

Methodology Article

The Economic Impact of Increasing International Dependence on Renewable Energy in Generating Energy on OPEC

Mosaad Mohamed Ismail Elgayish

Economics Department, Faculty of Politics & Economics, Beni-Suef University, Beni-Suef, Egypt

Email address:

mosaad2000@eps.bsu.edu.eg

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Abstract: The international dependence on renewable energy in the generation of energy has increased significantly, which stopped the researcher in studying the impact of this on *OPEC* countries that rely heavily on *oil* to form their revenues and economic capabilities. The researcher has noted that the demand for *renewable energy* to generate energy increased, especially during the period from 1990 to 2018, as the proportion of the contribution of renewable energy to power generation ranged between 15% in 1990 until it reached 23% in 2018, and at the same time it was observed that the rate of *generation Energy* from *oil* for the same period shrank from 13% in 1990 until it reached 3% in 2018 (*according to data from the International Energy Agency*). The research assumed that increasing international dependence on renewable energy sources will negatively affect oil revenues for *OPEC* countries and limit global demand for Petroleum to generate energy in exchange for increased dependence on renewable energy, which reduces the oil revenues of *OPEC* countries have been relied on data of *the World Bank and the International Energy Agency*, and the *multiple regression model* was used to reach the variable most influencing the revenues of *OPEC* countries and reach the ratio of the impact of the use of renewable energy in generating energy on the revenues of *OPEC* countries. Until 52% of the changes that occurred in oil revenues in *OPEC* countries are caused by the price of a global barrel in dollars, while the impact of renewable energy on *OPEC* revenues was 30%. Accordingly, the research recommends that *OPEC* countries should strive not to rely entirely on oil as a main source of income - especially with the availability of an alternative from renewable energy in most of the *OPEC* countries - and that *there has become a need to diversify the sources of income for OPEC countries* and not rely entirely on one source of income.

Keywords: Renewable Energy, OPEC, Extension, the Economic Impact

1. Introduction

1.1. Background of the Study

OPEC (Organization of the Petroleum Exporting Countries) was established in 1960 in Baghdad. The organization has established by five countries from the important countries in oil production, namely Iraq, Saudi Arabia, Kuwait, Venezuela and Iran, and its headquarters are in Vienna, Then Qatar joined in 1961, and then it left at the end of 2018. It also joined Indonesia in 1962 and then left in 2008, Libya joined in 1961, and the UAE joined in 1967 (*joined in the name of Abu Dhabi*

and then changed its name to the UAE in 1974), then joined Algeria in 1969, Nigeria in 1971, Ecuador joined in 1973. Gabon started as an associate member from 1973, and then became a full member in 1975. OPEC member states possess 40% of the world's production of oil and 70% of the world's oil reserves, so OPEC has huge oil potentials in terms of reserves and production. These quantities make it a large oil and economic bloc that can control the global oil market. Joining of a new member country requires the approval of three-quarters of the current members of OPEC, including all five founders [1]. If the traditional sources of energy (coal, oil, and natural gas) are exposed to the risk of depletion in addition

to causing environmental pollution and climate change issues, however, renewable energy sources are free of these risks, and it is possible to overcome the difficulties and challenges facing the exploitation of renewable energy sources. The European Union achieved the highest rate of wind energy production growth of 19% in 2006¹ [2].

1.2. Experiences of Some Countries

At the beginning of 1981 wind energy became a rapidly growing field after the efforts made during the seventies in research and development for a wealth of recent studies that proved that wind energy is a practical source of electricity. The need to find an alternative to oil in the United States became urgent as a result of the fuel shock in the 1970s, to the point of enacting an energy law that came under the name PURPA (Public Utility Regulatory Policies) and since 2010, the states have implemented their wind energy plans by setting specifications for the purchase of renewable energy, and on top of these States: *California, Iowa and Texas*. The United Kingdom is one of the richest wind energy systems in Europe, and it has adopted wind energy subsidies to fight climate change and achieve energy independence under the National Fossil Fuel Obligation plan, in addition to the support provided to nuclear energy under the same plan. add to that the growth of the wind energy industry in China started with the issuance of a law Comprehensive Renewable Energy in 2005 [3]. Germany also announced the independence of the Energy Authority for Wind Energy Development in the late 1980s to promote renewable energy projects, and the Indian Renewable Energy Market was distinguished by a unique advantage which is to support both the private and public sector of the Ministry of Renewable Energy in the late 1990s, which prompted the new and renewable energy market to grow, India also worked to establish wind energy plants, and in some Arab countries² there are factories to produce solar water heating systems [4].

It must note that besides the use of oil in power generation, it is used as a raw material in industry such as petrochemicals, and this use (industry) will not be affected by the competition of renewable energy.

2. The Research Problem and Aim

2.1. Research Problem

The researcher noted that the demand for renewable energy to generate energy increased, especially during the period from 1990 to 2018 as the proportion of the contribution of renewable energy to power generation ranged between 15% in 1990 until it reached 23% in 2018, and at the same time it was observed that the rate of energy generation of the oil for the same period shrank from 13% in 1990 to 3% in 2018, and sales of OPEC countries ranged between 8.75 in 1990 to \$ 8.24 billion in 2018 *according to the International Energy*

Agency data, [5] despite the population increase that it occurred to the world population during the period, which the researcher was called to study the economic impact of increasing dependence For international renewable energy in power generation to OPEC.

2.2. Research Aim

Research aims to reach the extent of the impact of increased international dependence on renewable energy on the revenues of the Petroleum Exporting Countries (OPEC).

3. Literature Review

The study of *Geoffrey Heal and Hallmeyer* [6] concluded that low oil prices may help slow the growth of the renewable energy market, a small portion of oil is used to generate energy in the United States & the world, the study confirms that oil will not compete with renewables in generating Electrical energy, and for oil-fired power plants to be able to compete with renewable energy, oil prices must drop to low levels - about \$ 15 a barrel, according to the study - a price level at which most oil producers lose their money. As a study titled, do renewables affect the strategic behavior of OPEC conducted by *Labiba Islam Anika & others* [7] explained, how increased use of renewable energy in power generation has affected the strategies of oil-exporting countries, the structure of the oil market and focus has been on two strategies for OPEC countries. The first strategy was to increase the share of oil supplied by OPEC, thereby reducing the price of oil, while the second strategy was to allow high-cost competitors to remain in the market and the result of the study was that when efficient members who are non OPEC members are more attractive to OPEC when they are not high in renewable energy production, consumers view both commodities as homogeneous products, in addition to that the pressure strategy stimulates more renewable energy production when the cost is low, and finally if non-OPEC countries can influence the price, the pressure strategy arises in light of Less demanding conditions when renewable energy is present. Another study by *Troster, Victor and others* [8] concluded that, the study has a causal relationship between renewable energy consumption, oil prices, and economic activity in USA from June 1989 to July 2016. The study found that there is a two-way causality between changes in renewable energy consumption and economic growth at the lowest quantities for distribution. The study also found that negative shocks in oil prices affect the consumption of renewable energy resources. The study also recommended the need to support policies that assist renewable energy companies only during periods of negative shocks to oil prices. Finally *Pinar Deniz 2019* [9] presented a study entitled Oil prices and renewable energy dependent countries. The study concluded that high oil prices may lead to a reduction in demand for it and the trend towards generating energy from renewable energy, which leads to shock events for oil-exporting countries. Oil affected positively on oil-importing countries while affected negatively on the oil-exporting countries, as the study also

¹ Intergovernmental Panel on Climate Change IPCC.

² United Arab Emirates, Syria, Lebanon, Palestine, Jordan, and Egypt.

showed that the oil-exporting countries have no intention of converting to dependence on renewable energy because the transition to renewable energy is very expensive even if the oil reserves of these countries have diminished. *While the researcher is trying to measure the effect on the Petroleum Exporting Countries to expand the use of renewable energy in power generation.*

4. Research Hypothesis and Methodology

4.1. Research Hypothesis

The importance of research came in that it searches on a subject that scientific studies are less in the field of renewable energy, especially when it is linked to oil, as it is a topic that concerns all countries of the world due to the importance of energy to industrialized energy-importing countries and non-industrialized producing and exporting oil. In addition to the importance of this issue in particular for OPEC countries, especially those that depend on oil as a primary source of national income, with a decrease in the relative importance of the rest of the income sources compared to the income flowing from oil, at a time when dependence on renewable energy sources in energy generation is increasing year after year, and that in most countries of the world. The research is interested in studying the impact of increased dependence on renewable energy in power generation on OPEC countries from 1990 to 2018.

4.2. Research Methodology

The research assumes that the increasing international dependence on renewable energy sources will negatively affect the oil revenues of OPEC countries and limit the global demand for oil to generate energy in exchange for increased dependence on renewable energy, which reduces oil revenues for OPEC countries, which makes the oil-dependent countries that depend on oil As a basic source of income in a predicament, unless OPEC remedy it and develop its sources of renewable energy. The multiple regression model was relied upon to reach the variable that most influences the revenues of OPEC countries according to the World Bank [10], [11] data³, and also to reach the ratio of the impact of renewable energy use in power generation on the revenues of OPEC countries, where it was assumed that the variable Y , the dependent variable in the equation, expresses the revenue of an organization OPEC as a percentage of the gross domestic product, as the independent variables were expressed in each of ($X1$: the global average oil price in US dollars⁴ $X2$: the contribution of renewable energy to energy generation% on

the world level, $X3$: OPEC sales of crude oil - billion barrel Annually and finally the annual contribution of petroleum to power generation is $X4$ % globally⁵).

5. Analysis of Model Variables

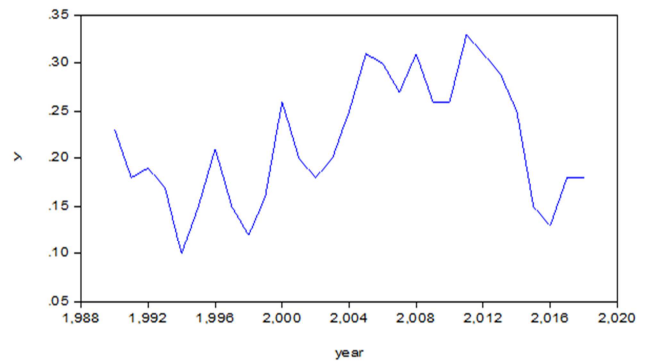


Figure 1. Revenue growth of OPEC countries as a percentage of the organization's GDP, based on World Bank data.

Notice that, The revenue of OPEC countries represented about 23% of the total GDP of the OPEC countries in 1990, then the percentage decreased in 1991 to only 18%, then the percentage decreased to 15% in 1995 and 1997, while this percentage increased to 25% in 2004 and then to 31% In 2005, then it fell to its lowest level in 2016 to 13%, then 18% in 2017.⁶

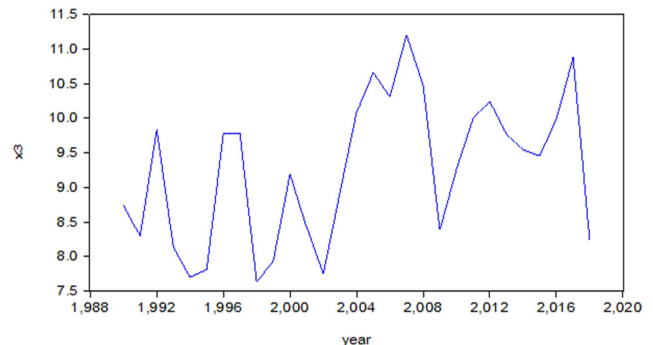


Figure 2. OPEC sales of crude oil have evolved throughout the study period from 1990 to 2018, based on World Bank data.

While Sales of OPEC countries ranged between 8.75 billion barrels per year of crude oil in 1990 to 8.30 billion in 1991, then to 9.20 in 2000 and then to 10.09 in 2004, then sales decreased in 2009 to 8.39. Then, OPEC sales increased in 2011 to 10 billion barrels, then 10.25 in 2012, and then OPEC sales ranged from 2013 to 2016 to less than 10 billion barrels. While sales increased in 2017 to 10.89 billion barrels, we find that sales decreased in 2018 to 8.24 billion barrels.

3 The revenues of each OPEC country were obtained from oil, then the researcher collected them, so we obtained the revenues of the OPEC countries from the oil, then the researcher obtained the gross domestic product of each OPEC country in dollars based on the data of the World Bank, then the researcher obtained the revenues As a percentage of the GDP of OPEC countries as a dependent variable.

4

<https://www.statista.com/statistics/262858/change-in-opeccrude-oil-prices-since-1960>.

5 Based on IEA data, Average annual OPEC crude oil price from 1960 to 2019.

6 It was taken into consideration that the country of Indonesia was a member of OPEC until 2008, and the country of Gabon was a member until 1994, the global demand for oil and renewable energy in power generation.

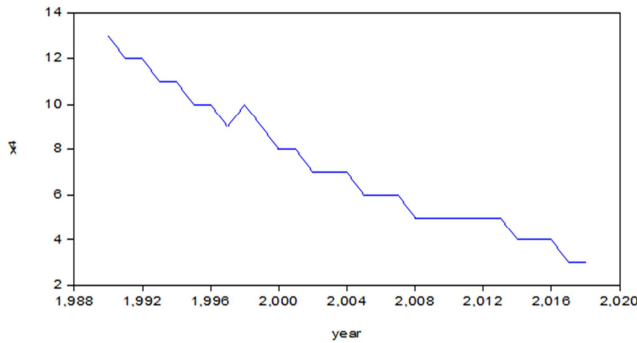


Figure 3. The contribution of oil to energy generation is% globally, based on data from the International Energy Agency.

While we find that the rate of petroleum contribution to power generation worldwide is declining, as it recorded 13% in 1990 and 12% in 1991 and then reached 9% in 1997, and continued to decline as the relative importance of oil in power generation decreased until it reached 8% in 2000, 2001. Then it represented 7% in the years 2002 and 2004, and it was only 6% in 2005 and 2006, finally the percentage reached only 3% in 2018.

6. Renewable Energy

6.1. Definition of Renewable Energy

Specialists have defined renewable energy as the kind of energy that can be obtained from a natural resource characterized by continuity, inexhaustibility, and its use requires converting it from natural energy into energy that can be used easily through technological progress. The IEA definition of renewable energy has defined it as energy that can be obtained from energy sources resulting from automatic nature such as sunlight and wind, which are renewed in nature with a higher degree of consumption [5]. as defined by the United Nations Environment Program (UNEP) as energy with a variable source or sources and its source is not fixed and limited, but it is renewed periodically and its forms are sunlight, wind, biomass, hydroelectric energy, Underground energy and tidal energy [12].

6.2. Characteristics of Renewable Energy

Renewable energy is distinguished by several characteristics that distinguish it from other traditional energy sources such that it is often available in most of the countries of the world, and it cannot be transported in its raw form and can be exported after its manufacture, it is also characterized as clean and works to help in reducing environmental pollution, as it is renewable and not capable depletion, as it faced the problem of the lack of required technology in the past, which is now available, but it could be found in developing countries, which can achieve economic development [13].

6.3. Types of Renewable Energy

There are many types of renewable energy, including solar

energy, as the sun is the main source of energy on the planet and therefore it is the mother of energies, and there are multiple areas of solar energy use in addition to its traditional uses, it is used in desalination of sea water, generating electricity thermally [14].

6.3.1. Wind Energy

There is Wind Energy, which is the energy that can be obtained from the wind. It can be used to produce electricity through wind turbines, or to obtain mechanical energy through windmills, and to pump water through wind pumps. There are also European countries that depend to a notable degree on Wind energy, for example, Denmark gets about 15% of its electrical energy from wind turbines, and in parts of Germany about 75% of its electrical energy is generated from the wind. [15].

6.3.2. Hydropower Energy

As for hydropower, it is energy that can be obtained from the continuous movement of water. Hydropower is characterized as clean, its most important costs are almost exclusively limited to building dams and reservoirs and the costs of periodic maintenance.

6.3.3. Ground Energy

As for the ground energy, it is the energy of the Earth's heat, where some areas of cracks and ground cracks are exploited, and that groundwater leaks through to great depths, so that it reaches areas of high heat and stimulates energy that can be used, and some scientists believe that it is sufficient to generate huge amounts of electricity in the future. Some specialists expect that the geothermal energy is a primary source of renewable energy for about 58 countries, 39 of which can be 100% fully supplied [16].

6.3.4. Hydrogen Energy

In addition to the existence of another type of renewable energy called hydrogen energy, it was called Jules Verne⁷ in his book "The Mysterious Island" which was published in 1874 (*Coal of the Future*). Many countries of the world have used hydrogen in various applications, and research is still practicing its role to improve their economies, to compete with traditional engines [17].

In 2005, US President George W. Bush allocated more than \$ 1 billion to support hydrogen research in the manufacture of fuel cell vehicles by the end of 2020 [18].

6.3.5. Nuclear Energy

The nuclear energy and the resulting water vapor, which is used in the production of electricity, are among the most important types of renewable energy that have received great attention worldwide and can be generated by controlling fission or nuclear fusion reactions, [19].

6.3.6. Tidal Energy

Finally, there is tidal energy that is considered a mechanical

7 A French writer born on February 8, 1828 in Nantes, France, and considered one of the pioneers in the field of science fiction, he died on March 24, 1905.

energy source, this energy is created by gravitation between the Earth and the Moon, it strengthens the effect of gravitational forces in the region on which the moon is perpendicular to the surface of the Earth, and tidal energy is used to Generating electricity by building a dam at the entrance to the bay, which has a great difference in the water level between the tides and electricity generation turbines are placed at the gate of this dam⁸.

7. Econometrics Model

The renewable energy contributed to generating energy worldwide at increasing rates during the study period, where the ratio in 1990 was about 15%, and this percentage remained in the years 1991, 1992, 1993, then the contribution rate increased between the years 1994 to 2000 to 16% and then increased in The years 2009 and 2010 amounted to 17%, then 20% in 2014, then 22% in 2017 and finally 23% in 2018. This is in addition to the fact that the share of renewable energy in generating electricity in particular is progressing significantly, and there are some examples that illustrate this. For example, Denmark ratio Electricity production from renewable energy in 2010 was about 32% and targeted 100% by 2050, and Turkey targeted 30% before 2030 after it was in 2010 26%, and France aims to reach 27% after it was 15% in 2010, just as Algeria targeted 20% in 2030 after the rate in 2010 was only 0.4% [20].

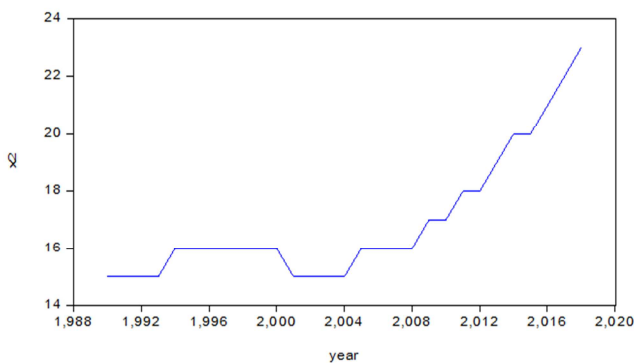


Figure 4. Contribution of renewable energy to power generation% worldwide (International Energy Agency).

All variables $Y, X1, X2, X3, X4$ were entered on *EViews*, using *STEPWISE* and *unit root test Augmented Dickey-Fuller Test Equation* and *Phillips-Peron test statistic* on them, all were unstable at the level and stable at the first difference. To accommodate these variables, the *natural logarithm of LN* was used for these variables. By entering all the study variables, which are $LN(x4), LN(x3),$ and $LN(x2)$ ($LN(x1)$) ($LN(y)$) on *e-views*, the variables ($LN(x3)$ and $LN(x4)$) was insignificant and the result was as follows:

$$N(y) = 1.392515 + 0.498501 \ln(x1) - 1.691332 \ln(x2) \quad (1)$$

8 Countries that benefit from this energy (tidal energy) Argentina, Australia, Canada, India, South Korea, Mexico, Britain, America, Russia, South Africa, New Zealand.

$$\ln(y) = -0.127003 + 0.037098 \ln(x3) \quad (2)$$

Where, $X1$ was entered, the *correlation coefficient* was 72%, the *coefficient of determination* was 52%, and with the addition of $X2$ the *coefficient of determination* reached approximately 82%, meaning that $X2$ the proportion of renewable energy impact on OPEC revenues was 30%, and that 1.392515 expresses the independent part, 0.498501 expresses a coefficient Regression $N(Y)$ on $LN(X1)$, -1.691332 the regression coefficient of $N(Y)$ on $LN(X2)$. It is noted that both $LN(X1)$ and $LN(X2)$ are *significant* at a level close to zero, the *coefficient of determination* = 0.819929, that is, 82% of the changes that occur in oil revenues in OPEC countries are caused by the price of the global barrel in dollars and the contribution of renewable energy, linear correlation coefficient Multivariate = 91%. It is noted that the model does not suffer from the problem of self-correlation using the *Breusch-Godfrey Serial Correlation LM Test*, and the model does not suffer from the problem of lack of stability contrast using the *Breusch-Godfrey Serial Correlation LM Test*, and that the differences follow the normal distribution using the *histogram normality test*.

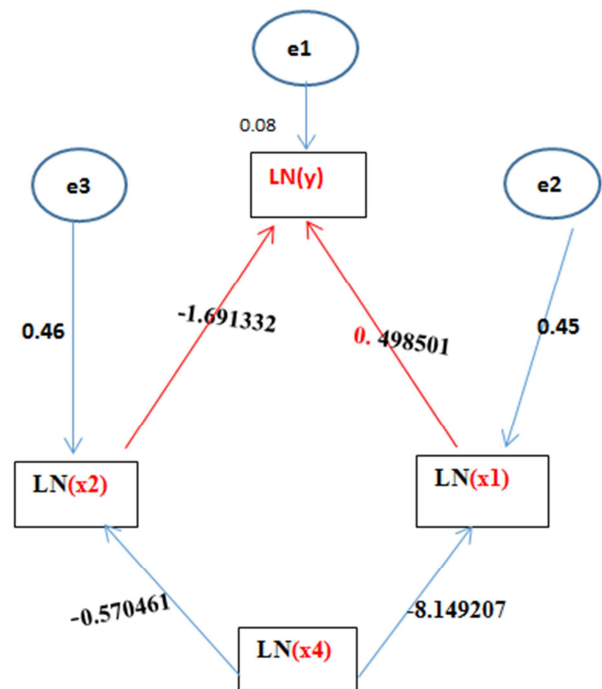


Figure 5. Note that $LN(X1)$ and $LN(X2)$ are significant at a level close to zero, limiting factor = 0.8199.

It is noted that the model does not suffer from the problem of self-association using the *Breusch-Godfrey Serial Correlation LM Test*. Also, the relationship between the dependent variable OPEC revenue and the independent variable, $X3$ OPEC sales of crude oil is a fundamental relationship and the *determination coefficient* is 35% as a simple linear regression and a slope of its capacity 04%.

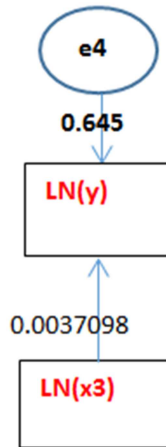


Figure 6. Correlation of 60.5%.

It was also found that there is a correlation of 60.5%

substantial correlation between oil sales revenue as a percentage of the output and the amount of oil sales per barrel, there is a correlative correlation 74% between oil sales revenue as a percentage of the output price of a barrel of oil in dollars, oil sales per barrel, there is a reverse correlation Intrinsic 39.8-% between the revenues of oil sales as a percentage of the output and the contribution of oil percent to energy production due to the low contribution of oil to energy production, there is a fundamental inverse correlation -73.6% between the contribution of renewable energy as a percentage in energy production and the contribution of oil to energy production due to increase dependence on renewable energy and a lack of dependence on oil, there is a substantial correlation extrusive 50.5% between the contribution of renewable energy as a percent in the production price of a barrel of oil means that increasing prices of oil barrel increases the demand for renewable energy.

Table 1. Results

Dependent Variable: Y				
Method: Least Squares				
Date: 03/03/20 Time: 20: 10				
Sample: 1990 2018				
Included observations: 29				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.392515	0.647172	2.151693	0.0409
X1	0.498501	0.045852	10.87205	0.0000
X2	-1.691332	0.257646	-6.564555	0.0000
R-squared	0.819929	Mean dependent var		-1.576389
Adjusted R-squared	0.806077	S. D. dependent var		0.317036
S. E. of regression	0.139612	Akaike info criterion		-1.002204
Sum squared resid	0.506778	Schwarz criterion		-0.860760
Log likelihood	17.53196	Hannan-Quinn criter.		-0.957905
F-statistic	59.19378	Durbin-Watson stat		1.799293
Prob (F-statistic)	0.000000			

Table 2. Breusch-Godfrey Serial Correlation LM Test.

Breusch-Godfrey Serial Correlation LM Test:				
F-statistic	0.110191	Prob. F (1, 25)		0.7427
Obs*R-squared	0.127260	Prob. Chi-Square (1)		0.7213
Test Equation:				
Dependent Variable: RESID				
Method: Least Squares				
Date: 03/03/20 Time: 20: 12				
Sample: 1990 2018				
Included observations: 29				
Presample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.029945	0.664689	-0.045052	0.9644
X1	-0.000403	0.046673	-0.008642	0.9932
X2	0.011197	0.264332	0.042358	0.9665
RESID (-1)	0.067336	0.202850	0.331950	0.7427
R-squared	0.004388	Mean dependent var		-8.76E-17
Adjusted R-squared	-0.115085	S. D. dependent var		0.134533
S. E. of regression	0.142064	Akaike info criterion		-0.937636
Sum squared resid	0.504554	Schwarz criterion		-0.749044
Log likelihood	17.59573	Hannan-Quinn criter.		-0.878572
F-statistic	0.036730	Durbin-Watson stat		1.868836
Prob (F-statistic)	0.990346			

Table 3. Heteroskedasticity Test: White.

Heteroskedasticity Test: White				
F-statistic	0.925565	Prob. F (5, 23)		0.4825
Obs*R-squared	4.857672	Prob. Chi-Square (5)		0.4335
Scaled explained SS	5.657375	Prob. Chi-Square (5)		0.3410
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 03/03/20 Time: 20: 16				
Sample: 1990 2018				
Included observations: 29				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.747507	4.603261	-1.248573	0.2244
X1^2	-0.008609	0.023935	-0.359666	0.7224
X1*X2	-0.102017	0.187114	-0.545213	0.5909
X1	0.329294	0.428024	0.769335	0.4495
X2^2	-0.537073	0.646318	-0.830973	0.4145
X2	3.551422	3.346096	1.061363	0.2995
R-squared	0.167506	Mean dependent var		0.017475
Adjusted R-squared	-0.013471	S. D. dependent var		0.030274
S. E. of regression	0.030477	Akaike info criterion		-3.961668
Sum squared resid	0.021364	Schwarz criterion		-3.678779
Log likelihood	63.44418	Hannan-Quinn criter.		-3.873071
F-statistic	0.925565	Durbin-Watson stat		2.680638
Prob (F-statistic)	0.482455			

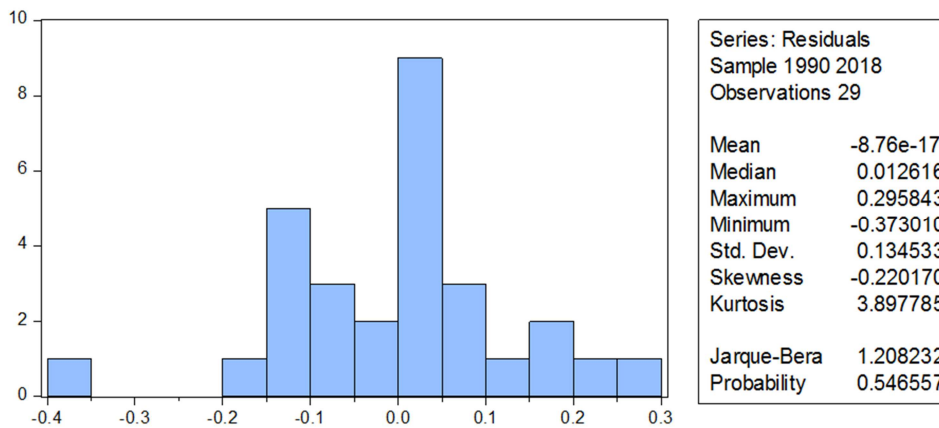


Figure 7. Series Residuals.

Table 4. Stepwise.

Variables Entered/Removed ^a			
Model	Variables Entered	Variables Removed	Method
1	The price of a barrel of oil in dollars	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
2	Renewable energy contribution%	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).

a. Dependent Variable: Oil revenues are% of output.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.722 ^a	.521	.504	.097
2	.905 ^b	.820	.806	.061

a. Predictors: (Constant), The price of a barrel of oil in dollars.

b. Predictors: (Constant), Renewable energy contribution%.

Table 5. Correlations.

Correlations		Oil revenues are% of output	Barrel oil sales	Renewable energy contribution%	Petroleum contribution%	The price of a barrel of oil in dollars
Oil revenues% of output	Pearson Correlation	1	.605**	-.045-	-.398-*	.739**
	Sig. (2-tailed)		.001	.815	.032	.000
	N	29	29	29	29	29
oil sales- Barrel	Pearson Correlation	.605**	1	.242	-.480-**	.539**
	Sig. (2-tailed)	.001		.207	.008	.003
	N	29	29	29	29	29
Renewable energy contribution%	Pearson Correlation	-.045-	.242	1	-.736-**	.505**
	Sig. (2-tailed)	.815	.207		.000	.005
	N	29	29	29	29	29
Petroleum contribution%	Pearson Correlation	-.398-*	-.480-**	-.736-**	1	-.745-**
	Sig. (2-tailed)	.032	.008	.000		.000
	N	29	29	29	29	29
The price of a barrel of oil in dollars	Pearson Correlation	.739**	.539**	.505**	-.745-**	1
	Sig. (2-tailed)	.000	.003	.005	.000	
	N	29	29	29	29	29

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

8. Results and Recommendations

8.1. Results

The research conclude that increased international dependence on renewable energy sources will negatively affect oil revenues for OPEC countries and limit global demand for oil to generate energy in exchange for increased dependence on renewable energy, which reduces oil revenues for OPEC countries, and 52% of the changes that occur in oil revenues in OPEC countries are caused by the price of the global barrel in dollars and 30% by the contribution of renewable energy, as the research also concluded that there is a fundamental inverse correlation relationship -73.6% between the contribution of renewable energy As a percent in Energy production and the contribution of oil to energy production is due to the increased dependence on renewable energy and the lack of dependence on oil. There is a fundamental direct correlation of 50.5% between the contributions of renewable energy as a percentage in the production of the price of a barrel of oil, which means that with an increase in the price of a barrel of oil, the demand for renewable energy increases.

8.2. Recommendations

Accordingly, the research recommends that OPEC countries should strive not to rely entirely on oil as a main source of income due to the availability of an alternative from renewable energy in the near future as a source of energy generation, as there has become a need for diversification of income sources for OPEC countries, and the promise of full dependence on one source of income, especially Leading countries in oil, such as Saudi Arabia, as the most important producing country and holder of huge oil reserves, the need to discover and exploit OPEC countries for their renewable energy sources, especially solar energy that many OPEC countries like the Gulf countries enjoy, and wind energy available especially to many European countries.

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