The Econometric Analysis of the Relationship Between Oil Price, Economic Growth and Export In OPEC Countries

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ABSTRACT In countries where the rate of industrialization and growth is high, dependence on oil is constantly increasing. Factors such as the increase in oil reserves of OPEC countries, differences in oil extraction costs, oil supply and demand imbalances cause oil prices to fluctuate. Increases in oil prices in OPEC countries have an increasing effect on energy export revenues and government budget revenues. In an economy dependent on oil export revenues, the existence of new reserves or the increase in oil production changes the structure of the production and export sectors in favor of oil. OPEC countries, which generate income based on oil exports, lose their competitive power in foreign markets when they cannot invest in R&D, technology and productivity. This situation causes countries to have an economic structure dependent on imports, to increase their current account deficit and to decrease their growth rates. The purpose of this study is to examine the relationship between average annual crude oil price (nominal value in US dollars), gross domestic product (2010 prices and $) and exports (2010 prices and $) for OPEC member countries through panel data analysis.

Keywords: OPEC, Oil Price, Panel Data Analysis

1. Introduction

The purpose of the OPEC organization is to provide a safe, fair and stable price for exporters by streamlining and combining the oil policies followed by the member countries, to supply regular and economical oil to importing countries and to protect the interests of capital groups which have invested in the sector. OPEC management determines oil prices and production amount. OPEC, acting in accordance with this purpose, affects various embargo and price regulations.

Factors such as the fact that large oil reserves are located in certain regions of the world, differences in oil extraction costs, oil supply and demand imbalances cause oil prices to fluctuate. Fluctuations in the oil market are mostly caused by the decisions of OPEC countries. The macroeconomic effects of fluctuations in oil prices affect the economies of oil exporting and importing countries in different ways. Increases in oil price have an increasing effect on energy export revenues and government budget revenues in oil exporting countries. In oil importing countries, it has negative consequences on production costs, external balance, growth and production capacity.

In an economy depending on oil export revenues, the presence of new reserves or the increase in oil production changes the structure of production and export sectors in favor of oil. As a result of the increase in petroleum-weighted foreign trade, more foreign currency enters the country, and the foreign trade balance deteriorates. In addition, shifting the investments in the country to petroleum and petroleum products predominantly causes the neglect of other sectors, in other words, to exclude the effect of their production and exports.

Countries that generate income based on oil exports lose their competitiveness in foreign markets because they cannot invest in R & D, technology and productivity. This situation causes countries to have an import-dependent economic structure, increase their current account deficits and decrease their growth rates.

As one of the main inputs in the development of nations, oil is one of the important strategic tools in the international system. Energy policies include the safe access of oil to global markets in the short term, production, distribution and price etc. issues, on the other hand, address the importance of oil in growth policies. While the increase in oil prices increases production costs in oil importing countries, the general level of prices increases, unemployment and economic growth decrease, while in oil exporting countries, economic growth increases. Therefore, changes in oil prices are closely monitored by all countries. In OPEC countries, industry and exports are largely based on oil. Therefore, oil price shocks have profound effects on the economies of these countries.

Oil revenues of GDP and export revenues of OPEC countries are proportionally high. These countries, which are far from different kinds of economic activities and industrialization, are defined by the western economies as hydrocarbon exporter rent economies (hyrocarbon exporting-rentier economies). In an economy dependent on oil export revenues; Finding new reserves or increasing oil production changes the structure of production and export sectors in favor of oil. As a result of the increase in oil-based foreign trade, more foreign currency enters the country and the foreign trade balance deteriorates. In addition, shifting the investments in the country to

petroleum and petroleum products sectors causes exclusion of other sectors, in other words, their exclusion effect and their production and exports decrease.

The aim of this study is to examine the relationship between average annual crude oil price (nominal value in USD), gross domestic product (2010 prices and $) and export (2010 prices and $) for OPEC member countries by panel data analysis. According to the results of the analysis, there is a cointegration and causality relationship between oil price, export and economic growth in OPEC countries. It is seen that there is growth in economic growth and that economic growth has a positive effect on exports.

2. Structure of Oil Market and Oil Dependency in OPEC Countries

OPEC (Organization of Petroleum Exporting Countries: The Organization of Petroleum Exporting Countries) is a confederation of 12 countries gathered in Baghdad, Iraq in 1960. The organization, which has about 2/3 of the OPEC global oil reserves, was later moved to Vienna. Currently, Saudi Arabia, Venezuela, Iran, Iraq, Kuwait, United Arab Emirates, Libya, Nigeria, Qatar, Algeria, Angola, Gabon, and Congo, Ecuador and Equatorial Guinea are members of the organization, where various countries joined after its establishment.

79.4% of the proven oil reserves in the world are in OPEC countries. Oil reserves in the Middle East constitute 64.5% of the OPEC total. According to the BP 2019 report, while production increases are expected in non-OPEC countries, it is expected that OPEC will continue to dominate crude oil production by 2040.

Established by countries that are the world's leading oil producer and exporter, this organization's main objectives are; By coordinating and merging the oil policies of the members, it is aimed to provide a safe, fair and stable price to exporters, on the other hand, to supply permanent and cheap oil to importers, and to protect the interests of those who invest in the sector. The cartel organization, determined by the members of oil prices and production quotas, started to lose its power later. As a result of the deviation of the member countries, especially Saudi Arabia from the principle of production within the determined quotas, it is gradually losing its quality as an effective cartel (Hamilton, 2009).

Although OPEC's impact on the international oil market after the 1973-1974 oil embargo has been decreasing due to the new oil reserves discovered in the North Sea, Alaska and the Gulf of Mexico, it still continues. OPEC members hold approximately 2/3 of the world's oil reserves today and realize 1/3 of the daily oil production (https://www.opec.org, Access Date: 15.10.2019).

As of 2018, the total of proven oil reserves in the world are in OPEC members with 1242.2 billion barrels, which make up 71.8% of 1729.7 billion barrels. As seen in Table 1, Venezuela ranks first among these reserves with 302.81 billion barrels and 25.5% share. Later on, Saudi Arabia (22.4%) with 267.03 billion barrels, Iran (13.1%) with 155.60 billion barrels, Iraq (145.22 billion barrels), Kuwait with 101.50 billion barrels (UAE (8.5%) etc.).

1854.3 million tons, which constitutes 41.4% of the world total oil production, which was 4474.3 million tons in 2018, was realized by OPEC members. Saudi Arabia ranks first among the OPEC countries with 578 million tons of production and 12.9% share, Iraq (5.1%) with 226.1 million tons, Iran (4.9%) with 220.4 million tons and UAE with

177.7 million tons (4.0%), Kuwait (3.3%) with 146.8 million tons, Nigeria (2.2%) with 98.4 million tons.

Country	Reserve Amount	Percent Amount (%)
Venezuela	302.81	25.5
Saudi Arabian	267.03	22.4
Iran	155.60	13.1
Iraq	145.02	12.2
Kuwait	101.50	8.5
United Arab Emirates	97.80	8.2
Libya	48.36	4.1
Nigeria	36.97	3.1
Algeria	12.20	1.0
Ecuador	8.27	0.7
Angola	8.16	0.7
Congo	2.98	0.3
Gabon	2.00	0.2
Equatorial Guinea	1.10	0.1

Source: OPEC Annual Statistical Bulltein 2019.

Table 1. OPEC Countries Crude Oil Reserve Distribution (Billion barrels, End of 2018).

OPEC countries' revenue from oil exports were given in Table 2. According to Table 2, OPEC countries' revenue from oil exports in 2018 was $ 711 billion. While Saudi Arabia ranks first among OPEC members, with 237 billion dollars, the share of oil in total export revenues was 33.3%. Saudi Arabia has Iraq with $ 91 billion (12.8%), UAE with $ 74 billion (10.4%), Iran with $ 67 billion (9.4%) Iran, Kuwait with $ 61 billion (8.6%).

Country	Produce Amount (Million Tones)	Percentage Share (%)	Oil Export Revenue (Billion Dollars)	Share in Total Export Revenue (%)
Venezuela	77.3	1.7	27	3.8
Saudi Arabian	578	12.9	237	33.3
Iran	220.4	4.9	67	9.4
Iraq	226.1	5.1	91	12.8
Kuwait	146.8	3.3	61	8.6
United Arab Emirates	177.7	4.0	74	10.4
Libya	47.5	1.1	21	3.0
Nigeria	98.4	2.2	42	5.9
Algeria	65.3	1.5	30	4.2
Ecuador	27.7	0.6	6	0.9
Angola	74.6	1.7	37	5.2
Congo	17.00	0.4	8	1.1
Gabon	9.7	0.2	5	0.7
Equatorial Guinea	8.7	0.2	5	0.7

Source: (BP, 2019; 14).; (http://petroturk.com/akaryakit/opec-petrol-ihracatindan-711-milyar-dolar-elde-etti).

Table 2. Distribution of Oil Production Quantities and Export Revenues of OPEC Countries (2018)

Oil dependence or fossil resource dependency in general is a concept with economic, political and social dimensions. It is stated that the countries that have 20% or more share of fossil fuels in total exports, or the revenues from fossil fuel sales, constitute at least 20% of public revenues, have a fossil resource dependency (Ulusoy et al., 2017). In economies that are dependent on fossil resources, these countries have a structure devoid of economic diversity, since uniform product production is generally carried out. Besides being the basic production input of oil, there is a significant uncertainty about its future due to the limited amount of reserves worldwide. This is an important risk factor for countries whose economies are dependent on oil.

Oil revenues in export revenues and national revenues of OPEC countries are proportionally higher. These countries, which are far from different kinds of economic

activities and industrialization, are defined by the western economies as hydrocarbon exporter rent economies (hyrocarbon exporting-rentier economies).

In OPEC countries, industry and exports are largely based on oil. Therefore, oil price shocks have profound effects on the economies of these countries. The decline in oil prices after 2014 has affected negatively the economies of export revenues, especially OPEC countries. In oil export revenues, OPEC countries, which have an important place in the national product, the increase in oil prices has a positive effect on the economic growth and welfare of these countries. However, if oil prices fall, this process is reversed, and this quality of economies with fossil resource dependence that hinders growth in the long run is defined by the concept of the resource curse.

Economic problems caused by sudden increases in revenues from fossil sources called Dutch Disease are seen in the majority of countries dependent on fossil fuels. There are problems such as overvaluation of domestic money, rising wages of workers and consequently labor migration from other countries, decreased production in other sectors due to low profitability, industrialization, unfair income distribution, an unstable economy, and insufficient institutional structures. Government intervention is required to solve these problems that arise in resource-rich countries.

3. Economic Effects of Oil Prices

In addition to the increase in energy demand caused by the increasing economic growth in the world economy in recent years, economic and political developments occurring in oil producing countries from time to time cause fluctuations in oil prices and significant economic effects. It is possible to divide the causes of these fluctuations arising from the peculiar characteristics of the oil industry into two main groups of origin, supply and demand (Ezgi and Özkılıç, 2016).

Supply Sources; Production quantities and capacities of OPEC and non-OPEC countries, changes in geopolitical conjuncture, climate and weather conditions, technological structure during production, transportation and refinery stages, stock status and oil quality. Among the Demand Sources; economic growth rate, industrial production amount, geopolitical developments, weather conditions, consumer behavior, changes in technology and taxes. In addition, policy changes, including economic and market regulations such as production and consumption balance, exploration, production, transportation and investment costs, dollar rate, embargo and conflicts, policies of OPEC and large companies, taxes and environmental regulations, cause fluctuations in oil prices (Uzuner, 2018).

Oil prices in the short term; geopolitical changes, speculations, changes in stocks and the value of the dollar, in the medium term; economic growth rates of countries, changes in sectoral investments and OPEC policies, in the long run; The potential and life of reserves are affected by economic growth rate, alternative energy investments, and climate changes. Fluctuations in oil prices affect oil exporting countries and oil importing countries in different ways. Increases in oil prices cause an income transfer from oil importing countries to oil exporters. In the economies of oil exporting countries, real income increases with the increase in export income due to the increase in oil prices, unlike countries that import oil. In oil importing countries, this development causes inflation, current deficits and budget deficits. However, the low

price elasticity of oil demand does not cause much decrease in oil demand. In terms of households, the increase in oil prices has a real income reducing effect. Accordingly, the decrease in real income has a negative impact on economic growth by reducing domestic demand.

Rising oil prices; Although it is advantageous for oil exporting countries, these countries may be adversely affected in the long run. As a result of the increases in oil prices, inflation will be experienced in the country, and also, the high rate of price increases will reduce the oil imports of countries with alternative energy sources in the world and decrease the export revenues of oil exporting countries (Alagöz et al., 2017).

Among the many oil produced in the world and sold in the markets; WTI (West Texas Intermediat), Brent Blend, Dubai Fateh Crude and OPEC Basket are accepted as the price markers and quality reference oils in international markets, and other oil prices are formed according to the prices of these oils (Bayraç, 2019).

Source: http://www.leftlanebrain.com/oil-and-gas-price/ Access date: 04.12.2019.
Figure 1: Oil Producer Countries and Oil Types

WTI price is formed in the US Oklohama-Cushing. WTI oil, which is lighter (light) because it contains low sulfur compared to Brent oil, is a price that is accepted as a reference throughout the USA and America continent (http://www.tpao.gov.tr).

Symbolizing the price of low-sulfur and high-quality oil produced in the North Sea in previous years, Brent oil is accepted as the reference price in the pricing of Middle East and African oil supplied to the European market today. It constitutes the largest class of crude oil traded worldwide and accounts for approximately 2/3 of the crude oil trade in the world.

Dubai Fateh Crude; It is a medium-sour oil, a basket of petroleum coming from Dubai, Oman or Abu Dhabi and slightly lower than Brent and WTI (https://www.investopedia.com/articles/investing/102314/understanding-benchmark-oils-Brent-blend-wt-and-dubai.asp).

OPEC Basket, Saharan Blend (Algeria), Girassol (Angola), Oriente (Ecuador), Minas (Indonesia), Iran Heavy (Iran), Basra Light (Iraq), Kuwait Export (Kuwait), Es Sider (Libya), Bonny Light (Nigeria), Qatar Marine (Qatar), Arab Light (Saudi Arabia), Murban (United Arab Emirates) and Merey (Venezuela) are the average prices resulting from the weighted average of oil (https://www.opec.org, Access Date: 11.11.2019). Prices

for WTI for the US market and London Brent for Europe and Middle East Petroleum are taken into consideration. Table 3 shows the monthly price changes of Brent oil in the 200-2019 period.

Year/ Month	January	February	March	April	May	June	July	August	September	October	November	December
2000	25,51	27,78	27,49	22,76	27,74	29,8	28,68	30,2	33,14	30,96	32,55	25,66
2001	25,62	27,5	24,5	25,66	28,31	27,85	24,61	25,68	25,62	20,54	18,8	18,71
2002	19,42	20,28	23,7	25,73	25,35	24,08	25,74	26,65	28,4	27,54	24,34	28,33
2003	31,18	32,77	30,61	25	25,86	27,65	28,35	29,89	27,11	29,61	28,75	29,81
2004	31,28	30,86	33,63	33,59	37,57	35,18	38,22	42,74	43,2	49,78	43,11	39,6
2005	44,51	45,48	53,1	51,88	48,65	54,35	57,52	63,98	62,91	58,54	55,24	56,86
2006	62,99	60,21	62,06	70,26	69,78	68,56	73,67	73,23	61,96	57,81	58,76	62,47
2007	53,68	57,56	62,05	67,49	67,21	71,05	76,93	70,76	77,17	82,34	92,41	90,93
2008	92,18	94,99	103,64	109,07	122,8	132,32	132,72	113,24	97,23	71,58	52,45	39,95
2009	43,44	43,32	46,54	50,18	57,3	68,61	64,44	72,51	67,65	72,77	76,66	74,46
2010	76,17	73,75	78,83	84,82	75,95	74,76	75,58	77,04	77,84	82,67	85,28	91,45
2011	96,52	103,72	114,64	123,26	114,99	113,83	116,97	110,22	112,83	109,55	110,77	107,87
2012	110,69	119,33	125,45	119,75	110,34	95,16	102,62	113,36	112,86	111,71	109,06	109,49
2013	112,96	116,05	108,47	102,25	102,56	102,92	107,93	111,28	111,6	109,08	107,79	110,76
2014	108,12	108,9	107,48	107,76	109,54	111,8	106,77	101,61	97,09	87,43	79,44	62,34
2015	47,76	58,1	55,89	59,52	64,08	61,48	56,56	46,52	47,62	48,43	44,27	38,01
2016	30,7	32,18	38,21	41,58	46,74	48,25	44,95	45,84	46,57	49,52	44,73	53,31
2017	54,58	54,87	51,59	52,31	50,33	46,37	48,48	51,7	56,15	57,51	62,71	64,37
2018	69,08	65,32	66,02	72,11	76,98	74,41	74,25	72,53	78,89	81,03	64,75	57,36
2019	59,41	63,96	66,14	71,23	71,32	64,22	63,92	59,04	62,83	59,71	63,21	67,31
2020	63,65	55,66	32,01	18,38	29,38	40,27	43,24	44,74	40,91	40,19	42,69	49,99

Source: EIA, 2019. (eia.gov).

Table 3. Brent Oil Price per Month (2000-2019) FOB $ / Barrel

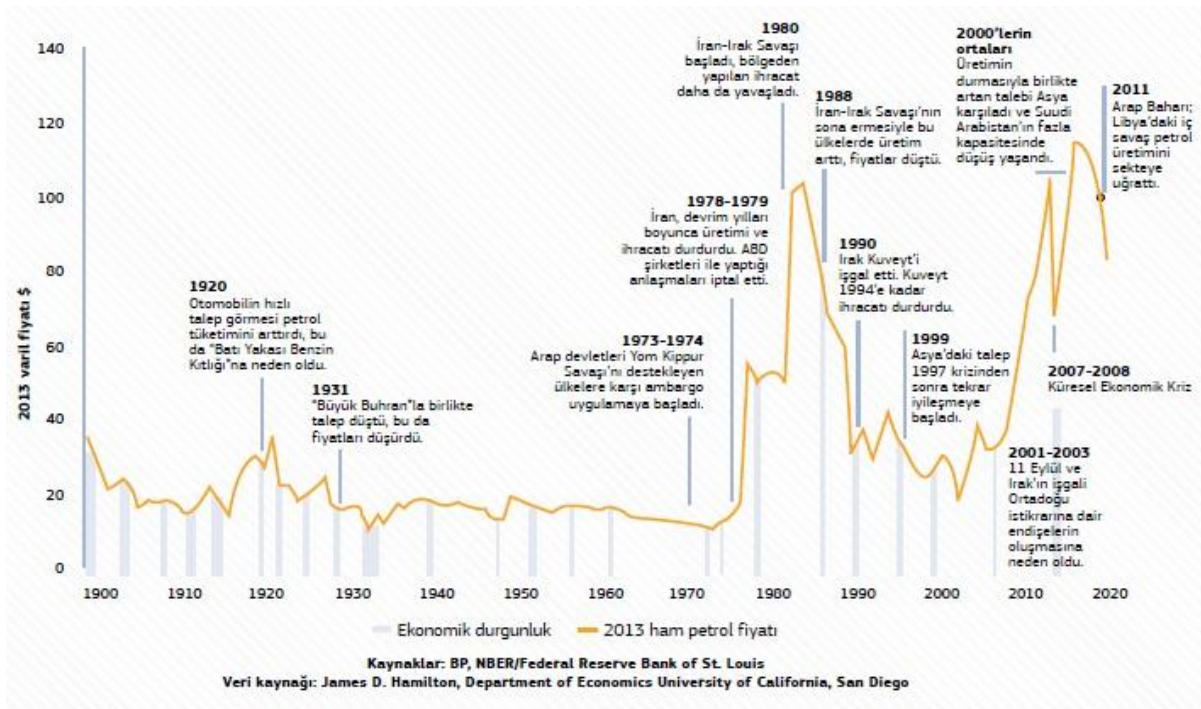In Figure 2, the historical development of the causes of shocks occurring in oil prices is given.

Figure 2. Historical Course of Events Causing Fluctuations in Oil Prices

4. Literature Review

Some of the methods used and the results achieved in the studies examining the relationship between oil prices, economic growth and exports in the literature are as follows.

Jimenez and Sanchez (2005) investigated the effects of oil price shocks on the growth of OECD countries, which occurred in 8 OECD countries in 1972-2001. They concluded that the increase in oil prices negatively affected the economic growth of oil importing countries (except Japan), the economic growth of Britain, one of the oil exporting countries, and the economic growth of Norway positively.

Elbeydi, et al. (2010) tested the export-based growth hypothesis for Libya, a large part of its exports being oil. Granger causality analysis based on Johansen cointegration and error correction model was performed, long-term cointegration relationship and bilateral long-term causality were found between export and economic growth.

In their research for OPEC and OECD countries, Elmi and Jahadi (2011) discussed the relationship between fluctuations in oil prices and economic growth in their research for the countries of OPEC and OECD, and found that economic growth was affected at different rates from oil prices in both OPEC and OECD countries. They stated that Nigeria and the UAE are the countries with the highest dependence on oil and fluctuations in oil prices are especially important for OPEC countries.

Ghalayani (2011), OPEC, G-7, could not determine a clear relationship between oil prices and economic growth for all countries in his research for China, India and Russia. He claimed that there was no causal relationship between the increase in oil prices and economic growth in OPEC countries, while oil shocks in G-7 countries had a positive effect on economic growth. Regarding China, India and Russia, no conclusions have been reached. Mohsen and Asghar (2011) examined the relationship between natural resource (petroleum) wealth and economic growth in oil producing countries in terms of Dutch Disease between 1968-2008. Considering the richness of natural resources together with structural fragility, they stated that industrial sectors suffered a loss of power and this caused a decrease in industrial exports.

Ağayev (2011) of 12 transition economies (Azerbaijan, Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan) that have relatively similar socioeconomic characteristics and are exporters of energy, raw materials, minerals and agricultural products. analyzed the export and GDP relationship through panel cointegration and panel causality analysis. For these countries, it is concluded that the export-based growth hypothesis is invalid. Findings show the existence of a causal relationship from economic growth to export growth in the short and long term.

Akıncı et al. (2012) investigated the relationship between OPEC and oil import countries' oil prices and economic growth in the period 1980-2011 through panel co-integration and causality analysis. In the analysis, it was found that the increase in oil prices in OPEC countries increased economic growth, while it decreased economic growth in importing countries.

Bouzid (2012) investigated the relationship between oil prices and real growth for Tunisia in the period 1960-2009. He claimed that the increase in oil prices had a negative effect on real economic growth and there was a causality from real economic growth to oil prices.

Akıncı et al. (2013) in another study, 11 OPEC and 116 oil importers analyzed the relationship between oil prices and economic growth in the 1980-2011 period with time series for a total of 127 countries. As a result of the study, a positive and significant relationship was found for the UAE, the OPEC country, and the positive relationship determined in oil importing countries other than Kiribati was linked to the export of products produced using oil input.

Yardimoglu ve Gülmez (2013) investigated the long-term relationship between oil prices and economic growth and whether Dutch Disease prevails in OPEC countries in their studies covering 10 OPEC countries between 1970-2011. Pedroni, Kao and Johansen Fisher have achieved the result of a long-term bilateral causality relationship between oil prices and economic growth by conducting Cointegration tests and Canning, Pedroni Panel Causality Analysis. Accordingly, they stated that there is a mutually significant relationship between oil prices and economic growth in the long term in OPEC countries and that Dutch Disease is valid for OPEC countries.

5. Methods and Analysis Results

This study examined the relationship between the annual series of annual average crude oil price (nominal value USD) Gross Domestic Product (Million $) and Exports (Million $) for OPEC member countries (15 countries) between the years 2000 to 2017 through panel data analysis. Descriptive statistics for the series are given below. These countries are:. Algeria, Angola, Congo, Ecuador, Equatorial Guinea, Gabon, IR Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates and Venezuela. Data were obtained from OPEC, BP Statistics and Worldbank.

In econometric studies, three types of data are used: time series data, cross-sectional data, and mixed data which is combination of time series data and cross-sectional data. If the same sectional unit is tracked over time, such mixed data is called panel data. As a result of the measurement of specific sampling units such as individuals, firms, households, cities and countries over time, the panel data structure that expresses data sets for the same audience is reached in different time periods (Baltagi, 2001).

Economic relations are tried to be estimated by using the cross-sectional data of time dimension with panel data analysis (Greene, 1993). Therefore, panel data analysis combines time series and horizontal cross-section series, and allows the creation of a data set with both time and section size.

The results of the study based on the cross-sectional data reveal only the differences between the units. However, in studies using panel data, changes occurring over time in both units and a unit can be revealed.

A simple linear panel data regression model is generally expressed as follows:

$$Y_{it} = \beta_{1it} + \beta_{2it}X_{2it} + \ldots + \beta_{kit}X_{kit} + \varepsilon_{it} \qquad (1)$$

i= 1….N, t= 1….N

There are three methods that can be used in the prediction phase with pooled regression as a method of estimation in the adaptation of both time and section data of the model. These methods are:

- 1. Classic Model

- 2. Fixed Effects Model

- 3. Random Effects Model

Classic model is a model where both constant and slope coefficients are fixed to units and time. This model is written as follows,

$$Y_{it} = \beta_o + \sum_{k=1}^{k} \beta_k X_{kit} + e_{it} \tag{2}$$

And the parameters can be estimated by the Least Squares Method. Below is the general representation of fixed effects model.

$$Y_{it} = \beta_{1it} + \beta_{2it} X_{2it} + \ldots + \beta_{kit} X_{kit} + \varepsilon_{it} \tag{3}$$

Random Effects Model is stated as follows;

$$Y_{it} = \beta_{1it} + \beta_{2it} X_{2it} + \ldots + \beta_{kit} X_{kit} + \varepsilon_{it} + \mu_i \tag{4}$$

(Greene 2003, Gujarati 2004, Baltagi, 2001).

Following the descriptive statistics, the unit root tests for the investigation of the stability of the series are as follows.

Series	Model	Test	p
GDP	At the Level	Levin, Lin & Chu t	<0,01
		ADF - Fisher	0.0958
		PP - Fisher Chi-square	0.0489
	difference	Levin, Lin & Chu t	<0,01
		ADF - Fisher	0.0119
		PP - Fisher Chi-square	<0,01
OIL	At the Level	Levin, Lin & Chu t	0.0477
		ADF - Fisher	0.6052
		PP - Fisher Chi-square	0.7948
	difference	Levin, Lin & Chu t	<0,01
		ADF - Fisher	<0,01
		PP - Fisher Chi-square	<0,01
EXPORT	At the Level	Levin, Lin & Chu t	<0,01
		ADF - Fisher	0.2075
		PP - Fisher Chi-square	0.9048
	difference	Levin, Lin & Chu t	<0,01
		ADF - Fisher	0.0042
		PP - Fisher Chi-square	<0,01

Table 4. Panel Unit Root Test Results

When Table 4 is examined, it can be seen that the hypothesis for the Oil Price , GDP and Export series for each of the three tests is not to be rejected with 95 % reliability. Therefore, it can be said that both series are not stationary at the level. However, it is seen that all two series have stabilized after first differentiation process. In the next analysis, it was studied with the series which were stabilized with first difference.

After the unit root tests are applied, it is necessary to perform the cointegration analysis of the panel to determine the long-term relationships between the series. Panel cointegration test results for the related series are given below.

Pedroni Cointegration Test				
	Statistics	p.	Weighted Statistics	p
Panel v	-1,297832	0.9028	0,482534	0.3147
Panel rho	1,956491	0,9748	0,656210	0,7442
Panel PP	0,952688	0,8296	-0,709650	0,2390
Panel ADF	2,126007	0,9832	-0,581208	0,2806
	Statistics	p.		
Group rho	1,700141	0.9554		
Group PP	-1,150002	0,1251		
Group ADF	-1,102410	0,1351		

Table 5. Cointegration Test when the GDP variable is considered as a dependent variable for GDP,Oil Price and Export

According to Table 5, it is understood that the hypothesis that there is no cointegration between GDP Oil Price and Export series cannot be rejected for all test statistics. Therefore, no cointegration was found between the Oil Price, GDP and Export series according to the Pedroni cointegration method.

	t-Statistics	p
KAO Cointegration Test	-0,009948	0.4602
Error variance	0,003034	
HAC Variance	0,002435	

Table 6. Kao Cointegration Results

According to the Pedroni Panel Cointegration test, there is no co-integration between GDP and Oil Price. However, according to the Kao cointegration test, there is a cointegration between the two series.

Panel model estimation results made by accepting GDP dependent variable are given in Table 7.

Model	Model Significance	R2	Independent Variable	Coefficient	Standart Deviation	t	p.
Cross Sectional Fixed Effects	<0,01	0,4215	OIL	0,632076	0,083826	7,540318	<0,01
			EXPORT	0,224732	0,066654	3,71638	0,0009
			C	1,934261	0,281023	6,882941	<0,01
Cross Sectional Random Effects	<0,01	0,39685	OIL	0.393067	0.080093	4.907668	<0,01
			EXPORT	0.594069	0.052613	11.29137	<0,01
			C	1.021617	0.234862	4.349857	<0,01

*OIL: Oil Price, Constant Term Model Significance: H0: The regression model is insignificant.

Table 7. Panel Model Estimation Results

In the Table 7, model results obtained for various panel data regression methods are given collectively. On examining the results, the highest representation ratio (R^2) for the Oil Price and Export series are seen in the time and cross sectional fixed effects model. Nevertheless, Hausmann Test to examine which panel regression model is valid is given in Table 8.

Variable	Cross Section Effect	Time Effect
OIL	1,000	-
EXPORTt	1,000	

Table 8. Hausmann Test Results

H0: valid for Random effects model

As a result of the Hausmann test for the hypothesis testing, it is seen that the model of Cross Sectional Fixed Effects is valid for GDP,Oil Price and Export models. When the random effects models are examined, oil price and Export series has a positive effect on GDP. Accordingly, the increase in oil price affects the GDP in an upward direction. An increase in oil prices and exports will affect the GDP.

Conclusion

Oil is one of the most important production input and energy resources in the economy. Due to the limited amount of reserves and production, changes in oil prices have significant effects on economic growth. Since industry and exports are largely dependent on oil in OPEC countries, the resulting oil price shocks deeply affect their economies.

In an economy dependent on oil export revenues; Finding new reserves or increasing oil production changes the structure of the production and export sectors in favor of oil. As a result of the increase in oil-based foreign trade, more foreign currency enters the country and the foreign trade balance deteriorates. In addition, shifting the investments in the country to petroleum and petroleum products sectors causes exclusion of other sectors, in other words, their exclusion effect and their production and exports decrease.

In the econometric analysis, it was determined that there is no cointegration between the Oil Price, GDP and Export series according to Pedroni and Kao cointegration analysis. After the cointegration analysis, when GDP is dependent variable, it is seen that the highest relation is in the cross-sectional fixed effects among all the models tried for panel models made by accepting variable oil price and export series independent variable. When the random effects model is analyzed, it is determined that oil price and exports have a positive effect on the GDP. Increasing oil prices and exports will affect the GDP.

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