology in the economic growth, highlighting on the total factor productivity and its relationship with these components.

Chapter four represents earlier analyses directed on the link between the economic expansion and the oil cost swings and shows the different results collected from these studies, starting with explaining the export-led growth hypothesis and examining the validity of this hypothesis for the OPEC countries.

Chapter five is the methodology part that shows the application of the Panel Data Model with Random Effects (RE), starting with explaining the aim of our study, introducing the model and the indicators used in it, and then illustrating the results of two different models treated in the study, concluding that in the finding and discussion part.

CHAPTER ONE

THE OIL AND THE ECONOMY: AN OVERVIEW

We cannot start research that analyses the effects of oil on economic expansion without highlight on these two factors and their performance. We will discuss the evolution of the global economy and the economy of the study's countries (Iraq, Iran, Saudi Arabia, Kuwait, Nigeria, and Venezuela), we will give the definition of OPEC illustrating its main objectives and showing its history since the establishment, point out the reasons for the changes in oil prices and talk about the oil shocks, their causes, and consequences.

1.1. Overview of the global economy.

The world economy or the changing of the world economy become an important subject to talk about in the recent years, (Drucker, 1985-1986) discussed that, starting with the primary-products economy and the fall in the prices of the non-oil commodity since 1977. The collapse in the primary products economy appears to have nearly no consequences on the global industrial economy in these last years. The only explanation could be given is that the primary products sector has become marginal and not central as before. For example, before the Great Depression period, the farm workers constituted 1/3 of American citizens and farm income represented nearly a quarter of GNP, today they represent less than 5 % of people and even less in GNP, where, in other advanced nations the share of the primary products field is even less important. In 1984, the raw materials were represented one to three percent of total production costs, which is explained by the new high-technology industries, this steady drop in the raw material intensity of manufacturing processes and manufacturing products extended to energy as well, and especially to petroleum. This sharp shift affected the free trade between developed countries as well as third world nations.

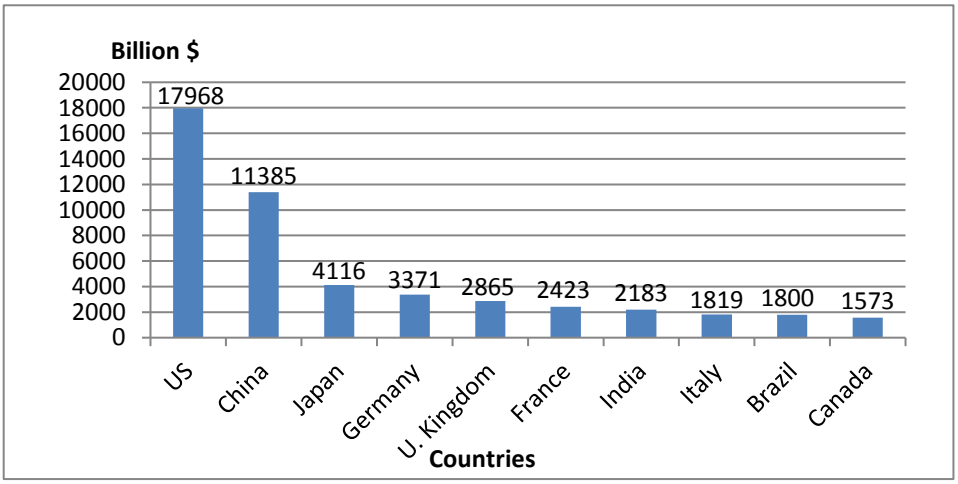
Another important change in the world economy is the labor cost which becoming less and less important with the increase of the manufacturing technologies. In 1984, the exports of American goods manufactured by Americans

increased by 8.3%, and they increased again in 1985. In 1978, the share of the United States manufactured exports was more than 17% of the world total exports. By 1985, it had risen to 20%, versus 16% of Japan and 18% of Germany. The manufacturing production of the United States rose by 40% between 1973 and 1985 while the manufacturing employment went down during the same period, we can conclude that, as (Drucker, 1985-1986) said by what is called "automation".

The total gross domestic product in current US dollars recorded 6.401 trillion in 1976 rose to 78.079 trillion by 2014 where the United States represents the world leader during years, and it has the largest world economy accounting for 24.5% of the global GDP in 2015 (World Bank).

Figure 1.1 shows 2016' top ten countries in the world according to their nominal GDP, where the United States ranked first with nominal GDP up to $17 968 billion. The US nominal GDP increased by more than $500 billion compared to 2014 where it recorded $17 419 Billion, followed by China, Japan, Germany, United Kingdom, France, India, Italy, Brazil, and Canada. India succeeded in making progress between 2014 and 2015 and took the place of Brazil ranked the 7_{th} by $2183 billion. Russia, which ranked the 10_{th} in 2014 with $1957 billion, disappeared from the top ten countries in 2015, probably due to the decrease in oil prices. The data are from the International Monetary Fund World Economic Outlook (Oct-2016).

Figure 1.1: Top 10 countries by Nominal GDP in 2016.



Source: Statistics Time, IMF world outlook

According to the world factbook of the CIA, the global export sales were $16.329 trillion in 2015, and the top ten exporting countries in 2015 are China valued at a total of $2,275 billion. Then, United States with $1,504 billion, Germany with $1,309 billion, Japan with $622 billion, South Korea with $548.8 billion, France with $510.5 billion, Hong Kong with $505.7 billion, Netherland with $476.5 billion, Italy with $450.1 billion, and finally, United Kingdom with $436.2 billion. The top export products in 2015 are Crude oil, Cars, Processed petroleum oils, Phone system devices (Central Intelligence Agency, The World Factbook Field Listing-Commodities. Accessed on June 11, 2015 International Trade Centre, Trade Map).

1.2. OPEC, its formation and history.

According to OPEC bulletins, the idea of establishing this organization was in 1949 when Venezuela proposed to other oil-producing countries including Iran, Iraq, Kuwait and Saudi Arabia to indicate avenues for regular cooperation on oil matters. However, the real motive came in 1959 when "seven sisters"[1] multinational oil companies started controlling the oil extracted and sold, determined the prices and to whom been sold. They made large benefits and giving their governments a small royalty, which caused the holding of the First Arab Petroleum Congress in Cairo, Egypt in April in order to find solutions to these issues and try to persuade oil companies to consult with governments before taking decisions on the oil matters. The request was rejected by the companies. On 10 September 1960 Oil-producing countries' delegates met in Baghdad and four days later, exactly on 14 September 1960, the Organization of the Petroleum Exporting Countries (OPEC) was established as a permanent intergovernmental Organization with five oil-producing countries (Islamic Republic of Iran, Iraq, Kuwait, Saudi Arabia, and Venezuela). These countries were joined by Qatar (1961); Indonesia (1962)—suspended its membership from January 2009-December 2015—; Libya (1962); United Arab Emirates (1967); Algeria (1969); Nigeria (1971); Ecuador (1973)—suspended its

[1]The seven sisters comprised: Anglo-Persian Oil Company (now BP); Gulf Oil, Standard Oil of California (now Chevron), Texaco (later merged with Chevron); Royal Dutch Shell; Standard Oil of New Jersey (Esso/Exxon) and Standard Oil Company of New York (Socony) (now part of ExxonMobil)

membership from December 1992-October 2007—; Angola (2007); Gabon (1975)—terminated its membership in January 1995, re-joined the Organization on 1 July 2016; and Guinea (2017)—became a member on 25 May 2017—; (See Table 1.1)

Table 1.1: OPEC Membership

	Year of accession	
Founder Members	1960	Islamic Republic of Iran Iraq Kuwait Saudi Arabia Venezuela
Full Members	1961	Qatar
	1962	Socialist People's Libyan Arab Jamahiriya
	1967	United Arab Emirates
	1969	Algeria
	1971	Nigeria
	1973	Ecuador
	2007	Angola

Source: OPEC bulletin 2009-2010[2]

The first site of the OPEC Secretariat was located in Geneva, Switzerland, after that, in April 1965, the OPEC Conference took the decision to move the headquarters to Vienna, Austria. OPEC's logo made by an Austrian designer "Gertrude Svoboda" after an international competition held in 1969, she collected the first letters of the organization's name in a rounded design and the logo is still in use by OPEC (OPEC Bulletins).

[2]1. Abu Dhabi joined OPEC in 1967 and, at its own request; its Membership was transferred to the UAE in January 1974.
2. Ecuador suspended its Membership in December 1992 and reactivated it in October 2007. Gabon, which became an Associate Member in 1973 and a Full Member in 1975, terminated its Membership with effect from January 1, 1995. It rejoined the Organization on 1 July 2016. Indonesia, which became a Full Member in 1962, suspended its Membership in December 2008.

“OPEC's objective is to coordinate and unify petroleum policies among Member Countries, in order to secure fair and stable prices for petroleum producers; an efficient, economic and regular supply of petroleum to consuming nations; and a fair return on capital to those investing in the industry.”(opec.org). OPEC acted as a “Trade-Union” whose core aim was to not let the earnings of its member nations declining (Fettouh and Mahadeva, 2013). These objectives have developed over the years and its member nations took over the work of their domestic oil companies. With its international dominance, which rose over the decades, OPEC has been able to affect the world oil price by controlling the oil supply of its members and moving the leadership from the multinational oil companies to the oil-producing nations. The differences in production capacities across OPEC members don’t put any of them in a lower position when it comes to making decisions, and all members become equal giving their opinion, the decisions must be made collectively with the agreement of all Organization’s members.

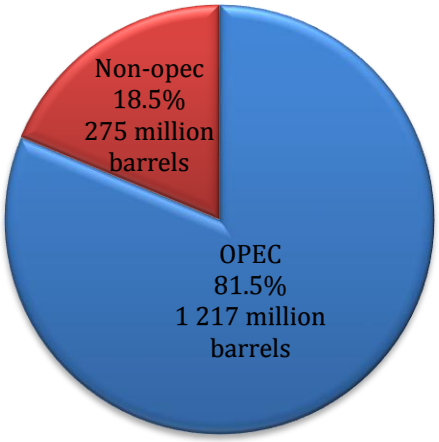
Since its formation, OPEC was eager to keep oil market well supplied and avoided oil price changes which affect not only its members, but also the global economy, especially in the critical times such as wars and natural disasters by increasing and decreasing the oil production of its members when the oil demand increase or decrease respectively. However, OPEC has always said that this aim—avoiding oil market instability—could be achieved by the cooperating with other non-OPEC oil-producing countries.

OPEC's crude oil share of world oil production was around 38.2% (8.3 mb/d) in 1960, from 1965 and for eight years from this point on, the international demand for oil quickly rose with an average annual growth of more than 3 mb/d (BP statistical review 2012). OPEC reached its peak in 1973 recording 52.8% of world oil supply (29.7 mb/d). During the 1980s, OPEC’s crude oil production fell sharply, recording 14.3 mb/d and a share of 24.9% of world oil supply. However, because of the increase in oil demand, OPEC crude oil production increased, reaching 29.6 mb/d in 2004. Since then, it has remained at around 30 mb/d registering an average of 30.1 mb/d from 2004 to 2012. The share of OPEC crude oil in total world oil supply has

recorded 34.6% in 2012, by 2015 OPEC reached a share of around 42.4% increased to 44.1% in 2016 (Data Analysis Energy, OPEC Performance, 2013).

Figure 1.2 shows the 2016' OPEC share of world crude oil reserves (million barrels, OPEC share), where OPEC's reserve represents 81.5% of the total world reserve. The world's proven crude oil reserve recorded 1,492 mb in 2016, increased by 0.1% from the previous year's level of 1,488 mb. OPEC increased its proven crude oil reserves by 0.1% to 1,217 mb in 2016, reaching a share of 81.5% of total world crude oil reserves according to the OPEC annual statistical bulletin of 2017.

Figure 1.2: OPEC share of world crude oil reserves in 2016.



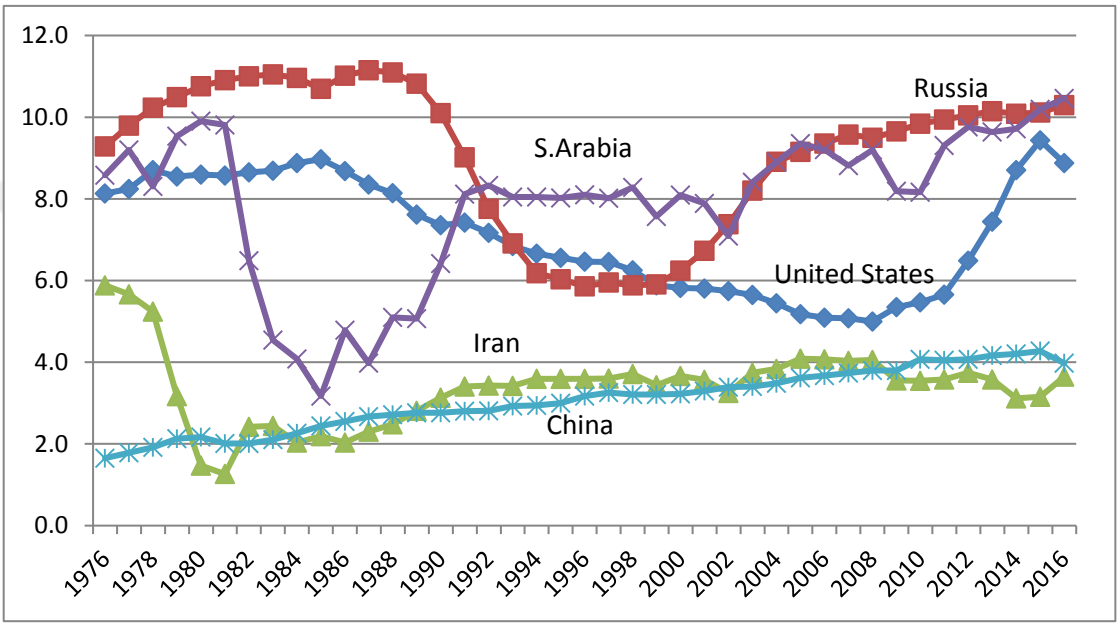
Source: Data from OPEC bulletin 2017.

According to the organization statue, OPEC membership is open to any country that exports crude oil and has similar interests of the Organization, and as we know some of the developed countries that produce oil such as Russia, China, and the US are not part of OPEC. We can guess that these countries want to stay away from rules and constraints, especially that they are the powerful countries in the world with their economic position and they have no need to join any organizations.

Figure 1.3 represents the top five Oil-Producing countries from 1976 to 2016. We can see that Russia ranked first almost since 2006, and Saudi Arabia come in the second rank. However, by 2016, Saudi Arabia came the first with a difference of almost 20 000 barrel per day more than Russia. The United States since 2000 ranked

the third, China, and Iran Rotate on the third and fourth place, where we see that since 2009 China was the fourth oil producing country in the world, here Iran ranked the fifth.

Figure 1.3: Top Oil-Producing countries 1976-2016, (1000 barrels per day).



Source: Data from OPEC.

1.3. The economic growth of selected countries during 1976-2016.

In this study, we have selected six OPEC countries, which are: Saudi Arabia, Kuwait, Nigeria, Iraq, Iran, and Venezuela. The results can be generalized on other OPEC's countries, taking into consideration the availability of the data and the same situation of the other OPEC countries, where oil export revenues representing a high percentage of the total export revenues (See Table 1.2). In this part, we will discuss the economic performance of these selected countries during our study period 1976-2016.

Table 1.2: Oil export revenues share of total exports revenues of OPEC

Country	**Oil exports revenues / total exports revenues**
Iran	80%
Iraq	95%
Kuwait	95%
Saudi Arabia	97%
Venezuela	96%
Qatar	93%
Libya	97%
United Arab Emirates	85%
Algeria	95%
Nigeria	98%
Ecuador	54%
Angola	97%

Starting with **Saudi Arabia**, according to (Tawi, 1984), the Saudi Arabian economy witnessed important issues before the nation began the exportation of oil in 1938. The government's major cause of earning was limited on customs duties on imports and fees financed by people doing a pilgrimage to the holy cities of Mecca and Medina.

During this period (1970-1982), the annual rate of increase of GDP in present prices was about 26% according to the National Accounts of Saudi Arabia and SAMA annual report. Oil had a key role in the expansion rate of GDP, totaling 49% for the period 1970-1982. Manufacturing's part of GDP was 9.6% in 1970, falling to 6.8% in 1982. However, the agriculture sector share of the total GDP dropped almost every year. In 1970, agriculture field registered 5.7%, decreased to 3.4% in 1982. The lack of water for irrigation purposes and the high percentage of illiteracy among farmers, in addition to the low return rate for the agricultural sector relative to others, are the causes of this decline (Tawi, 1984). The most needed production factor is labor. About two million members of the Saudi Arabian labor force are foreigners

(Al-Mubtaath Magazine, 1983). This means there was full employment in the economy (Alam, 1982).

The period between 1983 until the 1990s saw a decrease in the economic expansion because of the dropping oil prices. That caused intensive efforts in order to rationalize public expenditure, enhance the efficiency of public institutions, the plurality of the economic base and the improvement of the developmental function of the private field. Contrary to the previous period where the rate of increase was high and the government started the build of huge projects, unfortunately, these projects could not be financed anymore during this period (Alkahtani, 2013)

The period of 1999-2010 experienced a surplus budget, helped the government to bolster the economy by means of big initiated projects like the six economic cities, some railroad systems, a new seaport, and other projects. In this period, the public spending reached its peak (Alsakran, 2014).

2010 until now, despite the challenges made by the government in order to Strengthen the non-oil sector, the oil sector still playing the role of the leader in the Saudi Arabian economy. The country tried harder to turn into an important world icon regarding innovation and technology. Such goals are expected to be met with a knowledge-based economy by 2025 (Kalan, 2013)

The GDP witnessed significant jumps in the Saudi Arabian growth rate during (1970-1982), recording around 13% per year. At the period of (1982-1999), Saudi Arabia experienced strong stagnation with deficit occurred overlapping with decreasing oil prices and the Gulf War during 1990-1991. During this period, the growth rate registered only 1%. The (2000-2010) characterized by an incredible economic potential because of elevated growth rates congruent with the increase of oil prices. The Saudi Arabian economy recovered relatively, and the growth rate averaged about 4%. The government was able to succeed in 1985 to vary the economy by acting more efficient in the non-oil field, recording the most elevated result when non-oil GDP accounted 76%, reached 66% of GDP between 1985 and 2010. After 2010, the non-oil sector started to shrink dramatically. By 2014, the growth in GDP recorded 3.6% (Alkahtani, 2013).

Table 1.3 represents the performance of the economic sectors of Saudi Arabia through their share of GDP. Where the Agriculture sector has almost a weak contribution in the economy and its share did not exceed 6% during the whole years, recording less than 1% in 1975 and 1980. The Industrial sector's share was the highest, recording around 2/3 of GDP in 1975 and 1980. Except 1985, where the service sector surpassed it registered its highest level (55%). The Service sector saw a jump from its 27% in 1975 and 1980, with more than a half in 1985 and since then, it has not recorded fewer than 30%.

Table 1.3: Changes in the structure of the Saudi Arabian economy 1975-2015 (%GDP).

	1975	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**
Agriculture	0.93	0.99	3.66	5.75	5.92	4.95	3.22	2.38	2.26
Industry	71.85	71.49	41.44	48.79	48.85	53.91	62.11	58.54	45.90
Service	27.22	27.52	54.90	45.47	45.23	41.15	34.66	39.08	51.83

Source: Data from The World Bank.

Passing to **Nigeria**, According to (Onwe, 2013), the economic growth of Nigeria has been generally disappointing. Agricultural and manufacturing sectors have been the bedrock of the Nigerian economy and the exports of the country.

According to the Central Bank of Nigeria, the agricultural share of the GDP was 62.9% in 1960, decreasing gradually reaching 32% in 2005. The manufacturing share of GDP was 4.8% in 1960, recorded 2.79% in 2005. Unlike the energy (oil) sector, which was 1.6% of the GDP in 1960, increased to 38.77% in 2005.

Nigeria has been working hard to improve the performance of its economy over the years. Despite this, the country tottered on a mean growth rate of not even 3% per year for most of the 30 years following the finding and exploitation of oil, at the period when most of developing economies were posting an approximate growth rate of more than 10% per year (Onwe, 2013).

The oil boom of the 1970s led Nigeria to ignore the agriculture sector and focus only on the manufacturing. In 2000, oil and gas exports accounted for more

than 98% of export earnings and about 83% of government revenue, with the domination of the oil sector over other economic sectors, citizens moved to cities and poverty increased. The GDP per capita recorded one-quarter of its mid-1970s, while the non-oil sector continued to collapse; the "informal sector" economic activities were estimated by 75% of the total economy (Odularu, 2008).

Nigeria earned about $200 billion from oil exports between 1970 and 1990; this represented about 95% of the total foreign exchange earned in the economy. In 2000, petroleum exports were over 98% of exports profits and around 83% of government income, counting more than $16 billion. In mid-2001, the crude oil production was averaging around 2.2 mb/d. However, inflation, which decreased to 0% in April 2000, climbed to 14.5% at the end of the year and reached 18.7% in August 2001. (Odularu, 2008).

Nigeria suffered from two decades of weak performance regarding economy after the great oil cost drop at the beginning of the 1980s. The Nigerian economic growth over the last 10 years recorded 6.9%. In 2011, the growth rate was 7.4%, and 67% of the Nigerian population were living on less than one USD a day. The poverty kept increasing now it covering 69% of the population according to (Omorogiuwa, Zivkovic, and Ademo, 2014). The rate of unemployment was almost 24% in 2011. By 2012, it decreased to 21.1% (Idalu, 2015).

Table 1.4 represents the performance of the economic sectors of Nigeria through their share of GDP. The sectors seemed almost equal to each other in 1975. However, by 1980, the Industrial sector’s share was almost half of GDP, where the Service sector’s share was almost 30% in 1980 and 1985. The table shows the dominance of the industrial sector from 1990 until 2005, while the service sector took its place in 2010 and 2015 recording 51% and 59% respectively.

Table 1.4: Changes in the structure of Nigeria's economy 1975-2015 (% GDP)

	1975	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**
Agriculture	30.10	22.23	39.21	31.52	32.06	26.03	32.76	23.89	20.85
Industry	35.64	48.04	29.86	45.27	46.02	52.21	43.51	25.32	20.38
Service	34.26	29.73	30.93	23.21	21.92	21.76	23.74	50.79	58.76

Source: Central Bank of Nigeria (Statistical Bulletin 2010), and the World Bank.

The economy of **Iraq** was in a good situation during the 1970s, this situation did not last long, where the country saw a great recession during the eight years of the Iran-Iraq war and the two years of the invasion of Kuwait (Alnasrawi, 2002).

The quick demographic growth throughout the last 30 years, associated with restricted cropland and a global stagnating agricultural productivity, prevented Iraq from achieving agricultural production stages close its capacity, that is led Iraq's government to import a large share of its domestic food needs. In 1985, agriculture accounted for only 14% of GDP. In the same year, Iraq imported almost 50% of its food (Sanford, 2003).

The second phase of the economic decline started with the Gulf War (1991), where the war destroyed about $230 billion of the infrastructure. Oil production during the 1991-2002 periods averaged 1.4 mb/d. Iraq was able to produce 3.5 mb/d at that time, the earning deficit since the war was around $200 billion. In the 1990s, the GDP is likely to have reached $25 billion (Nordhaus, 2002).

The insistence on increasing its oil-production income in order to be more powerful pushed Iraq to enter into wars, and unfortunately, the results were unexpected in terms of economy. In addition to the destroy of industrial fields, the damage of the oil exporting system, the lack of privatization, the high level of inflation, the proliferation of unemployment and the increase of the military expenditures created unbalance between income and expenditure (Poyraz,2008).

According to the Economist Intelligence Unit (EIU), the gross domestic product reached the highest level at $53.9 billion in 1980 and fell by about 50% to

$26.9 billion in 1989. GDP reached its low point in 1994 falling to $6.5 billion. Iraq's GDP stood at $66.2 billion in 1989. The GDP increased from $10.8 billion in 1996 to $31.8 billion in 2000, before falling back to $26.1 billion in 2002. According to (Al-Nasrawi, 1994), GDP per capita in constant dollars reached $4,083 in 1980. By the end of the Iran war, it had collapsed to $1,537 and reached its minimum with $343 in 1996, reaching $1,941 in 2000. In nominal dollars, EIU indicated that per capita GDP was $3,675 in 1987. EIU reported that per capita GDP increased from $503 to $1,385 between 1997 and 2000, before falling to $1,184 in 2001.

The third phase started with the invasion of Iraq in March 2003, the Iraqis, in general, were living under the poverty line, and the overthrow of Saddam Hussein did not repair the economy situation, contrary, it left huge issues that need determined effort and a long-term approach to be fixed. The invasion expanded the old problems, such as the increase of the jobless, where the unemployment in Iraq was over 60% in July 2003. In addition to the increase of the internal migration because of the unstable environment, According to the report of the International Organization for Migration (IOM), approximately 1.4 million Iraqis moved to saved environments. That movement touched the Iraqi demographic pattern and generated some other issues, like limiting the opportunity to find local work and obtaining health care.

According to (Looney, 2008), the inflation rate was 36.3% in 2003, decreased to 31.7% in 2004, by 2005, it registered 31.7%, and it increased to 53.2% in 2006. According to the International Monetary Fund (IMF) data in 2007, consumer price inflation per year was around 30 to 35%.

Today, the level of the economy reflects how the situation in Iraq is. The oil revenues constitute 43% of GDP, 99% of exports and 90% of all federal revenues, which make the government always under pressure (World Bank).

The **Iranian** economy has been known as an ill economy, for 50 years. This fact is not only because of political issues but also because of the international disagreements. The Iranian economy, identically to oil producing countries, putting

all the concentration on the oil sector, the dominance of agriculture, for example, was faded by oil and gas exploitation, and that made Iran a net importer of foodstuffs. The share of agriculture sector in GDP fell in the 1990s, from 23.9% in 1993 to 19.7% in 1998. In 2000, it declined again by 0.3%. The government support of the agriculture sector has been reduced more over the last years (Navazeni, 2010).

The Iranian standard of living was significantly high during the 1970s, when per capita income recorded $180 per year before 1973, jumped to $810 in 1974. The 1990s saw important changes in the development strategy of Iran. However, in 1991 the Inflation rose by 50%, and consequently, the wages fell by 20%. This situation made people dissatisfied with these programs and plans, which led the government to abandon its new development strategies and focusing on the price controls. The decline of oil revenues reduced the industrial capacity utilization as well. In 1997, the GDP growth registered only 75% of planned target, and the unemployment averaged 14.7% only a half of the planned target (Isfahani, 2009). At the beginning of the 1980s, the non-oil exports had fallen to well below 1% of Iran's non-oil GDP (Pesaran and Esfahani, 2008).

By 2005, the state of the economy relatively improved because of the oil price windfalls, the GDP growth reached 5.4%, and the unemployment rate reached 12.5%. The total increase in productivity at the national level reached 0.52%; and the foreign reserves account exceeded $34 billion (Amuzegar, 2005).

The twentieth century and after several hundreds of years of lack of development and no improvement in the economy, the Iranian economy started to evolve regarding structure, efficiency, and global impact. By the end of the century, per capita income had risen seven times; international trade had doubled relative to GDP. Now by the turn of the 21st century, the Iranian economy becomes complicated and stronger (Pesaran and Esfahani, 2008).

Iran’s economic structure shows that the services sector takes a lead in its share of GDP during 1980-2000 (See Table 1.5). The Agriculture sector did not exceed the quarter, which illustrates the neglect of this sector. The Industrial sector

occupied a significant role in Iran's economy recording a share of 57.85% in 1975, decreased in 1980 and 1985 and increased after that since 1985.

Table 1.5: Changes in the structure of Iran's economy 1975-2014, (% GDP)

	1975	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2014**
Agriculture	6.80	11.31	13.23	12.76	12.47	9.13	6.62	6.86	9.34
Industry	57.85	35.93	31.66	33.51	38.99	40.56	46.91	41.43	38.23
Services	35.35	52.76	55.11	53.72	48.54	50.31	46.47	51.71	52.43

Source: Data from The World Bank.

The economy of **Kuwait** considered as a small, wealthy and relatively open. The main source of its income was the oil since its discovery in 1938. The life in Kuwait before that was very simple, people were basically depended on livestock trading, fishing, pearl diving, and long-distance trade with Basra, India, and East Africa (Merza, 2007).

When petroleum was discovered, the country changed into a modern state. Oil export considered as the biggest revenue stream in Kuwait. It represented more or less 90% of total exports, 80% of the government's income and 64% of total GDP. The average value of the ratio of oil GDP to total GDP was 63.7%. These values illustrate Kuwait's dependency on oil during the period 1970-1982 (Moosa, 1986).

The benefits obtained from the oil made the Kuwaiti satisfied, where the per capita GDP in Kuwait estimated as one of the most elevated in the world. The government also allocated a huge budget for education, where from the first level until the high school level the education is totally free, it has provided financial support for health services, employment, and housing, in addition to the tax exemption on income and sales (Merza, 2007).

According to International Monetary Fund (IMF), the total GDP was estimated at $2.87 billion in 1970 and rose to $55.66 billion in 2004, where the per capita GDP increased from $3,882 in 1970 to $21,327 in 2004, with an annual growth rate of approximately 5%. However, the GDP of Kuwait faced a significant

decrease during the 1980s where the share of the oil sector to GDP declined from 60.3% in 1970 to 48.3% in 1982, while the non-oil fields rose from 39.7% to 51.7% (Moosa, 1986). Kuwaiti GDP in 2010 was over $200 billion, and it remained constant during the last decade. The real GDP growth recorded 8.2% in 2011 and 6.6% in 2012 (WorldEconomic Outlook 2012, International Monetary Fund)

Between 2004 and 2008, the Non-oil GDP grew by 14% and by around 6% in 2009 resulting from the governmental actions in diminishing the dependency on oil, and since the policy of diversification is still on, the trend seems to be stable for several years ahead (Doronin, 2013).

Table 1.6 represents the performance of the Agriculture, Industry, and Services sectors of Kuwait through their value added (% GDP). The data are from Trading Economics and World Bank. The Agriculture sector has an insignificant sharing due to the lack of water and arable lands, and the damages to the soil suitable during the Iraq-Kuwait war, which made the Agriculture very weak (less than 1%). The Industrial sector was the dominant sector almost ever recording more than 2/3 of GDP in 1975 and 1980. The services sector has seen an increase since 1975 until 2010, recording its highest in 2000 (59.51%), then it declined to 38.54% in 2010, by 2014, it increased again recorded 48.30%.

Table 1.6: Changes in the structure of Kuwait's economy 1975-2015, (% GDP)

	1975	**1980**	**1985**	**1990**	**1995**	**2000**	**2010**	**2015**
Agriculture	0.2	0.17	0.6	0.63	0.42	0.48	0.42	0.63
Industry	79.2	77.8	67.03	53.01	52.8	59.03	61.05	51.06
Services	20.6	22.03	32.37	46.36	46.78	59.51	38.54	48.30

Source: Data from The World Bank, and Economic Trading.

Briefly, we can describe the economy of **Venezuela** by the "Oil economy". In the late of the 1930s agriculture provided 22% of GDP and took 60% of the labor force. The collapse of agriculture started by the beginning of the twentieth century as the petroleum sector overwhelmed all other sectors of the economy. It recorded its

worst growth in the 1980s. In 1988, the sector led to hardly 6% of GDP, recruited 13% of the workforce, and provided just 1% of all exports (Haggerty, 1990).

Since its discovery in the 20_{th} century, oil has been the backbone of the Venezuelan economy. Venezuela grew steadily until the late 1970s, where the revenues increased to the quadrupled in 1973, recording the unique increase in the government income. The president of Venezuela declared that Venezuela could turn into an advanced nation in the following years. However, this period characterized by some negative effects, such as persistent inflation and an increasing indebtedness (Peterson, 2007).

In the 1980s, the decrease in oil prices, with the growing population and the bad management caused high public debt, decline in per capita GDP and collapse in the Venezuelan economy. The economy continued to suffer from the effects of low oil prices. The public sector grew up totaling 24.4% in 1981 decreased to 6.7% in the 1990s. The per capita income declined by 27% between 1979 and 1999, the real industrial wages decreased by 40% between 1980 and 1996. Poverty increased from 17% in 1980 to 65% in 1996. The Balance of Payments registered a deficit of $4.7 billion in 1988 (Velden, 2009). By 1998, Venezuela became poorer, where half of the Venezuelan citizens were living under poverty (Wilpert, 2003)

From 2000 to 2013, Venezuela has benefited from high oil prices. The economic growth and redistribution policies resulted in an important decrease in poverty, which, according to the World Bank it decreased from 50% in 1998 to approximately 30% in 2013. In 2014, Venezuela registered a decrease in GDP Growth by 3% and it was the world worst managed economy, according to the 2014 report of the International Finance Corporation and The World Bank.

At the end of 2015, according to the Central Bank of Venezuela, the country recorded an inflation rate of 270%, the highest in the world and a shortage rate of goods over 70%, while the poverty rate was between 76% and 80%. The country ended 2015 with 10% contraction in its GDP, 275% inflation, widespread shortages of consumer goods and a decrease in the central bank international reserves (Central

Intelligence Agency). The International Monetary Fund found that the GDP shrank another 8% in 2016 and the inflation reached 720%.

Table 1.7 represents the changes in the structure of Venezuela's economy from 1975 to 2014. The Agriculture sector did not exceed 7% ever, which explain its poor participation in the economy and in the GDP growth. We can say that the GDP formed from the Industrial and services sectors fifty-fifty, where there was no dominant sector between the two sectors. The Industry sector recorded its highest in 1990 (60.56%), while the Services sector recorded its highest in 1995 (53.20%).

Table 1.7: Changes in the structure of Venezuela's economy 1975-2014, (% GDP)

	1975	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**2014**
Agriculture	5.03	4.80	6.31	5.47	5.53	4.21	4.02	5.79	5.64
Industry	46.44	46.37	50.83	60.56	41.27	49.67	57.80	52.16	41.80
Services	48.53	48.82	42.87	33.97	53.20	46.12	38.18	42.05	52.55

Source: Data from The World Bank.

1.4. Historical facts on oil price changes.

According to (Ditté and Roell, 2006), the price of oil reached less than $5 per barrel in October 1973 (the first oil shock). Measured in US refinery acquisition costs, the price rose from $2.59 in 1973 to $13.06 in June 1974, reaching an increase of more than 500% within 7 months, and it remained stable at this level until 1979.

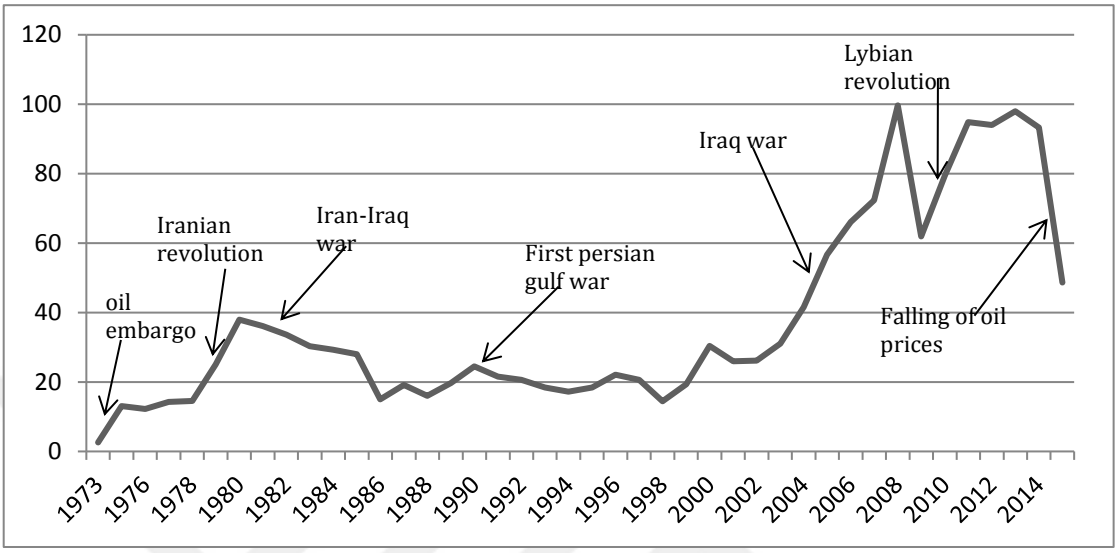
In 1981, (second oil shock) the oil price was $39, it returned to less important levels going from 12 to 18 dollars in 1986. In the 1990s, the price fluctuated below $20, except in 1991 (before the Gulf War), the price doubled to $33 for a short period. In 1999, because of the financial crises in Asia, the price reached its lowest point of $10. It recorded a strong increase after that, reaching around $25 in 2002. During 2003, the price increased above $30, before reaching $60 in August 2005. By 2006, it reached a level of $70[3] (U.S. Energy Information Administration (EIA)).

[3] The prices are in nominal terms.

According to WTRG Economics, in 2008, the oil price continued to increase, due to the drop in its supply, trading on NYMEX closed at a record $145.29 on the beginning of July 2008. By the end of the year, the oil price recorded $40 in December. Following an OPEC cut of 4.2 mb/d, in January 2009, the prices rose steadily. In late February 2011, the loss in the Libyan exports because of its civil war led the prices to increase. However, in October, 400,000 b/d produced by Libya were restored.

Figure 1.4 shows the react of West Texas Intermediate (WTI) Crude Oil prices to the events happened in the world from 1973 until 2016. The figure starts with the 1970s, this period saw a critical and radical change in the infrastructure of the oil market, and the world knew since then the importance of the possession of oil and natural resources in general. The role of OPEC became clear and its influence on the oil market was scary for many countries, especially after the oil embargo in 1973. The oil prices during this period saw an unexpected increase, where the oil price went from $3 per barrel to nearly the quadruple, the situation left perturbations in the global economy. The oil prices experienced another increase during the Iranian revolution in 1979-1980, where the oil prices increased from $15.85 to $39.5 per barrel due to the shortage in the Iranian oil production. In 1980, during the Iran-Iraq war, the oil prices decreased despite the decrease in world oil production, the decrease was due to the long-run impact of 1973 embargo, where the word saw a decrease in total oil demand. The oil prices recorded a collapse from $27 to $12 in 1986. In the First Gulf War, the oil prices almost doubled, increased from 16.54 to 32.88. During the US invasion of Iraq, and the Lybian revolution the oil prices saw other increases, where, in 2014, the WTI crude oil fell sharply from $93.25 in 2014 to $48.66 in 2015. Where the OPEC crude oil prices recorded $96.29 in 2014 and $49.49 in 2015.

Figure 1.4: The oil prices react to a variety of geopolitical and economic events.



Source: Data from U.S. Energy Information Administration (EIA) and Statista.

1.5. Oil Price Shocks: Causes and Consequences.

Such as any commodity, the changes in oil prices have a relation with the demand and the supply sides. However, the major international oil crises that took place over the end of the century were strongly linked to political events which occurred in the Middle East. In this part, we will discuss the causes and the effects of these oil price shocks.

1.5.1. Yom Kippur war, October 1973.

During the 1973 war, Arab members of OPEC cut oil production and banned petroleum exports to the US and other countries in the West, in order to punish them for their support of Israel in the Arab-Israel war.

Saudi Arabia, Kuwait, Libya, Egypt, Algeria, Syria, Abu Dhabi, Bahrain, and Qatar took a decision of cutting 5% of their oil production every month, starting from September 1973 and increasing the cut by 5% per month until the Israeli evacuation from all Arab territories. By November, the Arab members' production was down by 4.4 mb/d from what it had been in September, and the results of this embargo

immediately appeared. The deficit was equivalent to 7.5% of world production (Hamilton, 2010). The increase in the production of Iran and other countries by about 900,000 b/d offset a small part of this cut, brought the real cutbacks to 3.1 mb/d, about 5.5 % of the world consumption (Covi, 2014).

The embargo did not affect only the target countries, but it crossed to reach the global economy (Chitazde, 2012). The crisis led to an increase of 387% in the posted oil price from 1 October to 1 January and an increase of 467% in the average government revenues (Covi, 2014).

(Covi, 2014) discussed the impact of the crisis on oil producing companies, where despite oil price increases gave them a great fortune, this situation has put them under intense scrutiny from their government and increased their taxes. The governments' royalty reached its maximum, 20%, and the tax rate touched 85%.

In 1974, Israel won the war, and the Arab nations did not get any of the conditions required. The oil cutoffs were removed silenced, nonetheless, the costs remained stagnant. The embargo has resulted in a remarkable rise in the cost of refined goods. For example, the gas increased by 57% between 1972 and 1975 according to EIA.

After these unexpected events of the first oil shock, every government tried to get a saved oil stock—the US launched the Strategic Petroleum Reserve, to provide at least 3 months of oil if any other embargo showed up—, others tried to find alternative energies (Horton, 2008).

1.5.2. The Iranian revolution 1978.

The second oil shock occurred after the Iranian revolution made by the Iranians in order to take the Shah out of the power. According to (Ataoglu, 2013), Iranians in general, were opposed to the shah from nearly every political perspective.

From 1973 to 1977, Iran's GDP reached approximately a rate of 8.4% per year, resulted from the first oil crisis. In 1974, Iran reached $2 billion surpluses in its budget (Licklider, 1988). By 1978, The Shah made a grave mistake with its rapid

industrialization plans, the years ended up by $7.3 billion deficit. The Shah, in an amateur way, transformed the oil bonanza into an awful industrialization defeat. (Gürbüz, 2004)

All these pressures pushed the Iranian to make protests claiming the Shah to leave. However, with the revolution, the economic crisis started in the oil-rich country. Iran lost their power in the international arena gradually (Ataoglu, 2013). The revolution has affected the energy sector, suspended the production and the export of oil. The Iranian oil share almost came to an end at the end of the 1970s, the total production of Arab oil-exporting nations fell down by 15 % from September 1978 to January 1979 and the world oil production suffered a cut of about 5 %. (Ditté and Roell, 2006).

1.5.3. The Iran-Iraq war 1980.

The war started in September 1980. However, the conflicts between the countries on the border were since the 16_{th} century. The Iranian revolution and the new rules made by the new Iranian leader were totally not welcomed by Iraq, with the risk of spreading the Islamic revolution to other countries. Saddam Hussein saw that Iraq was the target, and he realized that it was the ideal time to hit Iran, which was just emerging from the revolution and in an unstable situation, in addition, Iran has distanced itself from its powerful friend the USA. These conditions push Saddam to invade Iran imagining that the war would be easy to win. (Oygarden, 2014).

The Iranian oil production had come back to more or less 50% of its pre-revolutionary stage after wars in 1979. With the Iraqi invasion, the combined loss of production from both nations was approximately equal to 6% of global production. The oil price continued to increase—doubling between 1978 and 1981—until the early 1980s, with the slowed economic activity, and the contractual use of energy in the world because of its high prices, the world saw a glut in oil and the oil consumption had fallen by 13% in 1981. The decrease in oil demand and the overproduction—especially from OPEC, which increased its production in order to

get more benefits—caused a six-years decline in oil prices with 46% price drop in 1986 (Chitazde, 2012)

The Iran/Iraq war took a year and the slow oil production from the two countries during the war period did not prevent the oil price collapse, which was a long-term demand response to the price hikes of the 1970s. Saudi Arabia shuts down ¾ of its production between 1981 and 1985 in order to prevent the decline in oil prices; these efforts, made by Saudi Arabia, were not enough to re-raise the oil prices. Saudi Arabia abandoned those attempts, and increased its production again in 1986 (Hamilton, 2010)

By the end of the war in 1988, both countries left with huge damages. Iran was left one million dead, $350 billion losses in the economic and political development. The war as well, strained Iraqi political and social life, Iraq ended up the war with almost 500.000 dead, around $200 billion losses and over $14 billion as war debts from the US and Kuwait. In addition, none of the war goals were realized (Bahadori, 2005).

1.5.4. The first Gulf War 1990.

The causes of the war started during the Iran-Iraq war when Kuwait financed Iraq by billions of dollars. Because of its disastrous economic situation after the war, Iraq asked Kuwait to dissolve the dept. The request rejected by Kuwait which caused disputes between the two countries over the years. To bolster its economic situation and pay its debts back, Iraq asked OPEC countries to decrease their oil production in order to increase oil prices and get more revenues. While other countries agreed, Kuwait did the opposite, which made Iraq dissatisfied. Saddam did not find any solution beside the military forces, and he invaded Kuwait under the cause that Kuwait was stealing Iraq’s oil through drilling in a diagonal manner into Iraq Rumaila oil field territory over the border.

The war caused a collapse of 9% in the world oil production, divided between the two countries (Hamilton, 2010). The oil production of Arab countries registered a

drop of 25%, which caused an increase of 100 % in oil prices within just two months (Ditté and Roell, 2006).

Since the beginning of the war, Iraq attacked a lot of Kuwait's petroleum infrastructure. The losses contained the major part of Kuwait's oil wells, refineries, and ports. Saddam set fire to approximately 75% of Kuwait's oil fields, he was planned to revenge, and he almost achieved that (Davis, 2007). The war ended on February 28, 1991. Both countries left the war with considerable material and human losses. The price of oil returned to its level only months later (Ditté and Roell, 2006).

1.5.5. The Iraq war 2003.

The official reason behind the war against Iraq started when the United States claimed the presence of weapons of mass destruction and the existence of a relationship between Iraq and terrorism. The terrorist attack on the US on September 2001 gave the United States the right to go after the terrorists, which was threatening the safety of the world. However, the real cause was that the United States wanted to dominate the oil wealth of Iraq in order to guarantee uninterrupted supplies of oil. The other cause is the fear of losing the Dollar's importance, where, in 2000; Saddam Hussein declared that he would use the Euro instead of Dollar for selling Iraq's oil, in addition to the desire of the United States to remove Saddam Hussein from the power after the conflicts created since the Kuwait-Iraq war. On March 20, 2003, after 48 hours given to Saddam Hussein and his sons to leave Iraq, Unites States started its attacks on Iraq (Bassil, 2012).

Iraq still suffering from the consequences of this war until now, and its impacts on oil were followed by the political events happened in Venezuela in 2002, which led to a fall in the oil production by 2.1 mb/d in December and January. The war also removed 2.2 mb/d over April to July (Hamilton, 2010).

The cost of Petroleum had fallen to below $35 on February 2009, but in May 2009, it had risen back to mid-November 2008 levels at about $56. The United States announced its withdrawal from Iraq in 2011 (Chitadeze, 2012).

1.5.6. The revolution of Libya 2011.

The Libyan revolution came after the revolution in Tunisia and Egypt on 15 February 2011, under the aim of changing the undemocratic regime of the Libyan Leader Colonel Muammar Gaddafi. Although its apparent wealth, the Libyans were not satisfied, which pushed them to make a popular protest, converted to an open-armed clash ended with the assassination of the Colonel Muammar Gaddafi on October 2011.

The revolution mainly happened because of the oppression that was done by the Libyan leader to his people. It was forbidden for everyone to oppose his regime, in addition to the lack of justice in the distribution of the country's wealth among the segments of society, the underdevelopment that the people suffered during years, despite the country's oil wealth, the regional economic disparities, the corruption, the unemployment, and the poor economic governance. The Libyans believed that their country should be more developed given its oil wealth (Guesh, 2013).

Since the beginning of the Arab spring in 2011, the oil market saw an unstable status. However, when it came to the biggest reserve holder in Africa and the major crude and petroleum product exporter to Europe, Libya left the most dramatic impact on the oil market. The loss of crude oil was 1.6 mb/d, representing a 2 % loss out of total oil production. The price of oil recorded $70 and $80 in October 2009 and October 2010 respectively (Darbouche and Fattouh, 2011). In early 2011 the world oil request rose by daily half a million barrels, by 0.9 mb/d in 2012, then by 1.2 mb/d in 2013. The price increased as well, registered above $100 in February 2011 and it continued to climb slowly during years stuck between $100 and $110 in early 2013 (El-Katiri, 2014).

1.5.7. The falling crude oil price from 2014 until now.

The oil price suffered from a new oil crisis since 2014 where the increase of shale oil production in the United States, the slowdown in the economic growth of China and European Union and the political insecurity across the world were the factors behind the oil price falling. However, the recent crisis in Ukraine and the friendly political relation between the USA and Saudi Arabia are the major contributors to the current uncertainty of the energy market. The price has fallen by more than 40% between June and December 2014 (Foo, 2015). By the end of 2015, the world Crude oil prices were under $40 per barrel, the lowest level since early 2009 according to EIA. The spot prices for West Texas Intermediate (WTI) crude oil were also increased to 53% between 2014 and 2015, reaching $49 per barrel for the year. Oil prices recorded below $30 in January 2016, by the end of the year exactly in December it saw an increase to over $54, and by January 2017, the oil prices increased by $1 per barrel recording $55. The U.S. Energy Information Administration forecast makes predictions about future oil prices and reports that volatility will not be as bad as in 2016 (Amadeo, 2017).

CHAPTER TWO

FACTORS THAT INFLUENCE OIL PRICES

In the previous chapter, we represented the changes happened both in the economy and in the oil prices since years, illustrated the political events and oil price shocks since the 1970s. In this part, we will see how the oil costs are touched by some other elements such as the alternative energies, the expectation, the US dollar, and the OPEC decisions. Analyze the relationship between OPEC oil production and the world oil production in order to illustrate the impact of OPEC on the total oil production, which causes an impact on oil prices as well, and in the last part, we will show the consequence of the oil costs on the international economy and on the selected countries in details.

2.1. Factors that influence oil prices

Besides the oil price shocks and the political events, there are some other elements that may change the petroleum costs directly or indirectly through influencing either the supply side or the demand side or both together.

2.1.1. Alternative energies threaten the oil prices and its future.

It is not new; the attempt to find other energies away from oil was the goal of so many developed countries for decades. The first oil crisis was the drop that overflows the cup; the developed countries did not bear the reality that a group of developing countries could control their economies and the global economy by cutting or raising the oil production. However, oil has played the role of the motor for the economies since its discovery, its importance evolved year after year and the oil was the cause of the economic recovery in countries that have it. Although all this importance, the powerful nations like the United States did not give up and they keep searching for alternatives that are able to replace the oil as energy. These alternatives would decrease the consumption of oil, which decrease its demand, then its price,

then it may lead to a crisis in the economies of oil producing countries, and especially those how oil revenues are the main resources for their countries.

There are two different assumptions about the future of oil; some of the economists go behind the ability of these alternatives to replace the oil some day. Others said that whatever the advantages of the new energy sources, the oil will not lose its importance and it will stay the main source for energy. Moreover, the demand for oil would not be affected by the entry of these alternatives to the world. In order to know more about the characteristics of these alternatives, and the possibility of replacing the oil, we will talk about that minutely in the following.

2.1.1.1. Natural Gas: Characterized by its inflammability, cleanliness, and the diminutive contributes to the pollution of the environment. The natural gas considered as the ideal energy from an environmental perspective, especially for household use. According to (Alsakran, 2014) the pollution caused by Natural Gas does not exceed 60% of Coal pollution. The Natural Gas, unlike the crude oil, does not need any transformations before its use, and during the last years the Natural Gas used as cars fuel and the efforts of using it in the transportation sector increased year after year in order to improve the environmental conditions.

According to the International Energy Agency (IEA) (Natural Gas Information), the world Natural Gas production measured by million cubic meters recorded 2 058 552 in 1990. By 2010 it registered 3 287 301, increased to 3 589 508 in 2015, where the total consumption recorded 2 053 437 mcm in the 1990s, then it increased over years. By 2015 it recorded 3 571 230 mcm, which is equal to 137610 200 Terajoules[4]. This remarkable increase during these years explains how Natural Gas took place as demanded energy in the world. The share of Natural Gas would continue to increase, growing at 2% per year of the global energy mix until 2020 (International Energy Agency (IEA)).

Table 2.1 represents the top ten producers, importers, and exporters of Natural Gas, and the amounts in 2015. The data collected from the International

[4]Terajoule (MJ) is an energy measurement unit, is multiple of the derived metric measurement unit of energy joule.

Energy Agency (key world energy statistics, 2016 edition). The amounts are measured by billion cubic meters, the net exports and net imports include pipeline gas and LNG (Liquefied Natural Gas). The top exporter, according to the table is Russia represents 23% of the world exports, where the top importer is Japan represents 14.40% of the total imports. The United States represents the top Natural Gas producer by occupied 21.4% of the world production, then Russia with 17.8%.

Table 2.1: Natural Gas top 10 producers, importers and exporters in 2015.

Producers	Production (bm^3)	Net exporters	Exports (bm^3)	Net importers	Imports (bm^3)
United States	769	Russia	192	Japan	117
Russian	638	Qatar	115	Germany	73
Iran	184	Norway	115	Italy	61
Qatar	164	Canada	59	China	56
Canada	164	Turkmenistan	51	Turkey	48
China	134	Algeria	44	Korea	43
Norway	122	Indonesia	33	France	39
Saudi Arabia	87	Australia	28	Mexico	37
Turkmenistan	83	Malaysia	25	U. Kingdom	31
Algeria	82	Nigeria	25	Spain	27
Rest of the world	**1 163**	**Others**	**143**	**Others**	**280**
World	**3 590**	**Total**	**830**	**Total**	**812**

Source: International Energy Agency (key world energy statistics, 2016 addition).

In addition to the characteristics above, the International Energy Agency wrote that Natural Gas is estimated as a great source of electricity provisioning according to several reasons. It is characterized by the low-risk (technically and financially) and lower-carbon emitted relative to other fossil fuels. Gas-fired power plants can be created pretty rapidly in about 2 years, instead of nuclear installations, which can take much more time.

2.1.1.2. Coal: Used as a primary source for energy through its direct burning for thermal energy generation. Carbon is the principal constituent of Coal. According to IEA, Coal became so popular due to so many characteristics such as its freedom from geopolitical tensions, its abundance, and its affordability. More than 40% of the electricity across the globe is made from coal, which is also useful for the production of pretty much all non-recycled iron. In addition, the transportation, the storage and the use of coal are not difficult. However, the high extraction costs, the lack of calories generated from it, the uncleanness during its usage, and its contribution to the pollution are some disadvantages related to Coal.

The use of Coal started during the Industrial Revolution, since then it was growing globally. According to IEA Energy Atlas, Coal accounts for 29% of the world's total energy supply, second only behind oil (31%). The total Coal production in energy terms being 2.7 times larger in 2014 than what it was in 1973 and 75% larger than what it was in 2000. In terms of electricity production, its share recorded 41%, against 22% of all renewable sources and 22% of Natural Gas. However, in 2014, the total production saw a decrease for the first time by 0.6% or 45 metric tons (Mt) after 14 straight years of growth. By 2015, this decrease became 221 mt or 2.8% lower. The total Coal production recorded 3 074 mt in 1973, increased to 7 974.6 mt in 2013. In 2014, it recorded a relatively low level to 7 929.7 mt, and then in 2015, it registered 7 708.7 mt.

According to EIA, the total consumption of coal equivalent (Mtce)[5] decreased by 2.6% or 148 million tons in 2015, recording 3839.9 million tons coal equivalent, from 3911.2 mtce in 2014. This decrease was due to the decrease in OECD[6]consumption by 89.6 mtce and exactly in the United States consumption, where even if the consumption of the rest of OECD countries without the US

[5] Total coal represents the sum of anthracite, other bituminous coal, coking coal, sub-bituminous coal and lignite, transformed into a common energy unit, million tons of coal equivalent (Mtce)
[6] OECD is the abbreviation for The Organization for Economic Co-operation and Development contains 35 developed nations, founded in 1960. The founding nations are Austria, Belgium, Canada, Denmark, France, West Germany, Greece, Iceland, Ireland, Italy, Luxembourg, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States. After that, the other 15 countries enter to the Organization.

increased by 5.0 mtce (6.3%), the decrease of 94.6 mtce in the US consumption led to decrease the total OECD consumption.

Table 2.2 represents the total production, exports, and imports of Coal in 2015 and the top ten producers, importers and exporters of it. The data are from IEA, and the Coal is measured by the metric ton (Mt). According to the table, China represents the huge part of the world production by approximately 50%, where the United States represents 10.5% of the world Coal production the other countries sharing the other 40%. Australia is the top exporter by 392 mt (33%), then Indonesia by 365 mt (31%) these two countries together represent more than 60% of the Total Exports. For imports, the Table shows that India is the top importer by 221 mt; however, we can say that the top four countries have almost identical amounts, where together they represent 62% of the total imports.

Table 2.2: Coal top 10 producers, importers and exporters in 2015.

Producers	Production(Mt)	Exporters	Exports(Mt)	Net importers	Imports(Mt)
China	3 527	Australia	392	India	221
US	813	Indonesia	365	China	199
India	691	Russian	129	Japan	192
Australia	509	Colombia	82	Korea	135
Indonesia	469	South Africa	76	Chinese Taipei	66
Russian	349	US	57	Germany	54
South Africa	252	Kazakhstan	27	Turkey	34
Germany	185	Canada	23	U. Kingdom	25
Poland	136	Korea	19	Malaysia	24
Kazakhstan	107	Mongolia	14	Thailand	23
R. of world	**671**	**Others**	**9**	**Others**	**233**
World	**7 709**	**Total**	**1 193**	**Total**	**1 206**

Source: International Energy Agency (key world energy statistics, 2016 addition).

Because of the pollution that it left after the use of coal, some countries hesitate of increasing their consumption although its other positive sides. However,

the efforts still ongoing in order to find solutions and decrease or maybe eliminate the pollution created from Coal use.

2.1.1.3. Nuclear power: The discovery of this power was in the 1950s, it has been used for more than 50 years. It is the energy released after the fission, which is a response after a confluence of the nucleus of an atom with a neutron, divides into 2 or more nuclei making an important quantity of energy.

Nuclear consumption grew rapidly during the 1970s and 1980s, especially after the 1973 oil crisis. The Nuclear energy growth saw a significant slowing after that, because of the economic slowdown in some of the countries after the oil crisis, in addition to the accidents happened in the United States and Ukraine because of the Nuclear. The fear about Nuclear safety in the world led to a remarkable decrease in its consumption. During the 1990s and 2000s, only a few countries continued building new reactors). However, the construction of new plants increased recently in Europe, India, Japan, Korea, China, Russia, and the Middle East through some new projects. By 2011, more than 430 power reactors were in operation in 30 countries with a total capacity of about 369 gigawatts (GW) of electricity, 72 reactors under construction since 2014, and in the following few years, many other sets up nuclear nations will probably go to begin creating additional capacity (NEA).

Over 6% of the globe's primary energy and around 14 % of total electricity are supplied from Nuclear energy. NEA talked about the future of this energy in its second edition of "nuclear-energy-today" in 2012, where it expected that the demand of this energy will grow rapidly in the next decades, especially with the growth of consuming energies in the world and the risks of using other energy sources. With the experience of more than 50 years of reactors operation and the accidents happened around the world because of this energy, in the next decades, the world would see more developing nuclear technologies with new techniques which going to increase the consumption of this energy (Nuclear Energy Today, 2012).

Although the pros of the Nuclear energy regarding the abundance, the low costs of raw material (Uranium) , which does not exceed 10% of the total unit costs and the low maintenance costs where Nuclear power plants do not need regular

maintenance (between 40-50 years), we cannot overlook about its cons which represented by the high investment costs, the long construction times regarding other kinds of power plant and the long operational lifetime, the lack of experience and the skilled of workers in this field, the environmental constraints and the monopoly of Uranium by some countries since it is used in the nuclear weapons industry (NEA).

Table 2.3 represents the top ten producers regarding their division of the whole global production, and the top ten nations regarding their net installed capacity, which represents the rate of work. The Data are from 2016's edition of (IEA)'s Key World Energy Statistics during 2014 (the most recent data available). The United States represents the top producer with around 33% of total production; it has the top installed capacity as well, by 99 gigawatts. We can observe that the top producers have the top installed capacity around the world, with the absence of the United Kingdom from the first ten nations regarding installed capacity.

Table 2.3: Top Producers of nuclear energy.

Producers	Terawatt-hour (TWh)[7]		Net installed capacity	Gigawatt (GW)
United States	831		United States	99
France	436		France	63
Russia	181		Japan	42
Korea	156		Russia	25
China	133		China	24
Canada	108		Korea	21
Germany	97		Germany	14
Ukraine	88		Canada	14
Sweden	65		Ukraine	13
U. Kingdom	64		Sweden	9
Rest of the world	**376**		Rest of the world	60
World	**2 535**		**Total**	**1 193**

Source: International Energy Agency (key world energy statistics, 2016 addition).

[7] 1 TWh (terawatt-hour)=1 000 000 000 KWh (kilowatt-hour)
1 GW (gigawatt)=1 000 000 KW/ KW (kilowatt)=1000 W

The future of Nuclear power seems to be prosperous according to the significant efforts in order to find solutions for the negative aspects of this energy. Nuclear power became new technology for producing isotopes for medical applications, sophisticated detection devices, food processing, environmental and other scientific research. All countries will find themselves in front of the fact of using this energy eventually.

2.1.1.4. Renewable energy: Energies generated from natural processes. Solar, wind, geothermal, hydro, and some forms of biomass are common sources of renewable energy. The IEA in the Medium-Term Renewable energy Market Report of 2016 wrote that in 2012, the world counted on renewable energies for about 13.2% of its global primary energies that have been used. In 2013, it increased to 22%. The share of renewable energy in total electricity production would rise from more than 23% in 2015 to nearly 28% six years later, and the total renewable electricity capacity is expected to increase to 42% by 2021. The following is the most important renewable energy sources in details:

a. **Solar power:** The most popular renewable energy, it comes either directly or indirectly from the sun. it provides heat, light, hot water, electricity, and even cooling, for homes, businesses, and industry through Solar panels or solar photovoltaic (PV) modules that harness the sun's power to generate electricity. The most important advantage of this energy is that it provides a clean power, which makes it the best one regarding the environmental perspective. With solar, there is no acid rain, no urban smog, and no pollution of any kind.

The use of solar power grew dramatically during the last years, two of the top three markets in 2014 were located in Asia, followed by Europe as a whole and the USA market. By 2015, it becomes clear that in a short period, the world would experience a huge spread of the solar power regarding the new markets established in many places around the world (IEA, 2015).

There are some barriers facing solar energy, such as the expensive costs of purchasing a solar system, even if the maintenance costs are so low where you have only to clean the solar panels couple of times per year. However, the efforts to

develop the technologies of solar systems in order to decrease its costs are ongoing in many countries. The solar power depends entirely on sunlight, which makes it related to the weather of countries, and totally out of use at night.

b. Wind power: The use of the wind as power started since a long time, when people depended on the wind to navigate using the sailboats in the rivers and seas and using the wind power in the windmills to pump water and grind grain. The new use of wind power as an energy source to generate electricity for homes and industry began in the late of the 19th century. Over the years, the wind power found new operations in lighting homes by remote from centrally generated energy. Throughout the 20th century, small wind power stations arranged farms and homes, and larger utility scale-wind farms that could be logged into electricity networks were elaborated (The Wind Energy Foundation).

According to the Renewable Energy World, through the article made by Zachary Shahan in 2014 about the History of Wind Turbines, the United States was the leader of using this power and creating the most developed techniques concerning the wind turbines. In 2009, Norway produced the first large-capacity floating wind turbine in the world. By the end of 2009, the American wind farm became the largest wind farm in the world with a power capacity of 781.5 megawatts included 634 wind turbines. By the end of 2010, the global wind power capacity recorded 197,039 megawatts. The United States had the world largest wind power market in 2012, but not for long, where China became the leader only one year later (2013). The Global Wind Energy Council announced that the world installed wind power capacity reached 432.680 MW in 2015, and 486.749 MW in 2016.

Wind power is a clean energy source, where the wind turbine does not generate atmospheric emissions or create acid rain, it does not need water for the energy generation, in addition to its low costs where it is considered as one of the low-cost renewable energy technologies available today. Unlike the solar power panels or PV, the wind turbine does not need a large area and it could be built on existing farms or ranches. Wind power decreases the unemployment rate, where according to the Wind Vision Report, by 2050 it will be able to provide more than

600,000 jobs. All these points represent the positive aspects of this renewable energy. However, there are some challenges of wind power, such as the location of wind turbines, where they are located in remote areas far from cities where the need of electricity is high, in addition to their appearance that might cause changing the viewshed.

c. Hydroelectric power: It is the energy coming from flowing water from mountain streams, waterfalls and lakes when the water goes down by the force of gravity; it turns turbines and produce electricity. The First use of the mechanical hydropower was during the 1700s. It was used to operate wheat mills for grinding wheat into flour and pumping water into farms. In Norway, it was especially important in the wood industry for sawing and cutting the wood.

By the invention of the generator in the late of the 19_{th} century, hydropower used for the first time to generate electricity, and exactly around 1880 where the first hydroelectric power was installed in England and USA, generating electricity for lighting. From the last part of the 20_{th} century and up until today, the electricity consumption from hydropower experienced a huge spread in Asia and South America (Svendsen, 2013).

Today, according to the World Energy Council, the hydropower plays an important role in the electricity mix, providing 16.4% of electricity generation worldwide and about 71% of global renewable electricity. Reaching 1 064 GW of installed capacity in 2016. At the end of 2015 more than 159 countries using hydropower is in fully mature technology.

The Hydropower is a source of clean, stable and reliable energy. On the other hand, the hydropower as the other energy sources has some disadvantages where in addition to the extremely expensive costs of the generation system and the building of dams. The Hydropower causes damages of the environment due to the construction of dams, and even to the people living in the lower areas.

d. Geothermal power: It is produced in the center of the earth, more or less 4000 miles under the terrestrial surface. Individuals used the geothermal

for heating and other purposes since ancient decades, while the active geothermal exploration for industrial purposes began in the first years of the 19_{th} century in Italy. The first geothermal district heating system started operating in the US by the end of the same century. By the 20_{th} century, the first successful attempt to produce electricity from a geothermal source was achieved (IEA).

According to IEA, the generation of electricity from geothermal has continuously risen, recording over 75 TWh in 2013, 77 TWh in 2014, and 151 TWh in 2015. Geothermal Energy Association (GEA) announced that 18 new geothermal power plants came online in 2015, adding about 313 MW (10 of them was from Turkey) of new capacity to electricity grids, bringing the global total to 13.2 GW increased from 12.9 GW in 2014.

Geothermal power plant requires low maintenance costs, it does not take too much space and thus help in keeping the natural environment safe. Contrary to solar energy, it does not rely on climatic conditions; in addition, it is abundant, and it could be used directly. However, it has a high installation and distribution costs, and it may cause an eruption of volcanoes and earthquakes. Despite these unfavorable properties, the interest in geothermal has expanded in the recent years and the development of its systems became the aim of many countries (2016 Annual U.S. & Global Geothermal, Power Production Report).

The quick propagation of renewable power is notable progress in the world energy. The IEA statistics proved that renewable energy extended at its most rapid level in 2015, represented over half of the globe's additional electricity capacity. The efforts made by countries in order to develop these energy sources and decrease their costs are indicators of the invasion of the energy world that would be made by renewable energy. Renewable energy would influence Fossil fuels (oil, natural gas, and coal) negatively. However, since there is a continuing increase in the world's needs for energies, all the energy sources would take place in our lives in varying proportions that depend on the circumstances of each of them such as prices, availability and the ease of use.

2.1.2. The role of OPEC in setting oil prices.

As it is mentioned before that oil prices affected by the global demand and supply, those are affected as well by indirect factors. The role of OPEC in affecting oil prices cannot be overlooked. OPEC members combined control over than 40% of the world's total supply in 2016 according to the OPEC bulletin (2017). The OPEC influence on the market is by manipulating the supply of its share, asking the members to rise or scale down their oil production in order to increase or decrease the oil price.

Since the establishment of OPEC and even before that, until the early 1970s, the OPEC's members did not play any role in pricing crude oil. The OPEC stated scaring the Non-OPEC countries and the whole world, improving its effectiveness on the oil market since the embargo against Israel and its allies in 1973.

The mechanism of OPEC in reducing and increasing their production in order to increase or decrease the oil price could be effective only after the union of its member, and the historical events confirmed that. In 1973, even the main goals of the embargo did not realize; the shortage in OPEC's oil production caused an increase in oil prices. However, during the 1980s when Saudi Arabia one-sidedly limited its oil production in order to increase the oil price, it was not being able to stop the decline, but it only slowed down the oil price falling.

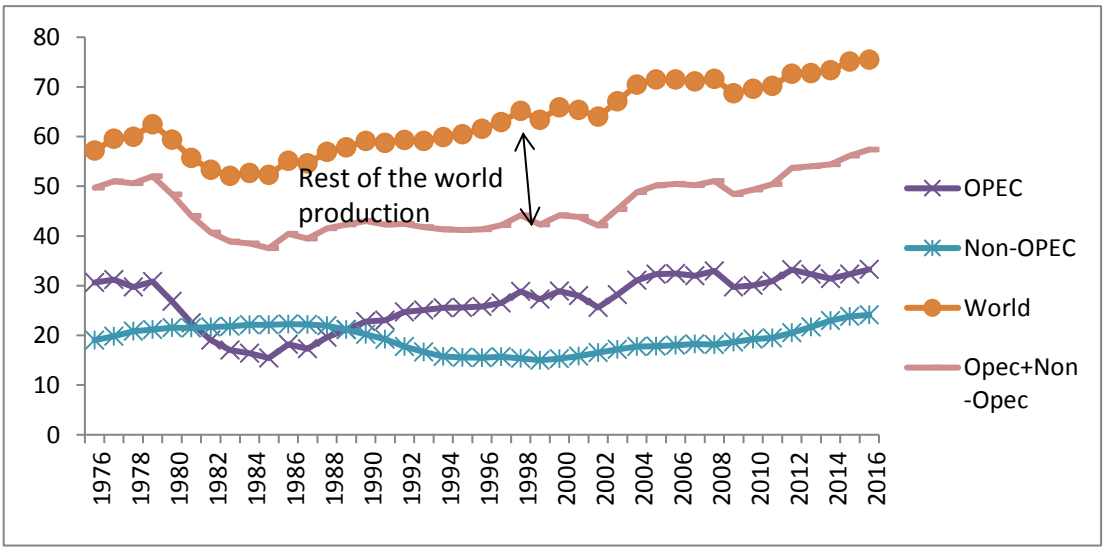
According to the results collected from Cheng (2005) researches, the global oil cost will decline by 1.23% for every 1% increase of OPEC's production (Boheman and Maxén, 2015). OPEC uses the majority system in making decisions, with taking into consideration its maximization goal of profit, and the interests of their member nations. Despite that the achievement of both goals in the same time sometimes is complicated, OPEC tries to find a compromise in every incident happen (Chitazde, 2012).

2.1.2.1. Analyzing the relationship between OPEC and world oil production

The world crude oil production increased by 0.35 mb/d or 0.5% and most nations which do not belong to OPEC showed significant decreases in their 2016 average crude oil production compared to 2015.

Figure 2.1 shows the OPEC, Non-OPEC (represented by China, the United States, and Russia), and the world oil production from 1976 until 2016. We can see that Russia, China, and the United States with OPEC's countries together represented a huge share of the global oil production. The Figure as well shows the decrease in the world oil production during 1979-1989 caused by a decrease in OPEC's production, due to the political instability in some of OPEC countries such as Iran, Iraq, Kuwait. The Figure appears the impact of OPEC on the world oil production as well, even if the oil production of Non-OPEC countries stayed almost at its level.

Figure 2.1: OPEC, non-OPEC, and the world oil production (1000 b/d), 1976-2016.



Source: Data from OPEC.

In order to know the relationship between OPEC oil production and the world oil production, we analyzed the correlation relation between them.

Table 2.4 contains OPEC and the world oil production from 1976 to 2016. The increase in OPEC's quota in 1977 by 0.02% led to an increase in the world production by 0.04%. The change in the same direction by an increase or a decrease in oil production of both OPEC and World during 1979-1983, 1985-1990, 1994-2006, and 2008-2012 make us putting the estimation of the existence of the positive link between them. The World oil production recorded its highest in 2014 (73 331), while the OPEC highest level was in 2012 (33 188).

Table 2.4: OPEC and the World oil production (1976-2016) (b/d).

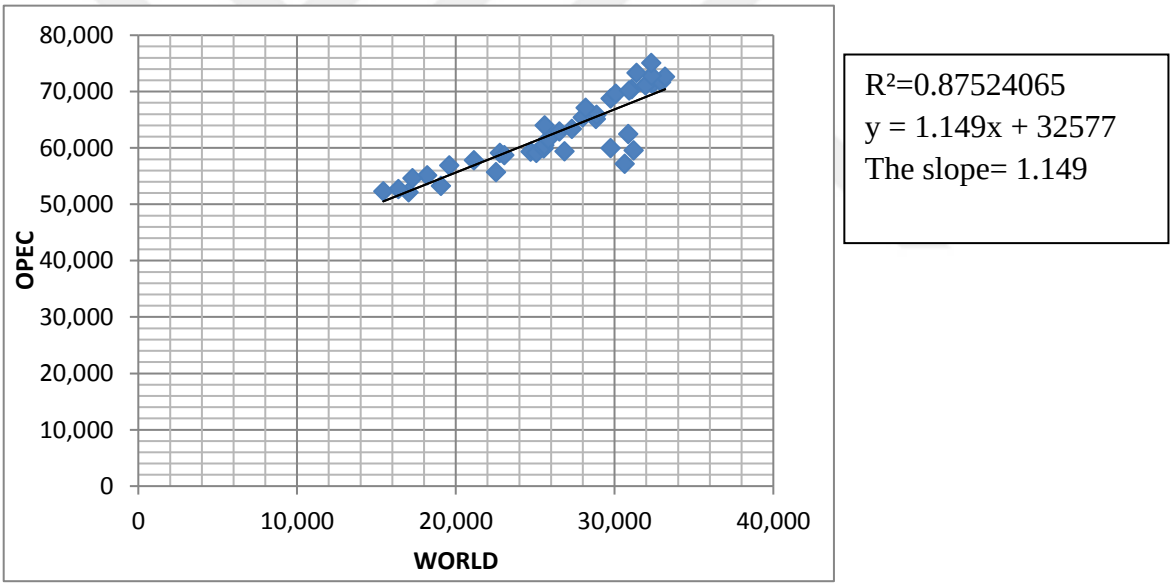
Years	OPEC	World		Years	OPEC	World
1976	30 650	57 191		**1996**	25 826	61 572
1977	31 209	59 581		**1997**	26 527	62 924
1978	29 763	59 954		**1998**	28 820	65 147
1979	30 862	62 464		**1999**	27 311	63 396
1980	26 856	59 396		**2000**	28 873	65 855
1981	22 532	55 675		**2001**	28 008	65 396
1982	19 059	53 285		**2002**	25 595	64 018
1983	17 031	52 120		**2003**	28 188	67 132
1984	16 396	52 696		**2004**	31 077	70 434
1985	15 433	52 283		**2005**	32 306	71 502
1986	18 199	55 116		**2006**	32 449	71 501
1987	17 280	54 636		**2007**	31 961	71 119
1988	19 594	56 913		**2008**	32 932	71 637
1989	21 138	57 806		**2009**	29 754	68 739
1990	22 781	59 107		**2010**	30 074	69 634
1991	23 055	58 697		**2011**	30 915	70 174
1992	24 715	59 327		**2012**	33 188	72 642
1993	25 075	59 107		**2013**	32 331	72 795
1994	25 532	59 889		**2014**	31 380	73 331
1995	25 588	60 444		**2015**	32 315	75 080
				2016	33 280	75 477

Source: OPEC.

The analysis results showed a strong positive relationship between the OPEC and the world oil production with correlation coefficient more than 90% which prove and clarify the effect of OPEC oil production on the total world production. The result means that when OPEC oil production increase the world oil production will increase as well, and vice versa.

Figure 2.2 shows the curve of the data given, where we can see the positive relationship through the positive slope (+1.149). Each point represents a combination World-OPEC in one of the years given (from 1976 to 2016).

Figure 2.2: The Correlation Relation between the World and the OPEC oil production.



2.1.3. The impact of expectations on the oil market.

The expectations concerning the future shortfalls and disruptions in the oil supply increase the global demand compared to the global supply, which caused a rise in the oil prices. The idea is that people expect an increase in the future oil prices because of the next shortfalls in its supply, which push them to reserve their oil needs from now and store them for their future use. Those people called speculators, and in the physical market, the speculator is someone how buys a commodity not for current consumption, but for future use. The increase in the oil demand relative to the oil supply would increase the oil prices truly (Kilian,2014).

The expected reduction in oil supply in 1974, 1979, 1990, and 2000 have led to a sharp increase in prices. During 2003-2008, the oil prices increased due to an unexpected boom in the global economy, particularly in the Asian economies (Roubini and Setser, 2004).

The trading of oil-linked goods and products or the anticipations of investors about these products affect the oil prices as well. Researchers at the Oxford Institute for Energy Studies made a study about that and found that when investors expect an increase in the oil products demand or a decrease in its supply, the price of these products will increase which resulted in a growth in the oil costs.

(Kilian, 2014) mentioned that the reason behind the increase in oil prices between 2003 and 2008 is because investors created a way to speculate on the future price of oil without having to store oil physically. The future markets and the physical markets are connected, which implies that the growth in oil future costs could raise the costs of oil in the physical markets and that is what happened in 2003.

2.1.4. The relation between the US Dollar and the oil price changes

The US Dollar is the official and the only currency to buy and sell oil. Considering the oil as a store of value, with the appreciation of the USD, the value of oil relative to the dollar would fall. (Lizardo and Mollick, 2009) confirmed the existence of the relation between US dollar and the oil prices and they found that the increase in real oil prices led to a considerable depreciation in the US dollar versus net oil exporter currencies. According to them, the US dollar was a precious currency and the numeraire of the Bretton Woods system[8] from 1944 up to 1971.

By 1973, the US dollar regained its importance when the king of Saudi Arabia agreed with the president of the US to accept the dollar as the only currency

[8]In 1944, more than 40 countries met and set up the Bretton woods monetary systemand agreed that the US dollar would be able to be changed in gold in a fixed exchange rate. This led other countries to link their currencies with US dollar, which gave the dollar a great status. However, this situation ended by the fall of the Bretton woods in 1971.

to purchase oil as long as the US protects militarily the oil wells of Saudi Arabia. By 1975, all OPEC members agreed as well to sell their oil in only US dollar.

The understanding of the relationship between the US dollar and the oil prices has taken the attention of the economists since the beginning of pricing oil in dollars. However, until the early 2000s, there was no proof of the relation between them. The European Central Bank confirmed the negative relation between them last decade, where, according to its study, the statistics found that the rise of oil prices by 10% resulted to decline the US dollar by almost 0.28%, and the decrease in UD dollar by 1% led to an increase in oil prices by 0.73% (Fratzscher, Schneider, and Robays, 2014). So, what is the secret behind this negative relation between the black gold and the greenback?

The depreciation of the US dollar appears the weakness of the economy, which illustrates the uncomfortable economic situation. In this case, investors tend to spend their money on goods such as oil instead of dollars. The decrease in the value of the US dollar versus other currencies pushes investors to buy a barrel of oil less in terms of dollars, which increase the oil demand, hence rising oil prices. The oil exporting nations then find themselves obliged to increase the selling price in order to cover their costs (Covi, 2014).

On the other hand, when the value of US dollar increases, oil becomes more expensive, and countries find themselves bound by spending more money on the exchange of their own currencies into dollars to buy it. That led them to cut back on their needs of oil, which decrease the oil demand the then the oil prices.

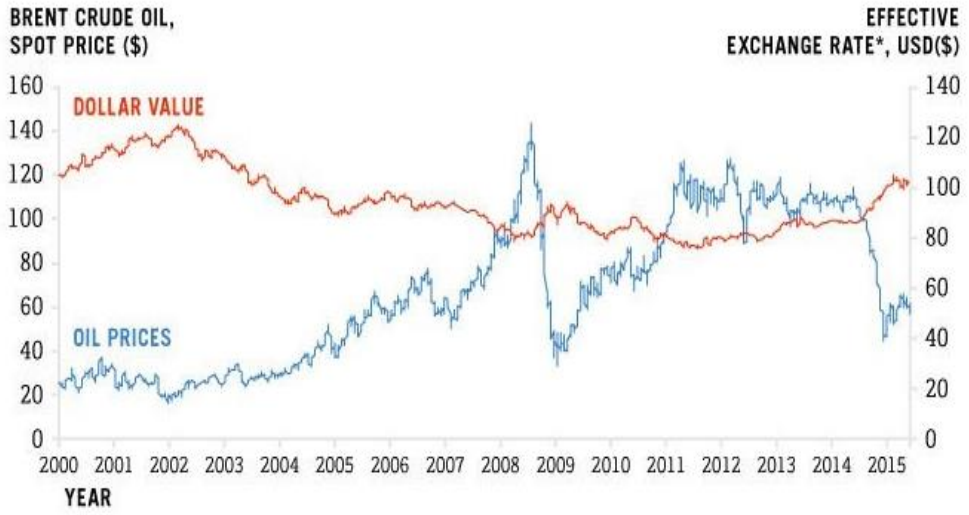
The increase in oil prices means an increase in all goods and products associated with it, as well as the transportation costs, which put the global economy in a critical situation and gradually slowing growth and weakening the US dollar.

Figure 2.3 from the US Energy Information Administration (EIA), illustrates the negative relation between oil prices and the effective exchange rate, US dollar. The graph shows the data since 2000, the year when the relationship between the oil prices and the US dollar became clear. The effective exchange rate shows the

Dollar's value relative to a basket of other currencies. We can see through the figure that the increase in oil prices linked with a decline in the US dollar value and vice versa.

The value of the dollar fell by about a third between 2002 and 2008 due to the Wall Street banks disturbances according to the US EIA, we can see through the graph that the price of oil increased by more than fourfold over the same period. During the financial crisis, the graph shows that the value of the US dollar increased by 18%, while the oil prices decreased by about 60% between March 2008 and March 2009. The period of 2014-2015 saw a decrease in oil prices as well, where the dollar value increased.

Figure 2.3: The relation between Oil prices and US dollar, 2000-2015.



Source: US Energy Information Administration (EIA)

2.2. The impact of oil price changes on the global economy

The oil price changes either by increasing or by decreasing left a huge impact on the global economy. Starting with the first oil shock in 1973, which left a significant impact on the whole world where, according to (Chitadze, 2012), the growth rate fell 2.1% in 1974 and 1.4% in 1975. The worldwide trade as well has seen tremendous chock, where after a growth by 12% in 1973, it sharply decreased, recording negative growth in the following two years -5.4% and -7.3% in 1974 and

1975 respectively. The flow of Foreign Direct Investment saw a huge collapse, where the annual growth fell in half between 1973 and 1974. The inflation was more than tripled registering 3.3% in 1972 and 11.1% in 1974. The rate of people who have no work increased from 4.9% in 1973 to nearly 8.5% only 2 years later.

(Covi, 2014) added that the first oil shock of 1973 caused a massive increase in the refined products prices as well and the world economic expansion decelerated to 4% each year until 1985. This period put the non-oil producing countries face to face with stagflation and the world was suffering from the high prices of products. The financial system as well touched by the fluctuations happened in the exchange rates, which made it unstable.

The precautions taken from the nations after the first oil shock were not able to prevent the effects of the second oil shock of 1979. The worldwide economic growth registered a decrease from 4.7% in 1978 to 4% in 1979 reaching 0.8% in 1982. The international trade saw great fluctuations registering 5.2% in 1979 moved to a negative rate recorded -3.1% in 1982 (Chitazde, 2012). The total external debts of the developed countries during the second oil shock were $635.8 billion in 1980 compared with $68.4 billion in 1970 (the first oil shock), an increase of almost 929% grew up to $1,182 trillion in the 1980s, almost all countries registered negative growth even some oil exporting nations like Nigeria, Mexico, and Venezuela because of the decrease in their demand for oil coming from advanced nations (Covi, 2014).

Because of the first Gulf War in 1990, the worldwide GDP growth fell in the war period from 2.5% to 0.8% in 1991. It remained low and only rose to 2.2% in 1994. The worldwide exports of commodities remained stable at a growth rate of around 4% per year (Ditté and Roell, 2006).

Summing up, the impact of the oil price increases on the global economy was cleared during the oil shocks, affecting the budget of consumers, the international trade, the inflation, the exchange rates, the unemployment, the investment, and the production costs. Briefly, the increase in the oil prices affect every person in the world through the fluctuations in the macroeconomic factors, where the economic

recessions that follow the oil price shocks over decades prove the strong correlation between them, it is not just a coincidence.

The decline in oil prices as well has an impact on the global economy and it was evident during the last events of falling oil prices. In the Iran-Iraq war, although the shortage happened in the oil production, the long-run effects of the 1973 crisis, and the slow down economic activity during this period prevented oil prices from increasing. In addition to the mid-2014 fall in oil prices, that put the world and especially the economy of oil exporting countries in a critical situation.

In 1998 and 1999, the low level of the oil prices affected the major advanced economies. For the developing countries, the increase in the real oil demand helped to increase their GDP (Mussa, 2000). So, the questions we should ask: Is the lower oil price good or bad for the economy? How are the winners and how are the losers?

The oil prices fell during the 2008 financial crisis, but they quickly picked up by the mid-2009 due to the strong growth in some emerging countries, and the civil wars in some Middle Eastern countries. This status changed in 2014 and the oil prices dropped sharply reaching its lowest in 2016 (Majumdar, 2016). According to the European Central Bank economic bulletin of 2016, at the beginning of 2015, the decline in oil prices was expected to have a good impact on the global economy; however, the result was less than what was expected. Although the low oil cost may still sustain national demand by raising the actual earnings of the net oil-importing nations, it would not remove the more general effects of lower international demand. (Blanchard and Arezki, 2014) found that during the decrease of the oil prices of 2015 the world GDP recorded a gain between 0.3% and 0.7 %.

According to (Roubini and Setser, 2004), when oil prices decrease, the oil importers are likely to be the winners, and the oil exporters are likely to be the losers where their real income will go down and their profit margins will shrink. Oil is elastic in the short run, which means that small changes in supply have a large price effect. It happened in 1974, 1979, 1990, and 2000, where the real or even the expectations of reductions in oil supply caused a sharp increase in prices in the short run.

2.3. The impact of oil price changes on the economy of the selected countries

The impact strength of oil prices depends on whether the country is within the oil importers or the oil exporters. Moreover, it depends on whether the economy of this country is oil-based economy or not, and how much this country counts on oil in its economic structure. The countries of our studies are oil-exporting countries, and as mentioned before, their economies are heavily reliant on oil.

The high oil prices had positive effects on all OPEC countries, such as the 1973 embargo, which gave OPEC a new strength to fulfill its aims. OPEC countries could be the beneficiaries from the oil price increases. According to the IEA through its report made in 2004, the real impact of the high oil prices on the economic growth of OPEC nations would depend on how the windfall revenues are spent. However, the increase in the oil prices decreased the oil demand, which decreased the OPEC's oil production, so in the long term, OPEC's oil revenues and their GDP are likely to be lower (Ghalayini, 2011).

During the first oil shock, the Iranian earning increased from $1.1 billion to $17.8 billion. Saudi Arabia recorded a growth of revenue passed from $1.2 billion to $22.6 billion. OPEC received over $100 billion of revenues in 1975. The first two oil crises brought permanent inflows of revenues to all OPEC countries, where some of them turned highly rich just like Saudi Arabia, which registered more than $200 billion revenues between 1973 and 1982, which represent 50% of OPEC total surplus. OPEC has been able to put the rules of the energy market, and it has succeeded to put the world and especially the oil importers at its mercy (Covi, 2014).

During the period of 1973-1977, the Iranian GDP rose by an average annual rate of 8.4% at a constant price; its per capita income reached $2000. The increase in the oil revenues caused a huge development in the industrialized sectors and in the economy in general. Between 1974 and 1978, the budget increased twofold from $60 billion to $120 billion and in less than 20 years, Iran dreamed to be transformed into

the fifth most industrialized countries in the world. The expansion of industry gained momentum after the quadrupling of oil earnings in 1973 and 1974 (Gürbüz, 2004).

(Santis, 2003) studied the case of Saudi Arabia during the first oil shock and found the oil exports increased by 45.8%. The increase in the prices of exports has doubtlessly a positive consequence on the Saudi Arabian volume of exchanges and earnings, where the profits became more than a double.

(Akpan, 2009) investigated the consequences of the oil crises on the economy of Nigeria and found that during the increase in the oil prices in 1973, Nigeria's export value in terms of US dollars increased by around 600%, the trade increased from 18.9% in 1972 to 65.3% in 1974. The Government revenue recorded an increase from 8% of GDP in 1972 to about 20% in 1975. This gave the government the ability to increase its expenditure focusing on developing the level of education, public health, transport, and import.

During the oil price crisis of 2003-2006, Nigeria witnessed an expansion in the share of the oil earnings to GDP from about 80% in 2003 to 82.6 % in 2005. Nigeria saw an undesirable macroeconomic environment, where the inflation registered an increase of almost a double in the 1970s. The logical and the reasonable causes of the disastrous performance of the economy is the bad management of crude oil revenues by the government (Centre for the Study of African Economies, 2009).

Kuwait, Iraq, and Venezuela benefited from the oil price increases during the 1973 crisis as well. However, in the gulf war, because of the huge budget deficit due to financing their military sectors, and the damaged inflicted by the oil fields in both Iraq and Kuwait, they were not able to cover these losses even through the high oil prices. Iraq production capacity decreased by over one million barrel per day during this period, compared to its pre-war level and Kuwait capacity decreased by more than that (Mabro, 1990). Besides the first oil shock of 1973, where all OPEC countries gained huge benefits, almost all other shocks in which there was at least one of the OPEC's member associated with the political events that caused the high oil prices, these members could not benefit from the oil revenues.

By contrast, the decrease in the oil prices affected the economy of the oil exporting countries negatively, and the historical fell in the oil prices left a huge impact on the OPEC countries and on our selected countries as well. The decrease in the oil price caused huge losses either in their real income or in their profits and typically led to an appreciation in the currencies of the oil importers and depreciation in the currencies of the oil exporters.

(Mathew, 2000) talked about the impact of the decrease happened in 1998 in the oil prices on oil producing countries. **Saudi Arabia** collected more than $45 billion in 1997 from exporting the crude oil. In 1998, it fell by 35% to around $29.4 billion. According to its dependence on oil, the tremendous decline in the earnings led to an inferior GDP growth rate, and also large budget deficit. The **Nigerian** oil export earnings fell by 36% in 1998, from $14.5 billion in 1997 to $9.2 billion. Unfortunately, in addition to the Nigerian bad economic status because of the significant decrease in the export earnings; Nigeria was in critical political phase, which made the situation more complicated and left a huge impact on the Nigerian economy. The **Kuwaiti** oil export revenues decreased by 33%, from $11.8 billion in 1997 to $7.9 billion in 1998. Kuwait's finance minister demanded to reduce the outlay by 25% for the rest of the fiscal year of 1998 because of the falling oil prices. The Central Bank of **Iran** announced in March 1998 that Iran had $26.4 billion of foreign debt obligations, including $14.1 billion of confirmed debt. In addition to the large budget deficit, the decline in the oil prices during 1998 led to a depreciation in its currency and a shortage in the foreign currency, which made the payment of these debts more difficult. Moreover, there were other economic problems such as the inflation and the unemployment, Iran lost almost $1 billion per year in the oil export earnings against each $1 drop in the oil prices. **Venezuela** registered a decrease of 37% in its oil export earnings, from $17.7 billion in 1997 to $11.1 billion in 1998. Its economic growth recorded -2% in 1998 compared to 5% in 1997, and its stock market recorded a 40% drop by the end of 1998. Venezuela tried to prevent government expenditures and increase the revenues whenever it was possible in order to decrease the consequences of lower oil prices and avoid the economic crisis. It was not the case in **Iraq**, which was coming out from the impacts of the First Gulf

War. It had an important place in the significant decrease in the oil costs, because of the steady increase in its oil exports. Iraq recorded an increase of more than 45% in its earnings of exporting oil from $4.2 billion in 1997 to $6.1 billion in 1998.

(Alawadhi; Holly and Burney, 2016) studied the economy of Kuwait in the next 5 years (from 2015 to 2020), they found that the deficit in the budget will be ranged between KD 43 billion and KD 67 billion if the oil prices continued to decrease.

According to the BBC News report made in January 2016 about the impact of the low oil prices during the last years, the Saudi Arabian incomes fell by 23% in 2015; the country announced a budget deficit nearing $100 billion, huge losses for the oil-rich Gulf States, which 73% of its revenues come from industry. With no prospect of high oil prices soon, Saudi Arabia tried to find solutions for this situation, where, by late 2015; it decreased the subsidies, reduced the growth of public sector salaries and limited the country's dependence on oil. Experts said that Saudi Arabia, which known by its efforts in OPEC in order to increase the oil price whenever it declines, is unlikely to show any efforts to decrease its production to raise the oil costs.

The situation was worse in Venezuela, where the decrease in the oil costs during the last year and a half led to a decrease in its revenues by 60%. The government announced 60 days of economic emergency to deal with the worsening economic crisis. The government increased the taxes and put emergency measures to pay for the welfare services and the food imports. Venezuelan people experienced a lack of food and basic goods, and the country faced a serious economic crisis.

The question that comes to our minds is why OPEC does not decrease its production portion in order to re-raise the oil prices? The answer could be summarized in the following. First, because of the bad economic situation of all OPEC countries due to the fall in oil prices, no country will agree to reduce its production. Second, even if OPEC takes a decision to reduce its production, the non-OPEC oil-producing countries like Russia, United States, and China will increase their production and replace the lack of the oil supply made by OPEC.

CHAPTER THREE

THE NEOCLASSICAL GROWTH MODEL

After talking about the economy in the previous chapters, we will highlight on the neoclassical growth model, the Solow model, and the total factor productivity, in this chapter, we will represent in detail the basis of the Solow model, its diagram and the importance of the technology in the economy.

3.1. The Solow Model

The model is created by Robert Solow in 1956 where he tried to simplify the assumptions of theory in a manner that the definitive results are not significant (Solow, 1956). Solow developed the neo-classical theory of economic growth in order to clarify the causes which define the percentage of economic expansion. According to him, the expansion originates from adding more capital and labor inputs and also from ideas and new technology. Simply, the Solow model can provide us with some deep insights into the causes of growth.

The Solow model based on two equations, the production function that describes the transformation of the inputs into outputs, given by

$$\boldsymbol{Y = F(K, L) = K^{\propto} L^{1-\propto}} \qquad (1)$$

Y is the output, L is labor and K is capital. $\propto$ is some numbers between 0 and 1 illustrates the elasticity of output, $(1-\propto)$ illustrates the elasticity of capital with respect to capital.

The capital accumulation equation that describes how capital accumulates is given by

$$\boldsymbol{\dot{K} = sY - dK} \qquad (2)$$

Where sY is the total investment, because we assume that there is no international trade, so the investments equal the individuals saving (following Solow, we suppose that employees save constant amount, s, of their income) and it is used to

accumulate capital, the individuals rent these amounts to firms in order to use it in production.

dK is the depreciation that occurs during the production process, where, in every period certain part of capital stock disappears by d.

$\dot{K}$ represents the evolution in the share capital by cycle, we refer to K̇ by this way to differentiate a derivative with respect to time $\dot{\boldsymbol{K}} = \frac{\boldsymbol{dK}}{\boldsymbol{dt}}$.

We get the per capita production function by dividing both sides of equation (1) by L then:

$$\frac{\boldsymbol{Y}}{\boldsymbol{L}} = \frac{\boldsymbol{K}^{\propto}\boldsymbol{L}^{\boldsymbol{1-\propto}}}{\boldsymbol{L}} = \left(\frac{\boldsymbol{K}}{\boldsymbol{L}}\right)^{\propto} \quad (3)$$

The output per employee is $\mathbf{y} = \frac{\boldsymbol{Y}}{\boldsymbol{L}}$ and the capital per employee is $\mathbf{k} = \frac{\boldsymbol{K}}{\boldsymbol{L}}$

The per capita production function then is

$$\boldsymbol{y} = \boldsymbol{k}^{\propto} \quad (4)$$

The equation (4) says that with additional capital per employee, companies generate more output per employee.

The capital accumulation function in terms of capital per workers is given by dividing equation (2) by K, but before that, we add the growth rate of the labor force which is shown in terms of the population growth rate parameter n

$$\dot{\boldsymbol{k}} = \boldsymbol{sy} - (\boldsymbol{n} + \boldsymbol{d})\boldsymbol{k} \quad (5)$$

Where **n** is the population growth rate or the labor force growth rate since the model assumes that each person is an employee.

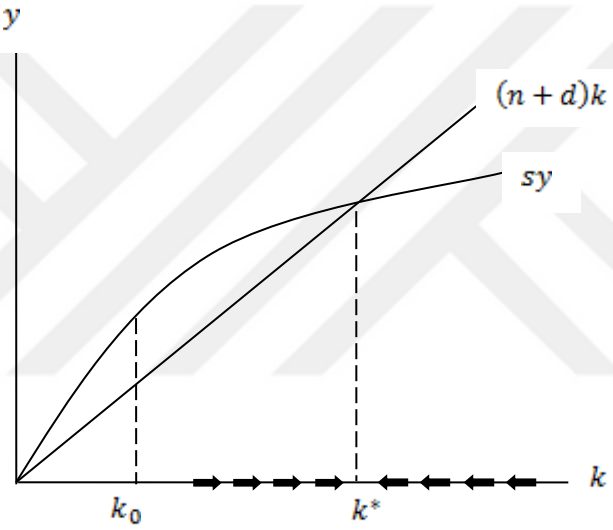
Equation (5) explains that the investment per employee sy rises k and the depreciation per employee dk reduces k, in addition to the population growth which reduces k as well.

The steady state is the point when $\boldsymbol{sy} = (\boldsymbol{n} + \boldsymbol{d})\boldsymbol{k}$ in this point the capital per worker is constant ($\dot{k} = 0$) which means that all investments are used only for repair or replace existing capital and wages, no new capital is created. The economy comes back to its steady state whether sy exceeds (n+d)k or the opposite.

3.1.1. The Solow Diagram

The Solow diagram divided into two parts; the first one represents the volume of investment per worker $\boldsymbol{sk^{\alpha}}$, this curve drawn as the production function curve. The second one represents the necessitated value of new investment per worker that make the value of capital per worker constant (n + d)k. These two curves are the functions of capital-labor ratio k.

Figure 3.1: The Solow diagram



At $\boldsymbol{k_0}$the value of investment per employee exceeds the value needed to keep capital per employee constant $\boldsymbol{sy > (n + d)k}$, in this case, we say that capital deepening occurs, this capital deepening will continue until it reach the steady point when $\boldsymbol{k = k^*}$or in the point when the amount of capital per worker remains constant which means that $\boldsymbol{sy = (n + d)k.}$ In the opposite situation when the economy starts by $\boldsymbol{k_0 > k^*}$which means that the quantity of invested capital per employee is inferior to the one keeping capital per worker stabilized, or by other words the investments are not enough to maybe repair our capital stock, in this case, the value of capital per employee decline until it reach the value of $\boldsymbol{k^*}$**.**

3.1.2. The Solow model with technology

Because technology is important to any economy, by entering this new element **A** to the Solow production equation

$$\boldsymbol{Y = F(K, AL) = K^{\alpha}(AL)^{1-\alpha}} \quad (6)$$

Where **A** is labor-augmenting which means that the productivity of labor increases when the level of technology is high. The capital per employee and the output per employee grow at the rate of technology change. Including the technology variable, the output per worker equation become

$$\breve{\boldsymbol{y}} = \breve{\boldsymbol{k}}^{\boldsymbol{\alpha}} \quad (7)$$

Where $\breve{\boldsymbol{y}}$**= Y/AL= y/A** which represents the ratio of output per employee to technology, $\breve{\boldsymbol{k}}$**= K/AL= k/A** represents the ratio of capital per employee to technology and the capital accumulation equation become

$$\dot{\breve{\boldsymbol{k}}} = \boldsymbol{s}\breve{\boldsymbol{y}} - (\boldsymbol{n} + \boldsymbol{g} + \boldsymbol{d})\breve{\boldsymbol{k}} \quad (8)$$

Where **g** is the growth rate of technology, notice that k is not constant in the long run.

The Solow model lights on the reasons behind the wealth of some nations compared to the poverty of others pointing that the high investment rates and the low population growth both allow countries to accumulate more capital per worker which increase labor productivity and thus make them rich countries and vice versa. The model as well praised the role of the technological progress in the economies, illustrating how the economies exhibit sustained growth by means of the technological progress.

3.1.3. The Solow model with human capital

By adding the human capital which represents the skilled labor to the physical capital K, the production function of the Solow model becomes

$$Y = K^{\alpha}(AH)^{1-\alpha} \quad (9)$$

Where H is the skilled labor, A is the labor-augmenting technology.

The human capital is accumulated by the time spent by individuals in learning new skills instead of working. Adding human capital to the model does not change the original flavor of the model by assuming that H is constant; however, the countries that spend a large fraction of time accumulation skills tend to be richer. In other words, countries that invest more in physical capital and in the accumulation of skills and use these inputs productively are richer.

3.2. Convergence and explaining differences in growth rates

The speed of growth of the rich countries compared to poor countries is not constant over time and at least under some situations, a few underdeveloped countries are likely to evolve more quickly than rich nations in such a manner to close the differences between each other, this is what it is called convergence. The technology transfer considered as an important reason behind the existence of convergence among countries.

The convergence hypothesis says that the rich countries or the countries that are relatively rich grow slowly while the countries that are relatively poor grow rapidly, which clarify the gap in growth percentages between countries; however, the hypothesis does not work for all countries. The neoclassical growth model suggests that the reason for the absence of the convergence hypothesis among some countries is because these countries do not have the same steady state. which means that countries that are similar concerning their technology levels, investment rate, and population growth, the hypothesis should keep working and the underdeveloped nations should averagely grow more quickly than advanced ones, and this is an important prediction of the neoclassical model.

The neoclassical model has another important prediction named “principle of transition dynamics” saying that whenever the country is below its steady state, it should grow faster and vice versa.

3.3. The economics of ideas

The definition of technology, according to the economics of growth and development is the way how inputs transformed into output. The existence of new ideas would enhance the production technology, it enables given inputs to make more or better output.

According to (Romer, 1990), ideas cannot be treated as the other economic goods, based on the differences in the characteristics of each of them, the ideas are nonrivalrous, which means that the use of the idea by a person or a factory does not preclude others to use it; instead, the goods are rivalrous. The ideas are highly excludable, where the excludability is the stage where the owners of the good charge a fee for its use, however, some ideas such as the scientific understanding of medicine are nonexcludable.

Goods that are rivalrous must be provided every time they are marketed, while goods that are nonrivalrous such as ideas have to be made only one time. If we look carefully into that, we observe that the ideas contain only the cost of production and no marginal cost, the creation of the ideas needs high costs, but the next copy can be produced very cheaply.

3.4. The total factor productivity

The total factor productivity (TFP) is one of the important measurements of economic growth, it represents the amount of output coming from somewhere else than the inputs utilized in production, it alludes to how properly and held in-depth inputs are carried out in the production operations. TFP is strongly correlated with output and hours worked or by other words, with the capital and the labor (Comin, 2006).

The economic growth is represented by capital, labor and residual that not caused by the inputs, in fact, any factor that is not identified individually within the production function will cause TFP to rise (SERI, 2015).

The real value of TFP is obtained through the division of the two sides of the production equation $\boldsymbol{Y = AL^{\alpha}K^{\beta}}$ by $\boldsymbol{L^{\alpha}K^{\beta}}$, where A is an index of the accumulated technology called total factor productivity or multifactor productivity, the TFP is given by

$$\boldsymbol{TFP = A = \frac{Y}{L^{\alpha}K^{\beta}}}$$

From the equation, we see how the aggregate capital and the aggregate labor affect the TFP and hence affect the economic growth (Lipsey and Carlaw, 2000).

The TFP also called Solow residual; Robert Solow explained that the increase in outputs with constant capital and labor inputs means that there is an increase in productivity. It is ongoing because it is a part of a development that cannot be clarified by capital accumulation or increased labor, this Solow residual called by the rate of growth of total factor productivity (Comin, 2006).

CHAPTER FOUR

LITERATURE REVIEW

In the previous chapters, we presented the performance of the economy and the fundamentals of the economic growth, we talked about the oil as well and we illustrated the consequence of oil costs shifts on the economic expansion. In this part, we will display the results found by other researchers regarding the link between oil prices and the economic growth and the consequence of the oil prices on the economies of several countries. We will start by explaining the export-led hypothesis and the validity of this hypothesis for OPEC countries since the oil is the main export product for these countries.

4.1. The export-led growth hypothesis (ELGH)

The concept of economic growth and the reasons behind its variations across countries took the attention of economists during decades. It is true that the economic growth depends on so many variables such as the physical and the human capitals, the labor, the investment, the technology process, and the population growth, however, the international trade or the export is seen as the major contributing factor to the economic expansion.

The export is not important only in terms of financial benefits, but it also has an indirect impact on the economic performance, it facilitates the transition of technological progress across countries, decrease the unemployment and increase the labor productivity, increase the investment and the total factor productivity (TFP) of countries.

Most of developing countries were depending on Import-substitution policy in order to encourage domestic manufacturing and decrease dependence on developed countries. However, this strategy did not hold up, especially after the 1970s, where many of these countries how had used this regime experienced slower growth and high inflation, which forces them to shift away from import-substitution toward the export-led growth (Palley, 2002).

Numerous studies concerning the relationship between the economic growth and exports have been carried out, and they have documented a strong and positive relation confirming the export-led growth hypothesis. An important level of research has been led in advanced nations and emerging economies to confirm and demonstrate this hypothesis; however, (Shahbaz, Ahmad and Asad, 2009) found as well that the relationship between the exports and the economic growth of Pakistan is positive emphasizing the existence of exports-led growth hypothesis in the case of Pakistan. (Yee Ee, 2016) found the same results concerning the sub-Saharan African Countries during 1985-2014.

(Alavinasab, 2014) examined the case of Iran, investigating the relationship of exports and economic growth during 1976-2010 using the ordinary least squares (OLS), the results showed significant and positive link among the economic expansion and the Iranian exports. (Alimi and Muse, 2013) analyzed the impact of exports on the Nigerian economic expansion and found the existence of causality between these variables.

(Tursoy, Resatoglu, and Faisal, 2017) investigated the correlations of the economic expansion, the imports and the exports with each other in Saudi Arabia during 1978-2014 and they found that export and GDP are strongly co-integrate with a positive impact of exports on the economic expansion in the long term. The results said that the increase in exports by one percent led to an increase of 3.39 percent in GDP, which illustrates the existence of the export-led growth hypothesis in the Saudi Arabian economy.

(Daoud and Basha, 2015) found a strong relationship between exports and GDP of Kuwait, Jordan, and Egypt during 1976-2013, with bifacial causality between GDP and export for Jordan and unifacial causality from export to GDP for Kuwait and Egypt.

4.2. The export-led hypothesis for OPEC countries

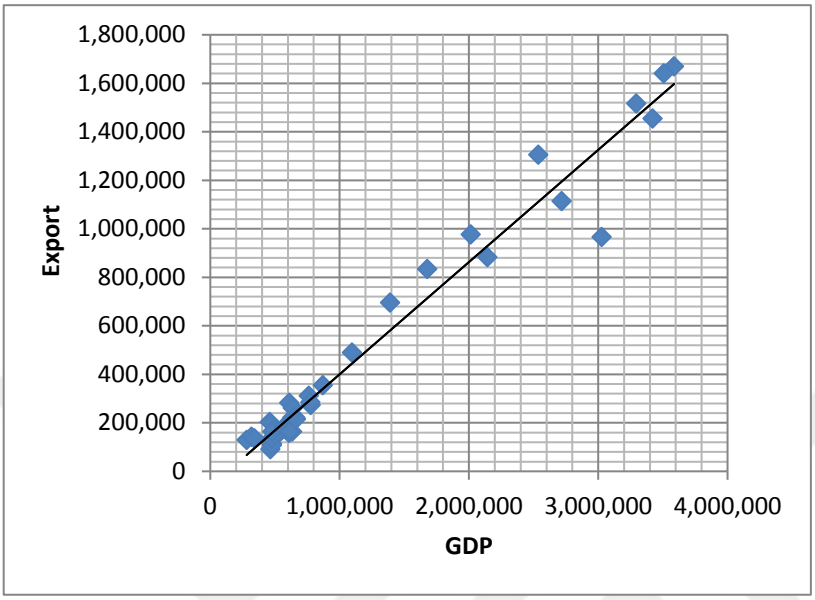
In order to analyze the existence of the export-led growth hypothesis in OPEC countries, we test the correlation between the value of exports (million $) and GDP at current market prices (million $) from 1976 until 2016 (see Table 4.1), using the data collected from OPEC. The results show a positive and strong relationship between them. Figure 4.1 illustrates that, where the correlation coefficient is more than 90% and the slope is (0.462), this close relationship between the GDP and the total exports of OPEC countries prove the existence of the export-led growth hypothesis (ELGH) for the OPEC countries.

Table 4.1: Total Exports and GDP of OPEC countries (m$).

Year	GDP	Exports				
1976	281 030	129 291		**1996**	633 389	220 621
1977	318 106	142 069		**1997**	657 545	221 896
1978	341 655	136 334		**1998**	615 269	165 817
1979	460 197	203 522		**1999**	663 546	214 739
1980	610 375	282 616		**2000**	762 774	311 663
1981	638 119	260 832		**2001**	776 968	272 467
1982	626 163	206 407		**2002**	775 367	285 425
1983	632 932	163 672		**2003**	870 239	354 455
1984	607 614	157 886		**2004**	1 096 573	489 152
1985	503 342	145 124		**2005**	1 389 699	695 496
1986	465 995	90 781		**2006**	1 677 239	833 589
1987	477 142	113 336		**2007**	2 014 701	976 135
1988	476 488	108 140		**2008**	2 535 779	1 305 237
1989	474 415	135 629		**2009**	2 143 581	882 819
1990	502 170	175 337		**2010**	2 718 041	1 113 411
1991	504 277	159 840		**2011**	3 294 470	1 516 146
1992	547 934	167 740		**2012**	3 586 635	1 668 929
1993	503 162	151 891		**2013**	3 506 924	1 640 459
1994	480 413	162 967		**2014**	3 420 836	1 453 833
1995	569 118	182 345		**2015**	3 027 811	966 007
				2016	2 939 039	888 990

Source: OPEC

Figure 4.1: The correlation between GDP and Exports of OPEC countries



R^2 =0.984190631
y = 0.462x - 62710
The slope= +0.462

The validity of export-led hypothesis for OPEC countries and for developing countries in general means that these nations have to raise their exports in order to generate their economic growth. The OPEC countries, for example, need to abandon their dependence on oil exports and try to find other export resources not only because their situation as oil-based economies put them in a risky zone, but their economies need more than oil and its derivatives to be exported, that would give them the opportunity to improve their economic performance.

4.3. Literature review on the relationship between oil and economic growth

The oil price changes and their impact on the economies of countries attracted the attention of an extensive number of researchers for decades; therefore, there is a huge body of literature, either empirical or theoretical that examine the impacts of the oil cost shifts on diverse economic variables of advanced and advancing nations. However, the size of the dependency on oil, whether the country is oil-importing or oil-exporting and the direction of oil price changes (increase or decrease) is the critical points that would give different results from one country to another.

Many studies focused on the developed or the industrialized countries, where (Mork, Olsen, and Mysen, 1994) examined the macroeconomic replies to the oil cost growths and reductions in Seven of OECD countries, which are USA, Canada, Japan, Germany, France, United Kingdom, and Norway. The study covered the period of 1967-1992. The results gave a negative and a significant correlation between the Gross Domestic Product (GDP) growth of these countries and the increase of the oil prices, except Norway, where the results showed a positive correlation probably because the oil sector share of its total economy is relatively high. The results showed a positive relationship between the oil prices decrease and the GDP of all countries, and it was significant for the United States and Canada.

(Rodríguez and Sánchez, 2005) also analyzed the effect of the oil crisis on the actual business activity represented by the GDP growth of some OECD countries (the United States, Euro area, Japan, Canada, France, Italy, Germany, the United Kingdom, and Norway) using Vector Auto Regression (VAR) model, between 1972 and 2001. The model resulted in finding a non-positive impact of the oil price rises on the GDP expansion, with a significant non-positive effect on the GDP of the United Kingdom. The analysis showed that the oil price crises were the significant causes of instability in the factors of the model. However, the Japanese economy showed contradictory results, the author mentioned that this unexpected result could be because of the circumstances of Japan during the period under study.

Regarding OPEC countries and this is what we are looking for. (Shalini and Pranith, 2015) studied the effect of the crude oil price swings on the OPEC countries for the period of 2004 to 2014, using the Granger causality test. The results showed that the decline in oil prices affected the crude oil exports of some of OPEC nations like Nigeria, Saudi Arabia, and Algeria during the period under study. While the rest of the countries (Kuwait, United Arab Emirates, Venezuela, and Ecuador) were not affected, whereas, the GDP of all OPEC countries got affected.

The study of (Ftiti, Guesmi, and Teulon, 2014) concerning the influence of the oil prices on the economic expansion of four of OPEC countries (Kuwait, United Arab Emirates, Venezuela, and Saudi Arabia) between 09/2000 and 12/2010, using the evolutionary co-spectral analysis. It resulted in the existence of both medium-run and short-run influences of the oil shock on the economic growth with a larger impact in the long term.

(Ghalayini, 2011) studied the impact on all the world, including OPEC, where the GDP data for OPEC nations began from 1986 to 2010, and found that the increase in the oil price did not lead to an increase in the growth economy justifying that by the bad exploitation of the inflows of funds after the increase in oil prices. Ghalayini pointed that the oil exporters need to focus on achieving the economic development goals and strengthen establishments to drive the capital inflows to beneficial economic projects instead of the evaporation of these inflows outside these countries.

(Nusair, 2016) investigated the influences of the oil price crises on the economic growth of the Gulf Cooperation Council countries[9] where the majority of its members are members of OPEC as well, using the non-linear co-integrating Autoregressive Distributed Lag (NARDL) model, found that the increases in oil prices led to raising the real GDP. While the decreases in oil prices were significant only for Kuwait and Qatar suggesting that the declines in the oil price lead to reduce

[9]The Gulf Cooperation Council (GCC) consists the Arab states of Persian Gulf except Iraq, which are: The United Arab Emirates, Bahrain, Saudi Arabia, Oman, Qatar, andKuwait under the aim of coordination, integration and interdependence among their members in various domains, formed when its leaders converged in Abu Dhabi on May 25, 1981.

the real GDP. In the cases of Bahrain, Oman, Saudi Arabia, and UAE, the results indicate that the non-positive oil cost shifts are not meaningful regarding statistics, intimating that the dropping oil costs have no major impact on their actual GDP.

(Sonmez, 2016) as well examined the effect of the oil crises on the economy of the GCC countries (Bahrain, Kuwait, Oman, Saudi Arabia, UAE, and Qatar) and the non-GCC oil exporters (Canada, Norway, Iran, Russia, Nigeria, and Venezuela) from 1970 to 2013. The results showed that the real oil prices had a positive effect on the real output of the GCC countries, these effects were stronger than what they were in the non-GCC countries, and the author noted that the reason of that is because these countries are more dependent on oil. However, we know that the economies of Nigeria, Iran, and Venezuela are heavily reliant on oil as well. The real exchange rate saw an appreciation as a result of the real rise in the oil prices, with practically no reaction in the nominal exchange rate in GCC countries, which was different than the results found concerning the non-GCC oil exporters.

(Berument, Ceylan and Dogan, 2010) studied the influence of oil crises on the economy of 16 selected MENA[10] countries (Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Palestine, Jordan, Kuwait, Libya, Morocco, Oman, Qatar, Syria, Tunisia, and the United Arab Emirates). The examination showed that the rise in oil costs left a good impact on the economy of most of the net oil-exporting nations: Algeria, Iran, Iraq, Kuwait, Libya, Oman, Qatar, Syria, and the UAE. With no critical impacts regarding the economies of other nations: Bahrain, Djibouti, Egypt, Palestine, Jordan, Morocco, and Tunisia. The rise in the output of these nations associated with the increase in oil price where the latter is connected by oil demand and oil supply shocks.

[10] MENA is abbreviation to "Middle East and North Africa" represented in approximately 22 countries accounts for 6% of the world population (355 million), 60% of the world's oil reserve and 45% of the world's natural gas reserve. Many of OPEC countries considered as MENA countries as well. The next nations are typically included in MENA: Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Malta, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates, Palestine, and Yemen. Ethiopia and Sudan are sometimes included.

Instead of studying the influence of the oil costs on a group of nations, some authors preferred to concentrate on studying the impact on just one country, (Adejumo and Olomola, 2006) and (Iwayemi and Fowowe, 2010) investigated the influence of the oil price crises on the macroeconomic factors of Nigeria during 1970-2003 and 1985-2007. Their results were similar, where they found that the oil price shocks had no influence on most of the macroeconomic variables in Nigeria. However, (Akpan, 2009) covered the period from 1970 to 2007 in order to focus on the first two oil crises periods between the 1970s and the mid-2000s. The study gave different results, where it showed an impact on the real output, inflation, and government expenditure.

(Farzanegan and Markwardt, 2008) investigated the impact of the oil crises on the Iranian economy. The pragmatic conclusions of the study demonstrated that oil prices boom raised the real effective exchange rate and appreciated the national currency in the halfway term which decreased the price of imports and increased the price of exports. The net imports and the internal production per capita increased dramatically, the net government outlays also increased in the half term. The negative oil shock showed an opposite impact on the macroeconomic variables.

CHAPTER FIVE

DATA AND METHODOLOGY

After the literature reviews and after discussing the results of previous studies that related to our subject, this last section will contain our independent results after using the panel data model with random effects to study the effect of oil cost shifts on the economic expansion of six of OPEC countries. The dependent variable is GDP where the independent variables are oil prices, oil exports, non-petroleum exports, total exports, and exchange rate. However, after finding insignificancy concerning the total exports, we remove it and we rerun the model. The results will be shown as two different models. First, we will explain the analysis goals, introduce the model and the indicators used in the study and finally we will discuss the results.

5.1. The Aim of the study

The decent status given to the oil during decades and its impact either on the oil importing or on the oil exporting countries, and the real effects of the change in its prices on the world in general and on the economy of countries made it an important subject to investigate about. Over time, several scientists have studied the effect of oil costs on the macroeconomic performance of nations; nonetheless, the majority of the pragmatic research conducted were concentrating on the oil importing economies, and especially the advanced countries, only a few of studies are interested in the oil exporting countries. The use of various methods of analysis led to a find of different results, sometimes sharply different, sometimes identical.

In order to investigate the influence of oil price shifts on the economic expansion of selected oil-exporting nations which are six of the Organization of Petroleum Exporting Countries (OPEC); Nigeria, Saudi Arabia, Kuwait, Iraq, Iran and Venezuela, where these countries represent the top oil producing countries in OPEC— UAE is not included—. We used the Panel Data Model covering the period 1979-2016 considering the most recent data available. Since the OPEC contains the

oil exporting countries, we can say that the rest of the OPEC members would be influenced by the swings or the shifts of oil prices in the same way.

The economy of the oil-exporting countries—including the study's countries—would be affected by the changes in these variables since these countries are highly depended on oil.

5.2. Indicators and Selected Data

The data used in the study concerning the six OPEC's countries are represented by

The dependent variable represented by **Real Gross Domestic Product (GDP)** of these countries, which is an inflation-adjusted measure that reflects the amount of collected money from selling final goods and services manufactured in the nation during a stated period of time—generally a year or quarter—.It measures the production activity, whether it has done by the country's own citizens, by foreigners located there or by industries.

The independent variables are: **Non-Petroleum Exports**; it represents the total exports minus petroleum exports that is contains the value of all exported petroleum products obtained from crude oil, Natural gas, and other hydrocarbon compounds. According to the Energy Information Administration (EIA), the petroleum products include unfinished oils, liquefied petroleum gases, kerosene, aviation gasoline, motor gasoline, residual fuel oil, some types of jet fuel, distillate fuel oil, petrochemical feedstock, lubricants, waxes, petroleum coke, asphalt, road oil, and miscellaneous products, any of these products that could be exported outside the countries represent the Petroleum Exports.

Total Exports, which is expressing the global goods and services manufactured in one country and transferred or shipped to another country under mutually agreed international trade rules in order to be sold. The revenues of these exports increase the income of either the original producers or the nations.

Oil Exports represent the oil sold from the producing countries to the importing or consuming countries in terms of Barrels per day.

Oil Prices represent the annual average crude oil prices.

Exchange rate represents the price of the selected countries' currency in terms of dollar (Official exchange rate).

Table 5.1 represents the definition of the dependent and the independent variables used in our study and the sources of these variables, where the GDP is the Real Gross Domestic Product (in constant 2010 prices) in terms of Million Dollars, collected from the World Bank (WBI), OECD National Accounts data files and OPEC. The non-Petroleum exports and the Total exports both are in terms of million Dollars and their data are from OPEC. The Oil Exports in terms of Million Barrels collected from OPEC, Nigeria Bulletins and Kuwait Annual Statistics. The Oil Prices in terms of Dollars collected from the U.S. Energy Information Administration (EIA), World International Energy Statistics, InflationData.com, and Statista–The portal for statistics. Official exchange rate collected from International Monetary Fund and the World Bank.

Table 5.1: Definitions and sources of the Variables.

Variables	Definitions	Sources
1. Dependent Variables		
Gross Domestic Product (GDP)	Real GDP, the value of final goods and services manufactured in the country in a period. (Million Dollars)	WBI, OPEC and OECD National Accounts data files
2. Independent Variables		
Non-Petroleum Exports	Total exports minus the value of the petroleum exports (m$)	OPEC bulletins
Total exports	The value of all products exported from the country (Million Dollars)	OPEC bulletins
Oil exports	The number of exported barrels (Million Barrels)	OPEC bulletin, Nigeria bulletins, Kuwait annual statistics
Oil price	Real crude oil prices (Dollars)	EIA, Statista, InflationData.com
Exchange rate	(local currency units per US$)	IMF, WBI.

5.3. The panel data model.

The Panel Data or the longitudinal data model is a model that can provide us with information about the behavior of entities such as states, companies, individuals, countries,…, both across entities and over time.

According to (Katchova, 2013), the panel Data model characterized by its ability to give information about individuals, both cross-section and time-series dimensions, which means that it can light on the differences between units, individuals or subjects that we want to analyze giving us a cross-sectional informative. At the same time, it can light on the changes within these units over time giving us time-series information. It includes N units spotted at T selected time

periods. The Panel Data model can be balanced and unbalanced depending on whether the individuals are observed in all time periods or not ($T_i = T$ or $T_i \neq T$).

The most important advantage of the Panel Data model according to (Hsiao, 2003) is that it gives an important number of data spots raising the level of freedom and diminishing the collinearity between the explanatory variables, which upgrade the efficiency of the econometric estimates. The Panel Data as well gives the ability to analyze some important economic issues that cannot be addressed or measured when we used only the cross-sectional or the time-series data sets. It allows us to analyze more complicated issues, the use of the Panel Data also helps in solving or at least decreasing the size of the main econometric problem, which is the usually contains some omitted variables that are correlated with the explanatory variables, this problem is most high in the empirical research. The highlight on both cross-section and time-series dimension helps to better verify the impacts of missing or unnoticed variables.

Panel data also provides us with the ability to know the individual's behavior by observing the behavior of others in case of similar conditions related to certain variables. It also gives the option of producing more precise prognostics for individual results.

According to (Katchova, 2013), there are three types of models: the pooled model, the fixed effects model, and the random-effects model.

1) The Pooled model:

The Pooled model assumes that all individuals are the same over all the period, which is not correct, where this assumption would neglect the heterogeneity that may exist among the individuals. The Pooled model is characterized by its high restrictions which make it the less model used in studies.

2) The Fixed Effects model (FE):

Used when we think that all factors that considered in the study are functionally equivalent, this implies that any variables which are able to have an

effect on the result are the same across all studies. In addition, our results limited to the identified individuals and could not be generalized to other individuals, these two conditions, together give us the ability to use the fixed effect (Borenstein, Hedges, Higgins, and Rothstein, 2009).

(Kumar, 2007) gave other conditions to apply the fixed effect model, he noted that we can apply this model in the case whenever we are simply willing to investigate the influence of some elements that are varied over time. The FE according to him assumes that there are omitted variables within the individuals may affect our results and we have managed this issue. The Fixed Effect removes the influence of the constant time features, which gives the possibility of finding the exact influence of the predictors on the outcome variables. Briefly, the FE used when we are going to dominate for omitted variables that change among individuals but are constant over time. The second assumption concerning the FE model is that those constant time features are not the same for all individuals, which means that each individual has unique time-invariant characteristics that could not be linked with other individuals. We cannot use the FE model also if the error terms are correlated.

(Katchova, 2013) and (Kumar, 2007) gave the formula of the fixed effects model as:

$$Y_{it} = \alpha i + \beta X_{it} + \varepsilon_{it}$$

Where:

- α_i is the unknown intercept for each individual. Where i is some numbers between 1 and n
- Y_{it} is the dependent variable
- X_{it} is the one independent variable
- β the coefficient
- ε_{it} is the error term

The use of FE model is not effective in the case of the examination of the time-invariant characteristics of the dependent variables, where the time-invariant characteristics are constant for each individual and it cannot cause any changes, but technically they are perfectly correlated with the individual. Moreover, it will give a benefit results if it is used to search for the reasons of changes within individuals (Kumar, 2007).

3) The Random Effects model (RE):

The Random effects model used when we assume that there is no common effect size on all studies, which means that the omitted effects on the results are not the same for all individuals. In addition, the results found in the study could be generalized to individuals that have the same conditions (Borenstein, Hedges, Higgins and Rothstein, 2009).

Unlike the fixed effect model, the variation across entities is not supposed to be associated with the independent variables of the study, if the researcher believes that the variation across entities has some impact on the independent variables of the study then the random effects model could not be the effective model to use. The advantage of the RE model is that we can include time-invariant variables, while in the FE model these variables are absorbed by the intercept (Kumar, 2007).

(Katchova, 2013) and (Kumar, 2007) gave the formula of the random effects model as

$$y_{it} = \beta x_{it} + \alpha + u_{it} + \varepsilon_{it}$$

Where:

- u_{it} Between-entity error
- ε_{it} Within-entity error

The differences among the FE model and the RE model could be summarized in the following

- Fixed Effects assumes that the individual-specific effects (unobserved effects) are associated with the independent or the explanatory variables, whilst in the Random Effects we suppose that the individual specific effects are not associated with the explanatory variables (Schmidheiny, 2016)

  "…the crucial distinction between fixed and random effects is whether the unobserved individual effect embodies elements that are correlated with the regressors in the model, not whether these effects are stochastic or not" (Greene, 2007)
- In the RE model the time-invariant variables exist, whilst in the FE these variables are disappeared because of the intercept. This means that the FE model removes the effect of time-invariant features.
- The RE model permits the generalization of the results beyond the sample used in the model, while the fixed effects model does not allow that.

In order to decide which model should be used in our analysis, we must run the Hausman test.

The Hausman Test.

The Hausman test helps us to know which model between the random effects model or the fixed effects model is more efficient or more appropriate in our study. In other words, it tests whether the link among the error term and the independent variables exist or not. The null hypothesis says that the efficient model that should be used is the random effects, whilst the alternative hypothesis says the opposite.

(Sheytanova, 2014) defined the hypothesis as:

H_0: The convenient or efficient model is RE. The error term and the independent variables are not linked in the panel data model. Cov $(u_i, x_{it}) = 0$

H_1: The convenient or efficient model is FE, with the existence of a relationship between the error term and the independent variables. $Cov(u_i, x_{it}) \neq 0$

- If the null hypothesis is unacceptable, then the FE is the model that should be used and the RE is inconsistent
- If the null hypothesis is accepted, then the RE is the model that should be used.

5.3.1. Application of the model

A balanced panel of 228 observations from six of the OPEC countries over the 1979-2016 periods (38 years) is exploited in the study. The selected nations represent six of the oil exporting countries and members of the Organization of the Petroleum Exporting Countries (OPEC) where the oil represents the main source of their outcomes, the most important exported products, and the oil export revenues occupy a huge share of their total export revenues and total Gross Domestic Products (GDP) as well.

Since the Panel Data model can be used through two techniques as mentioned above, we used a Random effects model based on a Hausman test. The Gross Domestic Product at constant prices represents the dependent variable, where the

non-Petroleum Exports, Oil Exports, and the Oil Prices and the real exchange rate represent the independent variables. The total exports was one of the independent variables, but it omitted during the application of the model because of collinearity.

The impacts of these unrelated variables on GDP are analyzed under this formula:

$$y_{it} = x_{kit}\,\beta_{kit} + V_{it}$$

Where β is the coefficient vector, whilst the constant term is zero and V is the composite error term, the collected data of our study is for Iraq, Iran, Saudi Arabia, Nigeria, Venezuela, and Kuwait.

5.3.2. Finding and discussions

In this part, the assessment outcomes for the impacts of chosen illustrative variables on GDP are shown. The descriptive statistics and regression outcomes are represented by the application of the Random Effects (RE) model.

The results showed an insignificancy concerning the total exports and this is probably because of the existence of a correlation between the total exports and the oil exports or the non-petroleum exports. Because of that, we ignore the total exports and we run our model.

In order to find the best results, we tried different combinations where we used oil exports in terms of million dollars in the first model and we found insignificant results, in the second model we used oil exports in terms of million barrels.

The following equation represents the first model

$$\boldsymbol{log(GDP) = C + c_1 log(oil\ prices) + c_2\ log(oil\ export\ (m\$))} \\ \boldsymbol{+\ c_3\ log(nonpetro\ export) + c_4\ log(exchange\ rate)}$$

Table 5.2 illustrates the results, where there is a favorable and meaningful effect of oil exports, non-petroleum exports and exchange rate on the GDP of the countries, but the results concerning oil prices were insignificant in this model.

Table 5.2: First model.

Dependent Variable: LOG(GDP)
Method: Panel EGLS (Cross-section random effects)
Date: 02/01/19 Time: 11:06
Sample: 1979 2016
Periods included: 38
Cross-sections included: 6
Total panel (balanced) observations: 228
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.684297	0.289408	30.00707	0.0000
LOG(OILPRICES)	0.079752	0.044825	1.779191	0.0766
LOG(OILEXPO1)	0.256181	0.024722	10.36251	0.0000
LOG(NONPETRO)	0.061948	0.015931	3.888504	0.0001
LOG(EXCH)	0.036783	0.010582	3.476030	0.0006

Effects Specification	S.D.	Rho
Cross-section random	0.551542	0.8613
Idiosyncratic random	0.221311	0.1387

Weighted Statistics

R-squared	0.728416	Mean dependent var	0.786412
Adjusted R-squared	0.723544	S.D. dependent var	0.421583
S.E. of regression	0.221664	Sum squared resid	10.95713
F-statistic	149.5271	Durbin-Watson stat	0.345215
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.462622	Mean dependent var	12.10697
Sum squared resid	76.30035	Durbin-Watson stat	0.049575

We run the second model using the following equation.

$$\boldsymbol{log(GDP) = C + c_1 log(oil\ prices) + c_2\ log(oil\ export\ (m\ barrels))} \\ \boldsymbol{+\ c_3\ log(nonpetro\ export) + c_4\ log(exchange\ rate)}$$

Table 5.4 represents the results of the second model where it shows a significant and positive impact of the independent variables on GDP. The results demonstrated a positive and significant impact of oil prices, oil exports, exchange rate and non-petroleum exports on the GDP of the countries, wherein, the increase in oil prices by 1% contributed to an increase in GDP by 33%. The increase in non-petroleum exports by 1% increased the GDP by 6%, the increase in oil exports by 1% increased the GDP by 25%, while the increase in exchange rate by 1% increased the GDP by 3%. In this model, approximately 72% (R^2) of the variations in GDP is interpreted by the independent variables.

The results explained the strong influence of the oil prices and the oil exports on the GDP of these countries, where the non-petroleum exports did not impact the GDP by the same strength. This is because these countries are heavily reliant on oil in their economies.

Table 5.3 represents the Hausman test of the second model where P=0.44 which means that the random effect model should be chosen.

Table 5.3: Hausman test.

Correlated Random Effects - Hausman Test
Equation: EQ01
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	3.712621	4	0.4463

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
LOG(OILPRICES)	0.337855	0.335933	0.000002	0.1744
LOG(OILEXPO)	0.252993	0.256181	0.000004	0.0890
LOG(NONPETRO)	0.058880	0.061948	0.000003	0.0836
LOG(EXCH)	0.038784	0.036783	0.000004	0.2906

Table 5.4: Second model.

Dependent Variable: LOG(GDP)
Method: Panel EGLS (Cross-section random effects)
Date: 02/01/19 Time: 11:06
Sample: 1979 2016
Periods included: 38
Cross-sections included: 6
Total panel (balanced) observations: 228
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.684297	0.289408	30.00707	0.0000
LOG(OILPRICES)	0.335933	0.030341	11.07179	0.0000
LOG(OILEXPO)	0.256181	0.024722	10.36251	0.0000
LOG(NONPETRO)	0.061948	0.015931	3.888504	0.0001
LOG(EXCH)	0.036783	0.010582	3.476030	0.0006

Effects Specification	S.D.	Rho
Cross-section random	0.551542	0.8613
Idiosyncratic random	0.221311	0.1387

Weighted Statistics

R-squared	0.728416	Mean dependent var	0.786412
Adjusted R-squared	0.723544	S.D. dependent var	0.421583
S.E. of regression	0.221664	Sum squared resid	10.95713
F-statistic	149.5271	Durbin-Watson stat	0.345215
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.462622	Mean dependent var	12.10697
Sum squared resid	76.30035	Durbin-Watson stat	0.049575

The outcomes did not come differently than what we expected, where we can see that the there is a significant impact of the oil prices and oil exports on the GDP which means that a small change in oil prices would be able to change the economy of these countries putting them in front of so many problems since their economies are heavily reliant on oil export revenues.

CONCLUSION

The majority of the research conducted concerning the link among the oil prices and the economic expansion has concentrated on the oil importing nations or the developed oil-exporting nations. However, there is still a shortage in the formal studies on the influence of oil prices on the economy of the developing oil-exporting nations. According to that, we were interested in studying the impact of oil prices on the economic growth of developing countries. One of the main challenges that faced us during the study is the shortage of reliable high-frequency data in the aggregate macroeconomic variable.

The thesis analyzed the impact of the oil price changes on six of oil-exporting nations, which are members of the Organization of Petroleum Exporting Countries (OPEC) as well. We utilized the Eviews program, using Panel Data model with random effects and covering the period from 1979 to 2016.

The results showed a favorable and meaningful effect of oil prices, oil exports, exchange rate and non-petroleum exports on the GDP of the countries. wherein, the increase in oil prices by 1% contributed to an increase in GDP by 33%. The increase in non-petroleum exports by 1% increased the GDP by 6%, the increase in oil exports by 1% increased the GDP by 25%, while the increase in exchange rate by 1% increased the GDP by 3%. The results were not different than what we expected, where they prove that the impact of the oil prices on the GDP is strong, and a small change in oil prices would be able to change the economy of these countries. The impact of the non-petroleum exports on the GDP is not as strong as the impact of the oil exports and this is because these countries depend largely on the oil, and their main exports are the petroleum products.

Now, if we think about the future of the economy of these countries, given to what happening to oil prices these days, these countries have to find a radical solution for this situation so oil should not stay the motor of their economies anymore, the most important step should be done by these countries and by the whole OPEC countries is that they have to try to make new strategies in order to secure the best distribution and exploitation of their incomes and reducing the public expenditure, then they have to find other resources for their incomes away from oil, taking into account each country circumstances and capacities.

These countries should give a chance to other sectors such as the tourism sector which is neglected by almost all OPEC countries, they can also focus on the agriculture sector and try to export the products that their countries have the privileges in cultivating them, they have to facilitate the investment and encourage investors to invest in their countries, they have to develop and focus on the other sources of energy such as the renewable energies where their costs are low, the governments should find a way to integrate the private sectors into the economy and facilitate the processes of establishing and creating private companies which help the expansion of the economy.

They must try to create new sectors where they would be stronger without fear of the changes happening in the oil prices or the future of the oil. Otherwise, they will keep suffering from the curse of decreasing oil prices and putting their economies in a risky situation. They have to move on, in order to develop their countries rather than keeping their eyes on the oil prices, when oil prices increase, their economy would do well.

This analysis and the results found in this thesis would be useful in building similar analyses in the future using different circumstances and different methods. However, the researcher should take into consideration that a small change in the factors used in this study, such as the study period, the independent variables, and the countries under study could potentially give dramatically different outcomes.

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APPENDIX

Dependent Variable: GDP
Method: Panel EGLS (Cross-section random effects)
Date: 02/01/19 Time: 11:41
Sample: 1979 2016
Periods included: 38
Cross-sections included: 6
Total panel (balanced) observations: 228
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	78937.16	39186.31	2.014407	0.0452
OILPRICES	1443.571	151.5515	9.525281	0.0000
OILEXPO	82.92250	10.92031	7.593419	0.0000
NONPETRO	3.392024	0.469014	7.232242	0.0000
EXCH	1.606713	1.339934	1.199099	0.2318

Effects Specification

	S.D.	Rho
Cross-section random	92888.48	0.7813
Idiosyncratic random	49146.67	0.2187

Weighted Statistics

R-squared	0.741611	Mean dependent var	20162.54
Adjusted R-squared	0.736976	S.D. dependent var	95666.73
S.E. of regression	49063.53	Sum squared resid	5.37E+11
F-statistic	160.0096	Durbin-Watson stat	0.331106
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.640581	Mean dependent var	235775.5
Sum squared resid	1.93E+12	Durbin-Watson stat	0.092302